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BACPAR Oral Abstracts

BO1

Rehabilitation services for non-ambulatory vascular amputees and Covid-19: a scoping survey of UK practice (part 2)

Miss Amirah Essop-adam[1,2,3], Professor Sally Singh[1,3], Dr Victoria Haunton[1], Miss Tanya Payne[1,3], Professor Rob Sayers[1,2,3]

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Introduction

It is unclear what type of rehabilitation services and interventions are being provided to vascular amputees in the UK and how Covid-19 has affected this.

Methods

An anonymised scoping survey (17 questions) was produced and piloted to convenience sample of researchers and health care professionals (HCP). Ethical approval was obtained. The survey was published via onlinesurveys.ac.uk and distributed via email networks, Twitter, British Association of Charted Physiotherapists in Amputee Rehabilitation and British Association of Orthotists and Prosthetists. Data collected were non-identifiable.

Results

46.4% of 125 respondents delivered rehabilitation interventions to non-ambulatory amputees. Wheelchair rehabilitation [76.8%]; general rehabilitation [73.9%], specialist amputee rehabilitation [59.4%] was provided by most HCPs. Prehabilitation interventions pre-amputation were uncommon [33.3%]. Rehabilitation interventions delivered include transfer practice [85.5%], wheelchair training [69.6%]; strength training upper limb [66.6%] and lower limb [62.3%]; functional rehabilitation of upper limb [59.4%] and lower limb [60.9%]; emotional support [60.8%]; few provided group exercise therapy [23.2%].

Covid-19 affected most respondents' clinical practice [86.4%] through redeployment of staff [59.2%], delayed treatment [52.8%], longer waiting lists [48%], change to telephone follow up appointments [43.2%].

Conclusion

Rehabilitation services for non-ambulatory vascular amputees vary widely across the UK and Covid-19 has had an impact on their clinical treatment.

BO2

Can a modified BLARt be used to predict discharge destination and hospital length of stay for patients who have undergone a major amputation?

Miss Elizabeth Bouch[1]
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Background
The BLARt is a preoperative scoring tool that predicts the probability of walking with a prosthetic limb after a major amputation. With increasing pressures for discharges following surgery within the acute setting a method of predicting a discharge destination could facilitate earlier discharges or transfer of care.

Aim
To modify the BLARt score to predict LOS and potential discharge destinations.

Method
Data was collected and analysed for 104 patients over a 18 month period. Additional questions were added onto the original BLARt score to incorporate functional ability, home set up and support already in place.

Results
55 patients scored 17 or less on the modified BLARt and had a median LOS of 14 days. The most common discharge destination for this patient group was home (76%). 42 patients scored between 18 and 24 with a median LOS of 22 days with 43% returning home and 26% going to inpatient rehabilitation. 7 patients scored over 25 with a median LOS of 23 days with 57% being discharged to 24 hour care.

Discussion and Conclusion
This tool has potential to be used in the acute setting to help aid early identification and referral of patients who require further rehabilitation.

BO3

Can a physiotherapist-led walking behaviour change programme be delivered as intended? Findings from a nested fidelity evaluation within the MOSAIC randomised controlled trial

Professor Lindsay Bearne[1,2], Dr Brittannia Volkmer[1], Dr Aliya Amirova[1], Ms Sophie Quirke-McFarlane[1], Professor Janet Peacock[1,3], Dr Melissa Galea Holmes[1,4], Mr Graham Fisher[1], Professor Bijan Modarai[1,6], Professor Catherine Sackley[1,5], Professor John Weinman[1], Dr Julie Bieles[1]

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Introduction

MOtivating Structured walking Activity for Intermittent Claudication (MOSAIC) is a physiotherapist-led, walking behaviour change programme (two face-to-face and two telephone sessions over three-months). This study assessed the fidelity of delivery of MOSAIC within a randomised controlled efficacy trial.

Methods

A random sample of 62 audio-recorded MOSAIC sessions were rated by two independent assessors.
A bespoke checklist was used to assess the extent to which mandatory components and Behaviour Change Techniques (BCTs) were delivered. High fidelity was achieved if ≥80% of mandatory components and BCTs/session were rated as fully/partially delivered.
Randomly selected 20-minute segments of the audio-recordings were rated for technical and relational proficiency of motivational interviewing (MI) using the Motivational Interviewing Treatment Integrity Scale.

Results

Fifteen physiotherapists delivered MOSAIC with high fidelity in 79% of sessions. High fidelity was achieved in both face-to-face sessions (session 1: 100%; session 2: 88%) but neither telephone sessions (session 3: 67%; session 4: 54%). Physiotherapists delivered MOSAIC with fair MI technical proficiency in all sessions and fair MI relational proficiency in both face-to-face sessions but neither telephone sessions (Table 1).

Conclusion

MOSAIC is an efficacious, walking behaviour change intervention that can be delivered with high fidelity in face-to-face but not telephone sessions.

BO4

Physical Performance Based Outcome Measures (PerBOMs) in vascular amputees: a scoping survey of UK practice (part 1)

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Introduction

Currently it is unknown whether PerBOMs are used in clinical practice and their usefulness for healthcare professionals (HCPs).

Methods

An anonymised scoping survey consisting (17 questions) was produced and piloted to convenience sample of researchers and HCPs. Ethical approval was obtained. The survey was published via onlinesurveys.ac.uk and distributed via email networks, Twitter, British Association of Charted Physiotherapists in Amputee Rehabilitation and British Association of Orthotists and Prosthetists. Data collected were non-identifiable.

Results

Total of 125 responded [clinical specialist physiotherapists 31.2%; physiotherapists 18.4%; vascular consultants 8%]. Over half had ≥10 years-experience working with vascular amputees [51.2%]. Timed up and go was the most used Ambulatory PerBOMs by HCPS [89%]. Non-ambulatory PerBOMS included Basic Ambulatory Mobility Scale (BAMS) [45% used, 39% aware but not using]; One Leg Balance Test [34% used, 50% aware but not using]; Transfemoral Fitting Predictor [39% used, 25% aware but not using] and Amputee Mobility Predictor no Prosthesis [13% used, 51% aware but not using]. Most respondents used PerBOMs to assess function, prove clinical effectiveness and monitor progression. PerBOMs were least used pre-amputation [15.2%] and greatest 6 months post-amputation [59.4%].

Conclusion

Ambulatory PerBOMs are well known and used more frequently than non-ambulatory PerBOMs for vascular amputees.

SVN Oral Abstracts

NO1

Setting up a new Vascular HOT clinic during COVID pandemic

Miss Sophie Harris[1]
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Introduction
Hot Clinic (HC) is an ambulatory service for management of urgent patients and is especially vital in the current Covid -19 pandemic, avoiding unnecessary admissions. The aim of introducing the one-stop Vascular HC was to review urgent patients in an efficient time frame to expedite management, reducing burden on A/E and admissions to hospital.

Methods
The quality improvement project (QI) conducted as part of a dissertation for MSc - Surgical Care Practice, was introduced in January 2021. MDT approach for this consultant-led service is recorded on a prospectively maintained database, audited against Peripheral Arterial Disease – QI Framework (PAD-QIF) and GIRFT recommendations for carotid interventions.

Results
177 patients were reviewed within 2 days of referral (median, range 0-12) till date with only 33 (19%) requiring admission. 27/88 patient with critical limb ischemia required direct admission with the rest being managed more electively. 16/27 admitted that required intervention were treated within 3 days (median, range 1-13). 18/29 urgent carotid referrals seen were suitable for intervention, had surgery within 7 days (median, range 1-43).

Conclusion
Vascular HC facilitates urgent review and subsequent intervention whilst avoiding unnecessary admissions. The times to intervention in line with the PAD-QIF and GIRFT recommendations.

NO2

Vascular nurse-facilitated “selective” care of elderly (CoE) input on vascular ward

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Introduction
The role of CoE input in the care of surgical and vascular patients is well established. However, the demand for the service is continuously increasing with limited resources.
We piloted a model of “selective” input into the highest risk group of vascular patients facilitated by vascular nurse specialist (VN)

Methods
Prospective cohort study of “selective” CoE input for vascular inpatients (n=124) in a regional vascular centre over 12 month period. A retrospective control (n=50) was generated from earlier audit.
CoE input was provided through two sessions per week. Patients were “selected” during routine ward round and VN facilitated CoE review and cross-team communication.
Data collected for comorbidities, number and type of interventions, length of stay (LoS) and delayed discharge.

Results
The “selective” CoE review patients were older (77y vs 70y p=0.01). There was no significant difference between the two groups in the number of comorbidities, interventions or amputations.
The mean LoS after medically fit for discharge was significantly reduced from 9 to 6.2 days (p=0.01)

Conclusion
The selective input from CoE team targets the highest risk group for optimisation. It had a positive impact on the overall care with a reduction in referrals to other specialties and reduced LoS.

NO3

EVAR Follow up and complications – A single-Centre 10 year follow up study

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Background

EVAR is considered as treatment of choice in AAA repair. EVAR has short- term survival benefit compared with open repair but risk of graft failure mandate lifelong follow-up. Few follow up studies describe all EVAR complications. The purpose of this study was to describe the incidence and outcome of complications visible on CT and US scan surveillance over 10-years.

Method

Patients with AAA; underwent EVAR from Oct 2009 till Oct 2019 at RSH, UK were included in this study. 279 patients met eligibility criteria. Aneurysm characteristics, follow-up, and secondary intervention data accumulated from medical records . Follow up CT and US were discussed in MDT.

Results

89 (31%) graft related endo-leaks were identified. Main complication was type II endo leak, other complications were graft stenosis /occlusion, type III and type I endo- leaks. 56 complications required intervention; out of which 39 were treated with endo-vascular procedures (graft extension, relining of limb, embolectomy, embolization, angioplasty) and 17 with surgical procedure (fem-fem cross over, Amputation, graft infection/removal). Over all 13.9 % of patient needed reintervention.

Conclusion

Many patients treated with EVAR had a radiological visible complication during initial stages of follow up. Complications requiring reintervention were not associated to increased mortality.

NO4

Increasing patients' awareness of their own health: Experiences of participating in follow-up Programs after surgical treatment for intermittent claudication

Tuong-Vi LE-MAGOWAN[1]
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Introduction
People with claudication have an added risk of cardiocerebrovascular events, amputation, and death. It is known than secondary prevention (best medical treatment and changes in lifestyles) can lower this risk, but secondary prevention requires engagement, participation, and adherence from the patient.

Aim
To explore patients' experiences of participating in a 1-year multicenter clinical trial, evaluating a nurse-led, patient-centered health-promoting programme after surgical treatment for claudication, the FASTIC study (1).

Methods
A descriptive design with qualitative semi-structured interviews was used. The study was conducted at the two centers for vascular surgery in the region of Stockholm, Sweden. In all, 17 patients who had completed the FASTIC study participated. Data was analyzed using qualitative content analysis.

Results
Two main categories were identified, 'Patient-Professional collaboration' and 'Experience of one´s health', which were associated with four subcategories: facing opportunities and obstacles, cooperating based on the illness experience, increasing awareness of one's own health, and maintaining a healthy lifestyle.

Conclusions
Patients' participation in follow-up programs after surgical treatment for claudication is highly valuable for an increased awareness of one's own health. A Person-centered care with patient-professional collaboration is experienced as important for maintaining a health-promoting lifestyle.

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SVT Oral Abstracts

TO1

The clinical efficacy of vascular ultrasound screening prior to kidney transplantation.

Mr Louis Alexander[1]
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Despite advances in surgical techniques, immunotherapies, and technology, catastrophic vascular associated complications continue to ensue with kidney transplantation (KTx). To reduce complications, pre-operative vascular screening of the carotid and iliac arteries has become routine practice. With an expected rise in demand and a post-pandemic accumulation of vascular scan requests, it is crucial that we maintain efficiency, safeguard patient safety and avoid unnecessary testing.

Pre-KTx vascular screening can be labour-intensive, time-consuming and distressing for patients. Furthermore, there is limited information regarding the effectiveness of vascular screening for KTx candidates. More information is needed to determine if carotid/iliac screening is beneficial and an appropriate use of limited resources.

Thus, this clinical audit will review retrospective data from a pre-KTx screening programme. The audit aims to identify the prevalence of carotid and iliac arterial disease in KTx candidates and determine if scan results had influenced patient outcomes. Audit findings will be used to aid vascular scientists with improving local scanning protocols.

TO2

Understanding the impact and associations of Health Literacy with outcomes for Chronic Limb-threatening Ischaemia (CLTI); The HeaLTHI study

Miss Chloe Bishop[1,2], Miss Rachel Bell[1], Professor Gill Rowlands[3], Mr Sandip Nandhra[1,3]
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Introduction
Health literacy (HL) is the ability to obtain, process and understand health information needed to make health-related decisions. Some healthcare settings have established that inadequate HL is associated with adverse health outcomes. Research suggests that 76.7% of vascular patients have inadequate health literacy. This is concerning given that chronic limb threatening ischaemia (CLTI) can lead to limb-loss. The HeaLTHI study aims to assess the effect of health literacy on CLTI post-intervention outcomes.

Methods
HeaLTHI is a HRA approved (REC:21/NI/0092) retrospective cross-sectional study evaluating the Health Literacy (by a validated 12-item HLS-EU-Q12 Questionnaire) of 100 participants at 1-year post-surgical intervention for CLTI. Associations with baseline demographics, socio-economic status (using indices of multiple deprivation, IMD), clinical complications, survival and re-interventions will be examined.

Results
HRA and REC have been granted and data collection is underway. The results are anticipated in advance of the VSGBI ASM.

Conclusion
This study will evaluate the current HL associations with adverse outcome. Given that HL is potentially modifiable, it is hoped that the HeaLTHI study will drive improvements in a shared patient and clinician priority area.

TO3

A prospective evaluation of the current diagnostic pathway for patients with suspected giant cell arteritis

Miss Sophie Bowen[1]

[1]*University Hospitals Bristol and Weston, Bristol, United Kingdom*

Early diagnosis improves prognosis of patients with giant cell arteritis (GCA) and prevents ischemic complications including blindness. Recent updates to GCA diagnostic guidelines recommend performing a temporal artery ultrasound scan within a fast-track setting. Many research studies have demonstrated the successful implementation of fast-track clinics where clinician assessment and diagnostic tests occur on the day of initial presentation. This style of service is not currently operating at our trust, therefore current patient pathways need to be evaluated.

This study will be a prospective service evaluation composed of two parts; an audit of local adherence to current recommendations and a questionnaire for referring clinicians. The audit will assess the timeliness of current patient pathways including the initial assessment, treatment and ultrasound scan. This data will be collected by recording a detailed patient history before the scan. The questionnaire aims to better understand clinicians' views on the efficiency of the ultrasound service and will consist of predetermined rating scale questions relating to themes such as timeliness and communication. The scores for these questions will be combined to produce an overall clinician satisfaction score for each patient.

The findings of this study could influence local decision making regarding the diagnostic pathway for GCA.

TO4

Transthoracic ultrasound evaluation of Thoracic aortic aneurysms.

Miss Hannah Davey[1], Mr Ian Nordon[1], Dr Rob Allison[1], Mr Ben Patterson[1], Mrs Puja Patel[1]
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Introduction
Thoracic aortic aneurysms (TAA) are life threatening if they rupture but often go undetected. A pilot study found that ultrasound has potential to be used as a diagnostic modality for TAA and may have a role in surveillance in patients for whom CT scanning is contraindicated. However, further validation of this methodology is required.

Methods
There will be two different groups: 1-Patients with a known TAA and 2-Patients with no TAA but known abdominal aortic aneurysm. All patients will have had a prior CT. A vascular scientist, who will be blinded to the CT diagnosis, will perform an ultrasound assessment of the thoracic aorta and will record the maximum diameter. All measurements will be compared to the maximum diameter obtained from the most recent CT scan from the last 3 years.

Results
The sensitivity and specificity of ultrasound will be analysed using cut-off points of both 35mm and 40mm. This will be done using a Clopper-Pearson confidence interval with a 95% confidence limit.

Conclusion
If the results of this study support prior work suggesting that TAA can be accurately detected and measured by ultrasound, it could be used for those in whom CT is contraindicated and a screening programme.

TO5

A retrospective service evaluation investigating the role of carotid artery screening prior to elective cardiac surgery in reducing perioperative stroke rate.

Miss Shannon Halliwell[1]

[1]*University Hospitals Bristol And Weston, Bristol, United Kingdom*

A major complication associated with cardiac surgery is perioperative stroke; this risk is increased by carotid artery stenosis (CAS). Screening for CAS using ultrasound is used to identify patients at greater risk of perioperative stroke. However, screening all cardiac surgery patients is not realistic. The literature around the subject is conflicted, which is reflected in the lack of official national guidelines on which cardiac patients should be screened. The local protocol indicates that all cardiac surgery patients with history of peripheral arterial disease, stroke/transient ischaemic attack, carotid bruit or left main stem disease should have a carotid scan before surgery.

Using local cardiac and vascular databases, the number of perioperative strokes in cardiac surgery cases between March 2018 and March 2021 will be recorded. And any cardiac surgery patients that had a pre-op carotid scan during the same time frame will be identified and CAS severity recorded.

By retrospectively analysing the stroke rate in approximately 4000 patients that did/didn't have pre-op CAS screening, this study aims to evaluate the current service and determine whether the local protocol is effective in reducing perioperative stroke rate. Additionally, these results will be used to determine any correlation between CAS severity and perioperative stroke.

TO6

A single centre service evaluation examining the effectiveness of contrast enhanced ultrasound compared to computed tomography angiography and duplex ultrasound in the detection of endoleaks post endovascular aneurysm repair

Mr David Machin[1]

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Objectives

Endoleaks are a common complication post-endovascular aneurysm repair (EVAR) and the reference for endoleak detection is computed tomography angiography (CTA). Contrast enhanced ultrasound (CEUS) is emerging as a comparable modality with superior safety for endoleak detection and discrimination. This service evaluation aims to investigate whether CEUS is as effective at detecting endoleaks post-EVAR compared to CTA and duplex ultrasound (DUS). Secondary aims are to investigate modalities ability to discriminate endoleak-type and to examine relationships between CEUS contrast temporal delay and endoleak-type.

Methodology

Data will be collected retrospectively and include patients referred for CEUS following residual sac expansion post-EVAR. Identification of endoleak-type will be recorded from DUS, CEUS and CTA scans since service implementation in 2019. Specificity, sensitivity and predictive values will be calculated from contingency tables with post-hoc comparative analysis including sensitivity to endoleak-type. Regression analysis will compare associations between endoleak-type and contrast temporal delay.

Future implications

This study is expected to demonstrate the efficacy of CEUS compared to CTA and DUS; particularly of value in CTA contraindicated patients and undifferentiated endoleak investigations. CEUS minimises radiation and nephrotoxin exposure and may reduce trust CTA demand. Investigations of CEUS contrast delay may provide a future quantification tool for endoleak discrimination.

TO7

An evaluation of using Ankle-Brachial Pressure Index (ABPI) and Toe-Brachial Index (TBI) as a screening tool post-angioplasty.

Mrs Rebecca Nygaard[1]

[1]*Nottingham University Hospitals NHS Trust, Nottingham, UK*

ABPI is the standard non-invasive diagnostic tool for quantifying the degree of peripheral arterial disease. However, its use can be complicated in individuals with diabetes mellitus, due to medial arterial calcification. This causes arterial stiffening, meaning vessels in the ankle can be difficult to occlude, leading to falsely elevated APBIs. Utilisation of TBI enables distal foot perfusion to be assessed via the digital arteries, which rarely develop calcification.

ABPI and TBI were previously not routinely used within my department pre- and post-angioplasty. However, more requests for toe pressures have been received recently from Vascular Consultants and Registrars.

This study will be a process evaluation of a 3-month pilot service within my department, utilising ABPI and TBI pre- and post-angioplasty as an addition to duplex ultrasound. It will assess the suitability of both ABPI and TBI pre- and post-intervention to evaluate reoccurrence of stenosis, assess sensitivity of ABPI and TBI, and decide if TBI alone is appropriate to use by our vascular department to reduce unnecessary duplex scans.

TO8

A retrospective study on ultrasound velocity criteria for suspected Popliteal Artery Entrapment Syndrome (PAES)

Miss Abigail Traynor[1], Mr Joseph Shalhoub
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Introduction
PAES presents a diagnostic challenge without a current reference standard to correlate clinical suspicion with diagnostic imaging. Due to the nature of entrapment, diagnosis favours dynamic duplex ultrasound (DDUS). However, there is lack of clinical guidance regarding the role of DDUS or an 'equivocal' Peak Systolic Velocity (PSV).

Methods
An 'equivocal' PAES diagnostic criteria (PSV ≤20cm/s; DDUSpsv_{20}) was implemented from 01/01/2015. Data was retrospectively collected from 70 consecutive patients (106 Limbs; 41±15y; both sexes) who underwent DDUS for suspected PAES (01/01/2015-31/12/2020; single NHS trust). Chi-square(X^2) was performed across DDUS, imaging and surgical outcome; interpreted using Cramer's V(⌀). Using ROC analysis, the sensitivity and specificity of DDUS will be compared against dynamic-invasive angiography and surgical findings; across different PSV cut-offs.

Results
DDUSpsv_{20} displayed the greatest agreement with dynamic-invasive angiography(X^2= 51.13,Φ=0.75), followed by CT angiography(X^2= 49.76,Φ=0.74), MR angiography(X^2= 47.35,Φ=0.71) and surgical findings(X^2= 9.75,Φ=0.46). For a cut-off ≤20cm/s, Area Under Curve (AUC)=0.53 & 0.61, representing a specificity (0.20 & 0.23%) and sensitivity (0.50 & 0.32%) for dynamic-invasive angiography and surgical outcome respectively.

Conclusion
An 'equivocal' PSV criteria may facilitate triage and diagnosis of PAES, highlighting patients warranting further diagnostic investigation. However, the risk of false-positives should be considered within the clinical context.

TO9

Retrospective analysis of abdominal aortic aneurysm growth rate in patients undergoing local ultrasound surveillance

Mr Ian Hornby[1]

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Background

Abdominal aortic aneurysm (AAA) ultrasound surveillance varies between hospitals in the UK. This hospital adopts a 6-monthly surveillance-interval for 4.5cm-4.9cm AAA, which is a deviation from nationally recommended 3-monthly intervals. Assessment of AAA growth rate (GR), and the concurrent impact of AAA risk factors (RF) for growth and medications prescribed for RFs, may inform whether this change in surveillance-intervals is safe and appropriate.

Methods

This analysis was conducted retrospectively. 1312 AAA ultrasound scans from 315 patients between January 2015 and March 2020 were split into 0.5cm groups, ranging from 3.0cm-5.5cm. AAA GR was assessed with one-way ANOVA. The impact of RFs and RF medication on AAA GR were analysed using multivariate and univariate linear regression and Kruskel-Wallis tests. Patient cause of death amongst surveillance patients was recorded.

Results

AAA GR was significantly associated with increased AAA diameter ($P<0.001$). There was a significant whole-group reduction in GR from 0.29cm/year to 0.19cm/year in diabetics compared to non-diabetics ($P=0.02$), supported by univariate linear regression ($P=0.04$). Additionally, gliclazide patients had lower GR compared to patients not on the medication ($P=0.04$). One AAA-rupture occurred <5.5cm resulting in death.

Conclusions

AAA measuring 4.5cm-4.9cm had a mean GR of 0.3cm/year (± 0.18cm/year). Therefore, mean GR and variability suggest patients are unlikely to surpass surgical threshold of 5.5cm between the 6-monthly surveillance scans, supported by low rupture rates. This suggests the surveillance-interval for 4.5cm-4.9cm AAA is a safe and appropriate deviation from national guidance. Additionally, it may be pertinent to consider diabetes status when designing surveillance-intervals.

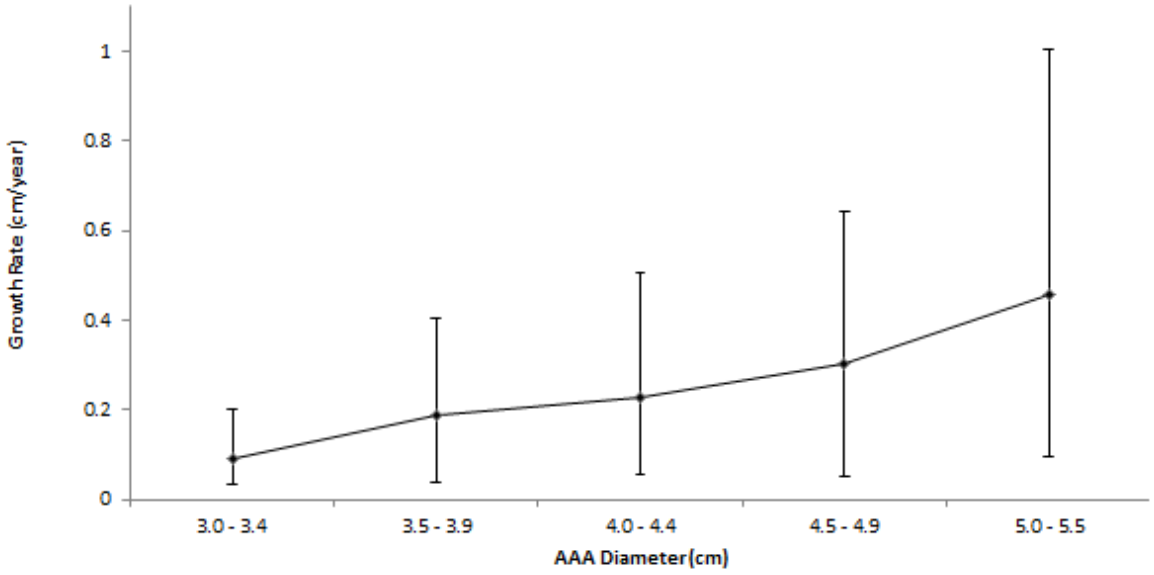

Table 1. Impact of risk factors on annual AAA growth rate. Means 95% CI

Risk Factors	Growth Rate (cm/yr)	*P* value
Age		
<70 years	0.3 [0.25, 0.34]	
70 - 79 years	0.27 [0.24, 0.29]	
80 - 89 years	0.24 [0.22, 0.25]	
>90 years	0.18 [0.14, 0.21]	>.05
Smoking status		
Current	0.23 [0.18, 0.27]	
Prior	0.26 [0.21, 0.31]	
Never	0.28 [0.21, 0.35]	>.05
Gender		
Male	0.25 [0.21, 0.28]	
Female	0.29 [0.23, 0.34]	0.02
Diabetic		
Yes	0.19 [0.14, 0.23]	
No	0.29 [0.24, 0.32]	0.009
Hypertensive		
Yes	0.25 [0.2, 0.29]	
No	0.25 [0.21, 0.28]	>0.05

TO10

Prospective evaluation of inpatient treatment for lower limb Deep Venous Thrombosis (DVT)

Miss Emily Morgan[1], Mrs Teresa Robinson, Mrs Sarah Westbury
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Introduction
Previous local audits in 2017 and 2018 have identified variability in the treatment and management of inpatient DVTs. Not all inpatients were treated with anticoagulants and the rationale behind these decisions was often poorly documented and difficult to ascertain retrospectively. Since then the Trust has issued new guidance on the treatment of inpatient DVT. This study aims to reassess the management of inpatients with DVT.

Methods
Between August 2020 and March 2021 the Vascular Science worklist was used to identify inpatients with a confirmed DVT. Patients with chronic thrombus or on long term anticoagulation were excluded. The following day the referring clinician was sent a study specific questionnaire to obtain the treatment plan and rationale.

Results
36 inpatients with a confirmed DVT were identified. 71% of clinicians responded within 24 hours of receiving the initial e-mail. All 36 patients were treated with anticoagulation (table 1). The type of anticoagulant (direct-acting anticoagulants or low-molecular-weight heparin) was clearly documented and adjusted according to risk factors, comorbidities, contraindications and personal preferences.

Conclusion
The inpatient treatment of lower limb DVTs is in accordance with the Trust guidance and clearly documented in the medical notes.

UHBW Trust guidance for treatment of DVT (Table 1)		Contraindications	Apixaban	Rivaroxaban	Enoxaparin
CANCER PATIENTS REQUIRING THERAPEUTIC ANTICOAGULATION for VTE	DOAC- Apixaban/Rivaroxaban if CrCl is <30 ml/min then LOW-MOLECULAR WEIGHT HEPARIN (LMWH)- Enoxaparin should be prescribed.	DOAC not advised in patients with luminal gastrointestinal cancers.	6		
ADULT PATIENTS WITH **UNPROVOKED** VTE	DOAC-Apixaban 10 mg TWICE daily (D1-7), 5mg TWICE daily (from D7) or Rivaroxaban 15 mg TWICE daily D1-21, 20 mg ONCE daily D22 onwards.	If creatinine clearance (CrCl) <15 ml/min or caution if CrCl is <30 ml/min.	11		
ADULT PATIENTS WITH **SYMPTOMATIC** VTE AND ADDITONAL RISK FACTORS	LMWH- Enoxaparin/Clexane 1mg/kg twice daily initially.	If creatinine clearance (CrCl) <20 ml/min.	4	3	12
Total patients			21	3	12

TO11

The feasibility of assessing Cerebrovascular Reactivity with Carotid Duplex ultrasound (Duplex-CVR)

Dr Osian Llwyd[1], Mr Klaus Bond, Professor Stephen Payne, Professor Alastair Webb
[1]*Oxford University Hospitals, Oxford, United Kingdom*

The ICA could be a suitable location to assess cerebrovascular function. This study determined the feasibility of using Duplex ultrasound to assess cerebrovascular reactivity (CVR); the changes to blood flow that occur in response to a stimulus such as CO_2.

CVR was assessed with Breath-Hold (BH) for up to 30 seconds and Rapid-Breathing (RB) for up to 60 seconds. Capnography monitored breathing rate and end-tidal CO_2 ($etCO_2$). Duplex ultrasound of the ICA measured blood flow velocity (BFV) and diameter of the artery (ø). The number of good quality Duplex (measurable change in BFV and ø) and $etCO_2$ (>10% change in $etCO_2$) recordings was used to determine the feasibility of each manoeuvre.

Fifty patients (15 female, 68 ± 13 years old) were recruited. During Resting, BH and RB, data recordings were of good quality (see table) in 96, 78 and 86% respectively. During BH and RB measurable and predicted changes occurred in BFV, ø, volume flow, pulsatility index and resistive index.

Duplex-CVR can be performed in patients undergoing a routine carotid Duplex assessment and can provide high-resolution imaging of changes in BFV that occurs in relation to changes in $etCO_2$, which can then be used to provide indices of CVR.

Table – Quality of data recordings and changes in physiological parameters following resting, breath-hold and rapid-breathing manoeuvre.

	n	Resting	*n*	Breath-Hold	*n*	Rapid-Breathing
Quality of Data						
$etCO_2$						
Manoeuvre duration (s)	50	60	48	22 (9)	49	46 (10)
% Change in $etCO_2$	50	2.4 (1.2-4.9)	48	23.8 (10.7)	49	19.4 (9)
>10% change in $etCO_2$ (%)	3	6	44	88	43	86
Poor Quality Duplex Ultrasound						
Doppler waveform (%)	2	4	5	10	3	6
Carotid artery ø (%)	0	0	2	4	0	0
Good Duplex & $etCO_2$ (%)	**48**	**96**	**39**	**78**	**43**	**86**
Physiological Parameter						
$etCO_2$ (%)						
Baseline	48	4.60 (4.30-5.02)	39	4.69 (4.46-5.24)	43	4.54 (0.63)
Manoeuvre			39	5.87 (5.47-6.09) #	43	3.63 (0.71) #
Recovery	48	4.68 (4.35-5.02)	39	4.68 (4.41-5.17) $	43	4.25 (0.67) # $
TAMEAN (cm/s)						
Baseline	48	23.5 (6.3)	39	22.6 (18.7-28.4)	43	22.9 (5.9)
Manoeuvre			39	31.6 (8.6) #	43	19.0 (5.9) #
Recovery	48	23.8 (6.7)	39	24.1 (7.6) $	43	20.7 (6.2) # $
Relative Changes						
% Change in BFV			39	34.4 (17.4)	43	18.4 (10)
CVR (% BFV/% etCO2)			39	1.5 (0.9)	43	0.9 (0.6-1.2)

Data are presented as n (% of available data), mean (standard deviation) or median (inter-quartile range, 25th to 75th percentile), as appropriate.
p-value for physiological parameters are based on paired t-test/Wilcoxon (resting) or repeated-measures ANOVA (breath-hold/rapid-breathing) within each manoeuvre.
n, number of participants; $etCO_2$, end tidal CO_2; BFV, blood flow velocity; TAMEAN, time-averaged mean velocity
#p<0.05 vs. baseline; $p<0.05 vs. manoeuvre

TO12

A service evaluation of abdominal aortic aneurysm ultrasound surveillance in a large London teaching hospital

Miss Hannah Lord[1]
[1]*King's College Hospital, London, UK*

Background
Regular Duplex ultrasound surveillance is essential in monitoring growth of Abdominal Aortic Aneurysms (AAA) to prevent rupture. This study evaluates the coordination of imaging in the AAA pathway in a large London teaching hospital.

Methods
This retrospective single-centre cohort study used data from medical records to assess the outcomes for patients who received an ultrasound of their AAA between January 2018 and December 2018. Reasons for unbooked surveillance were documented and categorised. Status of surgical clinic appointments were also investigated to determine the number of patients lost to follow up.

Results
312 patients were included in this study. 43% (n=134) had follow-up surveillance booked. Reasons for missing follow-up included: clinic discharge, death, intervention and relocation. 9 patients were considered completely lost to follow- up. In total, 157 patients were identified as having a clinical indication for receiving subsequent duplex ultrasound surveillance. Of this group, 85% (n=133) had appropriate follow-up ultrasound organised, whilst 15% (n=4) did not.

Conclusion
Inadequate coordination of AAA surveillance increases wasted clinic time and risks losing patients to follow-up. This study highlighted an area of improvement in the AAA surveillance pathway with potential for vascular scientists to support medical colleagues by assuming responsibility for follow-up.

TO13

Should the iliac veins and veins below the knee be scanned routinely as part of the protocol in ultrasound scanning for deep vein thrombosis diagnosis?

Mr Amine Turay[1]

[1]*Imperial College Healthcare NHS Trust, ,*

Clinical guidance for ultrasound scanning protocols currently varies regarding whether the IVC/iliac veins and veins within the calf should be routinely scanned. The protocol followed at Imperial recommends that the IVC/iliac veins and calf veins should be scanned routinely.

The aim of this project was to determine whether the protocol followed at Imperial could play a wider role in the diagnosis of DVTs and therefore, whether it would be beneficial to be adopted by other centres. Routinely scanning the iliac veins has provided the opportunity for the reliability of phasicity within the common femoral vein (CFV) to determine whether thrombus is present or absent within the IVC/iliac veins to be validated.

Of the DVTs identified, 41% were isolated calf DVTs, suggesting that scanning the calf may have some clinical relevance. Only one patient with an isolated iliac DVT would have been misdiagnosed if the Imperial protocol had not been followed.

The sensitivity of phasicity alone was 72%; whereas this improved to 96% when the patient's history, clinician suspicion and phasicity were taken into account. Demonstrating phasicity to be a useful tool.

TO14

Case study - SMA syndrome

Miss Emily Hillier[1], Ms Helen Dixon[1]
[1]*King's College Hospital NHS Foundation Trust, London, United Kingdom*

SMA syndrome, also known as Wilkie's syndrome, is a rare cause of small bowel obstruction. It is caused by a decrease in the aorto-mesenteric angle which leads to compression of the duodenum.

The presentation will describe a case study of a 23 year old male with a complex GI history referred to the vascular laboratory for assessment for SMA syndrome. Normal appearance of the SMA will be reviewed. The abnormal ultrasound appearances of significantly reduced aorto-mesenteric angle seen in this case will demonstrated. Clinical history of the case as well as other causes of SMA syndrome and the use of other imaging modalities will be discussed.

TO15

Semi-automatic measurement of carotid plaque volume using 3D ultrasound: a potential new clinical tool

Miss Alison Phair[1,2], Mr Jonathan Ghosh[1,2], Professor Charles McCollum[1], Professor Craig Smith[3], Dr Steven Rogers[1,2]

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Background

Stenosis is a poor predictor of stroke, particularly in asymptomatic carotid disease. Carotid plaque volume(CPV), as measured by 3D-ultrasound, may be a better predictor but long analysis time limits clinical utility. This study tested accuracy of Artificial Intelligence derived semi-automatic CPV measurement plus the time saved.

Methods

Semi-automatic CPV(Auto-CPV) was measured from 94 3D ultrasound scans by two blinded operators using the semi-automated software (PIUR imaging, GmbH, Austria). Inter- and intra-rater agreement, accuracy compared with the surgical volume and measurement time compared with previous manual CPV measurement were calculated.

Results

Inter- and Intra-observer error was good with mean difference(±sd)[95%CI] -0.03 (0.19) {-0.40-0.35}cm3 and -0.09(0.13) {-0.33–0.16}cm3 respectively. Both showed excellent correlation and narrow confidence intervals, ICC=0.95;95% CI(0.92-0.96) and ICC=0.97, 95% CI(0.85-0.99). Auto-CPV compared well to the surgical volume with a mean difference(±sd)[95%CI] -0.05 (0.25) [-0.53-0.43]cm3. Correlation was excellent (ICC= 0.91, 95%CI 0.86-0.94). Auto-CPV measurement was faster than previous manual CPV measurement time with median(IQR) 05:39(01:58) minutes compared to 13:05(04:15) minutes, $p<0.01$.

Conclusion

Auto-CPV assessment is accurate, reproducible and significantly faster than previous methods. Improved feasibility means CPV could be routinely assessed prior to surgery or used in large cohort studies to stratify risk in asymptomatic carotid disease.

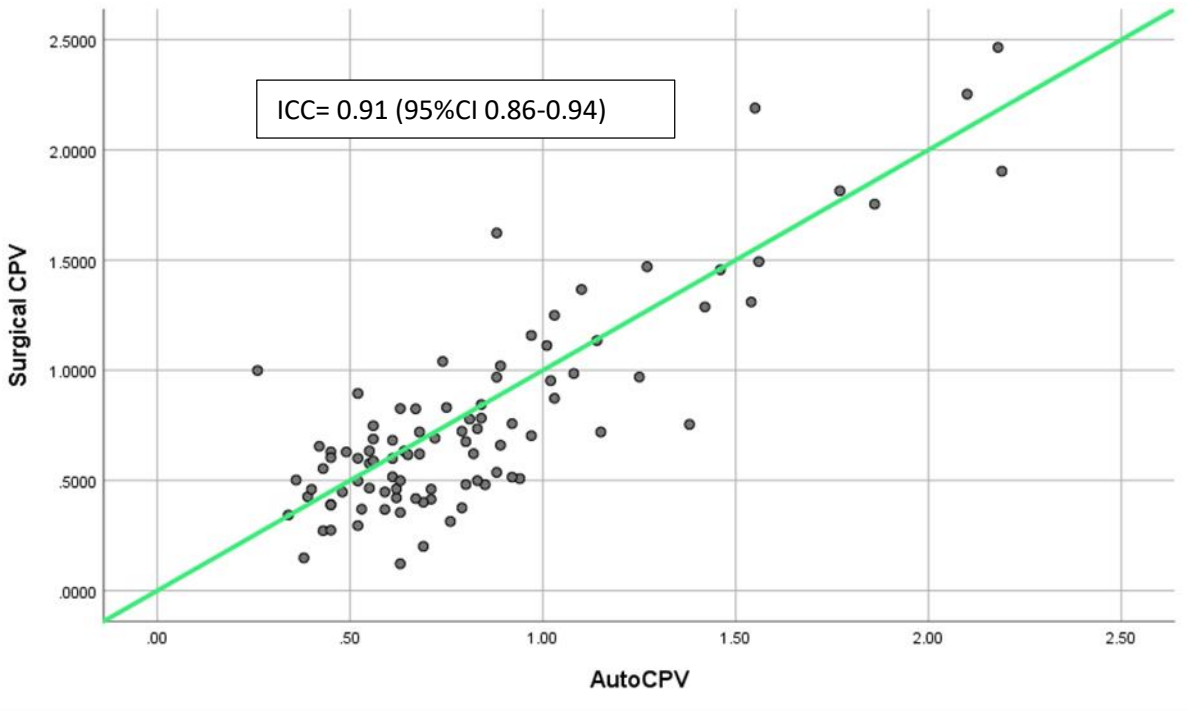

Figure 1: Interclass correlation between the surgical plaque volume and the Auto-CPV.

TO16

Persistent Sciatic Artery

Mrs Nicolette Kelly[1]
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Background
A persistent sciatic artery (PSA) has a reported incidence of 0.03-0.06% making it a rare entity. However, it carries a significantly high risk for aneurysmal degeneration in up to 40% of cases. Rupture, thrombosis and distal embolisation are known complications with risk of lower limb amputation.

Presentation
A 66 year old male presented with 9-month history of left posterior buttock and thigh pain. Cowie sign was negative as he had palpable femoral and popliteal pulses on the indexed limb. A pulsatile mass was present in the left buttock.

Imaging
Arterial duplex identified left superficial femoral artery (SFA) that deviated from the femoral vein.The popliteal artery was noted patent distally, however, when tracked proximally demonstrated occlusion leading to a partially thrombosed fusiform aneurysm in the gluteal region. Computed tomography angiogram confirmed the diagnosis of a partially thrombosed persistent sciatic artery aneurysm measuring 4.5 cm with an incomplete SFA (Pillet-Gauffre classification 2a).

Management
Endovascular approach was decided and occlusion of the PSA aneurysm sac achieved. Follow-up arterial duplex 8 weeks post-treatment confirmed occlusion of the PSA aneurysm.

Conclusion
Arterial duplex scans can identify aberrant anatomy with sufficient information to make the initial diagnosis of this rare clinical entity.

TO17

Popliteal Artery Entrapment Syndrome – Using Ultrasound to Determine What is Normal vs Pathogenic.

Mr David Barrett[1], Mr Michael Crook[1], Mr Joao Carreira[1], Dr Fiona Burrows[1], Dr Steven Rogers[2]
[1]Independent Vascular Services Ltd., Manchester, , [2]Division of Cardiovascular Sciences, University of Manchester, ,

Popliteal entrapment syndrome (PAES) is a rare condition whereby musculoskeletal structures compress the popliteal artery (POPA) leading to vascular or neurogenic symptoms. This study investigates dynamic plantar and dorsal loading to develop a diagnostic ultrasound-based protocol.

Healthy individuals, elite athletes, and symptomatic PAES patients were recruited with triplex ultrasound imaging of both legs being performed (n=112). Proximal and distal POPA's in dorsi- and plantar- flexion in erect and prone positions were imaged at rest and with loading.

Full compression most commonly occurred in the distal POPA whilst prone during plantar-flexion (70%) compared to the proximal vessel. When prone, control (n=22, 55%), athletes (n=28, 70%), and patients (n=23, 77%) had distal compression in plantar-flexion. When prone, control (n=1, 2.5%), athletes (n=2, 5%), and patients (n=6, 20%) had distal compression under dorsi-flexion. When erect, compression was only noted in the patient group under both dorsi-flexion (n=7, 17.5%) and plantar-flexion (n=8, 20%).

Compression of the POPA seen by ultrasound should not be the sole diagnostic criteria for PAES. POPA compression exists in healthy, asymptomatic individuals, primarily in prone plantar-flexion. The use of triplex ultrasound imaging is ideal for functional PAES diagnosis due to its dynamic and real-time capabilities.

TO18

Case study - TIPIC syndrome

Dr Fiona Norwood[1], **Ms Helen Dixon[1]**
[1]King's College Hospital NHS Foundation Trust, London, United Kingdom

Transient Perivascular Inflammation of the Carotid artery (TIPIC) syndrome, formerly known as carotidynia and first described in 1927 by Temple Fay, is a condition which presents as unilateral neck pain overlying the site of the carotid bulb.

TIPIC syndrome is believed to be caused by a transient inflammatory process in the vessel wall and pericarotid tissue, and treatment methods include non-steroidal anti-inflammatory drugs, aspirin or steroids in some cases.

Ultrasound appearances are of increased echogenicity around the distal CCA and carotid bulb and there may also be soft plaque present. MRI is also used in diagnosis and demonstrates perivascular enhancement. During diagnosis other conditions with similar presentation, for example vasculitis and dissection should be excluded.

This presentation will discuss clinical presentation and demonstrate the ultrasonographic features associated with this condition.

TO19

Measuring carotid plaque content with grey-scale median by 3D ultrasound

Miss Alison Phair[1,2], Mr Jonathan Ghosh[1,2], Dr Fiona Wilkinson[3], Dr Ria Weston[3], Professor Frank Bowling[1,2], Professor Craig Smith[4], Dr Steven Rogers[1,2]

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Introduction

Lipid/thrombus-laden Carotid plaques are more vulnerable to rupture and cause stroke. Determining plaque composition, prior to considering surgery, may identify asymptomatic patients at risk. Ultrasound evaluation of Grey-scale median (GSM) gives an objective measure of plaque content. We tested the reproducibility and accuracy of GSM measured by 3D ultrasound.

Methods

3D-ultrasound GSM (3D-GSM) was performed in 49 symptomatic and 11 asymptomatic carotid disease patients, prior to surgery. Two blinded observers repeated measurements for inter and intra-rater agreement. Wilcoxon rank sum test compared the means between groups and Bland Altman agreement and Interclass correlations were performed for reliability assessment.

Results

Mean (sd) 3D-GSM in the symptomatic group was 57(13) and in the asymptomatic group was 64(7), Wilcoxon rank sum test p=0.056. Intra-observer mean difference (±sd)[95%CI] was -1.1 (6.69)[-14.22-12.00] with excellent ICC=0.93(0.88-0.96) and narrow confidence intervals. Inter-observer mean difference (±sd)[95%CI] was 4(9.29) [-14.2-22.2] with good correlation ICC=0.89 (95%CI 0.58-0.97).

Conclusion

GSM can be measured by 3D ultrasound with good reproducibility between observers. Its role in assessment of asymptomatic disease can now be tested.

TO20

Carotid Web; Missed on Duplex

Dr Nazia Saeed[1], Dr Edmund Charles[1], Mr Selva Theivacumar[1], Dr Kamran Modaresi[1]
[1]*London Northwest University Healthcare NHS Trust, ,*

Carotid webs are a rare and frequently misdiagnosed cause of recurrent transient ischaemic strokes (TIA) in patients without cardiovascular risk factors. This case study examines the challenges faced by clinical vascular scientists when presented with rare phenomena such as a carotid web. A 45-year-old male of south Asian descent, with no significant medical history, who experienced multiple left sided TIAs in the last 2 years was being managed conservatively. On two out of three occasions the presence of a carotid web was missed during a routine TIA clinic carotid duplex ultrasound (DUS). Following his most recent episode of left sided weakness and slurred speech, where the DUS was essentially normal, the patient went on to have a CTA where a 'narrowing' and a left sided posterior web was visualised, later confirmed by repeat DUS and MRA. The patient was treated surgically with an endarterectomy and removal of the web with no recurrence of symptoms after 6 weeks. When carotid arteries in otherwise well young stroke patients are imaged by DUS, pathologies such as carotid webs can be overlooked; such patients should raise suspicion and carry a low threshold for seeking alternative imaging modalities.

Vascular Oral Abstracts (Aortic, Trauma)

VAO1

Evaluation of AAA intervention turndown rates in referrals from the NHS Abdominal Aortic Aneurysm Screening Programme (NAAASP)

Dr Constance Wou[1], Jo Jacomelli[1], Morag Armer[1], Tim Hartshorne[1], Lisa Summers[1], Philip Gardner[1], Mr Akhtar Nasim[2]

[1]NHS Abdominal Aortic Aneurysm Screening Programme (NAAASP), Public Health England, , UK, [2]Sheffield Vascular Institute, Northern General Hospital, Sheffield, UK

Background

This study investigated if there is variation in turndown rates between screening providers, in men referred from NAAASP for elective abdominal aortic aneurysm (AAA) surgery. There is little published large scale data.

Method

Data were collected prospectively via a national IT system. Final outcomes of referred men were categorised. Turndowns were defined as men clinically unsuitable for surgery or declined by the man. Multiple logistic regression ascertained differences by age, deprivation, early implementer (EI) or non-EI providers, and providers predominately performing EVAR or open surgery.

Results

649 out of 5,413 men (12%) referred between 2013-2020 were turned down. Older men were more likely to be turned down, with odds increasing with age. ≥80 years had the highest odds compared to 64-69 years (adjusted odds ratio (AOR) 9.51, $p<0.001$). Men from less deprived IMD quintiles were less likely to be turned down compared to the most deprived, with the largest association in the least deprived quintile (AOR 0.44, $p<0.001$). EIs were associated with higher turndowns, compared with non-EIs (AOR 1.91, $p<0.001$). There were no significant differences between providers predominately performing EVAR or open surgery.

Conclusion

This large, multi-centre study found associations between older age, deprivation and EIs, and higher turndowns.

VAO2

Is pre-operative Malnutrition Universal Scoring Tool (MUST) a prognostic indicator for patients undergoing elective abdominal aortic aneurysm repair?

Dr Dilraj Bhullar[1,2], Dr Bence Baljer[1,2], Mrs Lauren Shelmerdine[1,3], Professor Gerard Stansby[1,2], Mr Sandip Nandhra[1,4]

[1]Northern Vascular Centre, Freeman Hospital, Newcastle upon Tyne, UK, [2]School of Medical Education, Faculty of Medical Sciences, Newcastle University, Newcastle upon Tyne, UK, [3]Translational and Clinical Research Institute, Faculty of Medical Sciences, Newcastle University, Newcastle upon Tyne, UK, [4]Population Health Sciences Institute, Faculty of Medical Sciences, Newcastle University, Newcastle upon Tyne, UK

Background

This study aimed to determine the prognostic value of preoperative nutritional scoring for elective infra-renal AAA repair.

Methods

A retrospective single-centre analysis of patients undergoing elective EVAR and open AAA repair (Jan'15-Dec'19) was reviewed. Malnutrition Universal Screening Tool (MUST), Prognostic Nutritional Index (PNI) and Geriatric Nutritional Risk Index (GNRI) were calculated. Kaplan-Meier and multivariable regression analyses were performed.

Results

Some 462 patients were included. Those at risk of malnutrition (MUST 1-3) had significantly lower survival (44.3months (95%CI 32.7-55.9) vs. 60.7months (95%CI 68.7-62.8), p=0.028), with higher risk of death (HR=2.47, 95%CI 1.07-5.69, p=0.034).

The MUST 1-3 group had lower BMI(p<0.001), lower GRNI(p<0.001), worse renal-function(p=0.010) and were more socially deprived(p=0.035). Weak correlation existed between MUST and deprivation index decile (rs(460)=-0.118, p=0.012) and GNRI.

MUST score was an independent predictor of death (HR=2.42, 95% CI 1.03-5.69, p=0.043), with increased likelihood of 2-year mortality (OR=6.96, 95%CI 1.88-25.5, p=0.004). Increasing age, presence of heart-failure, higher creatinine and hypo-albuminaemia were also significant (p<0.05). None of the studied nutritional indices were associated with postoperative complication, hospital stay or readmission.

Conclusion

Preoperative malnutrition (MUST category) appears to be a significant predictor of survival following elective AAA repair, perhaps highlighting the value of nutritional evaluation prior to surgery.

VAO3

Are the outcomes for Fenestrated Endovascular repair (FEVAR) affected by socio-economic status?

Ehsanul Karim Choudhury[1], James Rammell[1], Nikesh Dattani[1], Rob Williams[2], James McCaslin[1], James Prentis[4], Sandip Nandhra[1]

[1]Northern Vascular Centre, Freeman Hospital, Newcastle-upon-Tyne University Hospitals, Newcastle-upon-Tyne, United Kingdom, [2]Interventional Radiology, Northern Vascular Centre, Freeman Hospital, Newcastle-upon-Tyne University Hospitals, Newcastle-upon-Tyne, United Kingdom, [3]Department of Anaesthesia, Newcastle-upon-Tyne University Hospitals, Newcastle-upon-Tyne, United Kingdom, [4]Population Health Sciences Institute, Faculty of Medical Sciences, Newcastle University, Newcastle-upon-Tyne, United Kingdom

Aims

Social deprivation (SD) is associated with poor clinical outcomes in other health conditions. This study evaluates the impact of SD on outcomes following FEVAR to potentially focus optimisation.

Methods

Elective FEVARS from 2010-2018 were stratified by indices of multiple deprivation(IMD). Primary outcome was overall survival by Kaplan-Meier. Secondary outcomes included, length of stay and complications. Cox-proportional-hazard analyses were conducted.

Results

Some 132 FEVAR patients were followed-up for 3.7(2.2) years; 57 patients from most deprived (IMD1-3), 34 moderate(IMD4-6) and 41 in the lowest areas of deprivation (IMD7-10). Groups were comparable for age, BMI, AAA diameter and co-morbidity. A higher proportion of patients from deprived areas had renal failure (15 (26.3%) vs. 9 (11.8%) p=0.019) but no overall difference in procedure complexity (200 mins (155-250) vs. 180 mins (145-240) p=0.412). Kaplan-Meier analysis demonstrated significantly poorer survival for most deprived areas (p=0.03) as well as a longer hospital stay (6 days (4-9) vs. 5 (3-7) p=0.005) and higher overall complications (21 (36.8%) vs. 14 (18.4%) p=0.02). Cox regression showed that deprivation was associated with worse survival (HR -0.85 (0.75-0.97) (p=0.02)).

Conclusions

SD appears to be associated with higher mortality, increased length of stay and higher complication rate in patients undergoing FEVAR.

VAO4

Factors influencing long term outcomes for endovascular revascularisation in patients with chronic mesenteric ischaemia.

Mr Mohammad Miah[1], Mr Sivaram Premnath[1], Mr Sreekanth Sukumaran[1], Dr Alaaeldin Ginawi[1], Mr Adel Abdallah[1], Dr Adam Talbot[1], Mr Philipe Ishak[1], Dr Saurabh Verma[1], Dr Sophie Spencer[1], Mr Tamer El-Nakhal[1], Dr James Kirk[1], Mr Timothy Rowlands[1], Mr Ganesh Kuhan[1]
[1]*University Hospital Of Derby And Burton Nhs Trust, Derby, UK*

Endovascular revascularization (ER) for chronic mesenteric ischemia (CMI) has comparable outcomes with open revascularization, but it is associated with higher rates of restenosis and re-interventions.

All patients treated with ER for CMI between 2012 and 2020 were analysed. Twenty clinical, five anatomical, six procedure-related and seven outcome variables were collected. Kaplan-Meier survival analysis was carried out to identify variables influencing symptom recurrence, re-interventions and survival. Predictors were determined using a log-rank test and Cox regression analysis.

Thirty-seven patients were included with a mean age of 72.9 (range 50-90) years and 64.9% were women. Smokers were 51.4%, 94.6% patients had single-vessel treatment and 81.1% were treated with covered-stent. Median follow up was 59.7 (range 10.7-111.2) months. The 30-day-complications and mortality rates were 16.2% and 5.4% respectively. Symptoms recurred in 18.9% and 10.8% had re-interventions. Median survival was 86.4 (95% CI 29.0-143.8) months, median symptom free survival was 52.9 (95% CI 24.8-81.0) months and median intervention free survival was 86.4 (95% CI 26.4-146.4) months. Smoking was associated with recurrence of symptoms (p=0.028) and re interventions (p=0.033). Revascularisation using covered stents reduced re-interventions (p=0.002).

The use of covered stent and cessation of smoking can improve the outcomes for ER in patients with CMI.

Fig 1. Kaplan Meier plots for re - intervention free duration comparing smokers and non smokers.

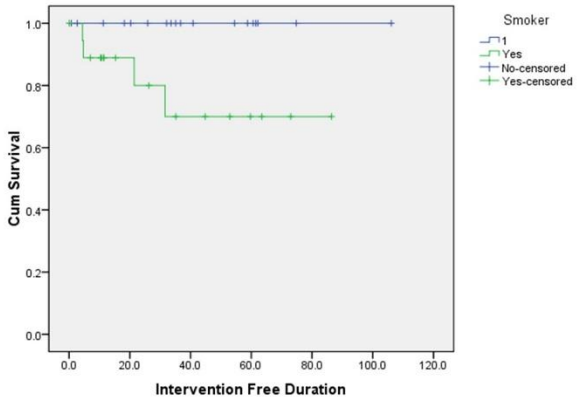


Fig 2. Kaplan Meier plots for symptom free duration comparing smokers and non smokers.

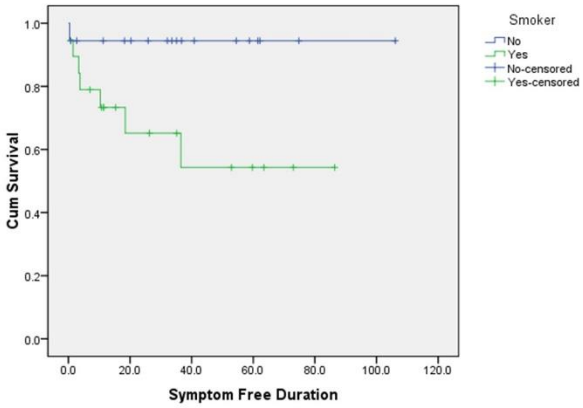
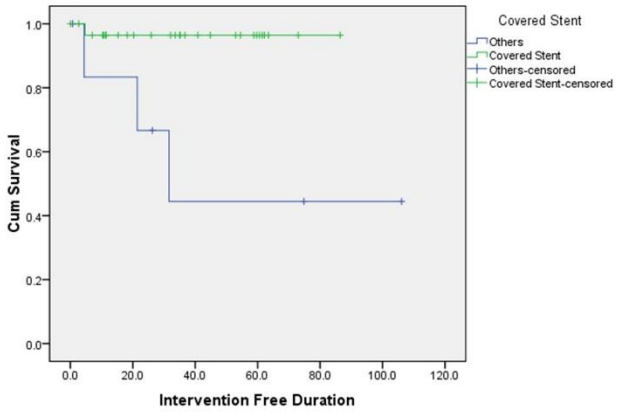


Fig 3. Kaplan Meier plots for re - intervention free duration comparing covered and bare metal stents.



VAO5

Isolated penetrating limb trauma with vascular injury: a single centre experience

Mr Aurélien Guéroult[1], Dr Dominic Hampson[1], Dr Jessica Davies[1], Mr Guy Martin[1], Prof David Nott[1]
[1]*Nhs, London, United Kingdom*

Introduction
Penetrating limb trauma (PLT) is associated with significant mortality and morbidity. Hospital attendances secondary to assault with a knife have increased by 41% in England between 2014/15 and 2018/19. The aim of this study was to evaluate the demographics, mechanism and distribution of injury, management and outcomes for isolated PLT with vascular injury (VI) presenting to a single UK major trauma centre.

Methods
Electronic patient records were retrospectively reviewed for patients presenting with isolated PLT with VI to St Mary's Hospital, 2015-2018 (n= 39).

Results
All patients were male and the median age was 21 (n=39; IQR 19, 25). Most sustained knife-related trauma (92.3%, n=36), others gun-related (7.7%, n=3). There were 43 VIs and 8 concurrent nervous injuries (20.5%) (table 1). 17 patients (43.6%) required transfusion with median 3 units RBCs (IQR 1, 4). Surgical treatment is summarised in table 1. There was one mortality (2.6%) and 3 post-operative complications (7.7%). Median length of stay was 3.5 days (IQR 2, 6.75).

Conclusion
PLT with VI is increasing in frequency, but broadly has good outcomes. The high rate of concurrent nervous injury reported in this study stresses the importance of a multidisciplinary approach to the surgical treatment of these patients.

Table 1. Characteristics of major vascular injuries and surgical treatment. *N.B. 4 patients sustained more than one injury. 1 upper limb arterial injury died intra-operatively.*

		Surgical treatment			
		Vein interposition graft	Primary repair	Embolisation	Vessel tie off/transfixion
Major arterial injuries					
Lower limb	22 (51.2%)	-	7	3	12
Upper limb	11 (25.6%)	6	2	-	2
Major venous injuries					
Lower limb	8 (18.6%)	-	2		6
Upper limb	2 (4.7%)	-	-	-	2
TOTAL	43	6 (14.0%)	11 (25.6%)	3 (7.0%)	22 (51.2%)

VAO6

Quantification of Sex-specific Differences in Aorto-iliac Complexity for Patients Undergoing Abdominal Aortic Aneurysm Repair: A Retrospective Cohort Study.

Miss Batool Alharahsheh[1], Miss Anna-Louise Pouncey[1], Mr Colin Bicknell[1], Professor Janet Powell[1], Miss Aqeilah Khan[1], Mr Guy Martin[1]
[1]*Imperial College London, London, United Kingdom*

Background
Female sex is associated with higher risks of mortality and lower-limb ischemia following elective abdominal aortic aneurysm (AAA) repair. We examined anatomical differences, which may contribute to these disparities.

Methods
A single-centre retrospective cohort study of elective AAA-repair patients (2014-2020). Each female was matched using nearest-neighbour greedy-matching to 2 males. Quantitative assessment of aneurysm and lower limb vasculature was conducted using a prespecified protocol and centreline function of the TeraRecon Aquarius workstation. Access-vessel disease was classified using TASC-II scores.

Results
Of 365 eligible patients, all 48 females were matched to 96 males. Females had smaller AAA-diameters (median, 56.3 vs 59.5 mm, P=0.003), but greater aortic size index (3.4 vs 2.3, P=0.017) and tortuosity (1.09 vs 1.04, P<0.001). AAA-thrombus burden was greater (59.6% vs 54.8%, P=0.03), more often irregular (14.6% vs 4.2%, P= 0.02). Access-vasculature was more diseased (TASC-II class A: 68.7% vs 50%, P=0.03), less tortuous (1.27 vs 1.33, P=0.005) and smaller calibre (P<0.001). 30-day mortality (10.4% vs 1.0%, P=0.016), additional lower-limb interventions (12.5% vs 0%, P=0.001) and lower-limb ischaemia (14% vs 2%, P<0.001) were more common.

Conclusion
Increased aorto-iliac complexity amongst females may contribute to disparity in outcomes. Validation and further work are needed to establish causality.

VAO7

Investigation of the Causes of Bowel Ischaemia after Abdominal Aortic Aneurysm Repair: Retrospective Cohort Analysis of Sex-Specific Differences in Aortic and Visceral-Vessel Anatomy and Pathology

Miss Aqeilah Khan[1], Miss Anna Louise Pouncey[1], Miss Batool Helmi Ahmad Alharahsheh[1], Mr Guy Martin[1], Professor Janet Powell[1], Mr Colin Bicknell[1]
[1]*Imperial College London, London, United Kingdom*

Background
Following abdominal aortic aneurysm (AAA) repair, female-sex is associated with greater risk of thromboembolic complications including bowel ischaemia (BI). This study investigated sex-specific differences in aortic thrombus burden and visceral-vessel morphology.

Methods
Retrospective cohort study of elective AAA repairs (2014-2020). Eligible females were matched to two males using nearest-neighbour greedy-matching. Aortic and visceral-vessel anatomical and pathological measurements were determined from high resolution CT imaging using TeraRecon Aquarius workstation by two independent researchers (interobserver and intraobserver error evaluated). Qualitative aortic wall thrombus (AWT) score was calculated.

Results
Of 358 patients, all 48 females were matched to 96 males. For females, AAAs were smaller (p=0.003), but aortic-size index greater (3.4 vs 2.3, p=0.017), with more thrombus (p=0.025), greater AAA tortuosity (p<0.001), and β-neck angulation (p=0.004). AWT score was greater (p=0.014), with more 'finger-like' thrombus (56.3% vs 30.9%, p<0.001). Visceral vessels were smaller calibre (p<0.001) and more tortuous (p<0.001). No significant difference in vessel-angulation, stenosis or calcification was observed. Post-operative BI (6/48 vs 1/96, p=0.006) and 30-day mortality (5/48 vs 1/96, p=0.016) were higher in females.

Conclusion
These data suggest the hypothesis that sex-specific differences in aortic thrombus and visceral morphology contribute to the increased rate of BI in females.

VAO8

A comparison of endovascular versus open repair for ruptured abdominal aortic aneurysm: Meta-analysis of propensity score-matched data

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Background

Optimal management of ruptured abdominal aortic aneurysms (rAAA) has been debated in the literature. This review aims to assess comparative outcomes from propensity-matched studies of endovascular versus open for rAAA.

Methods

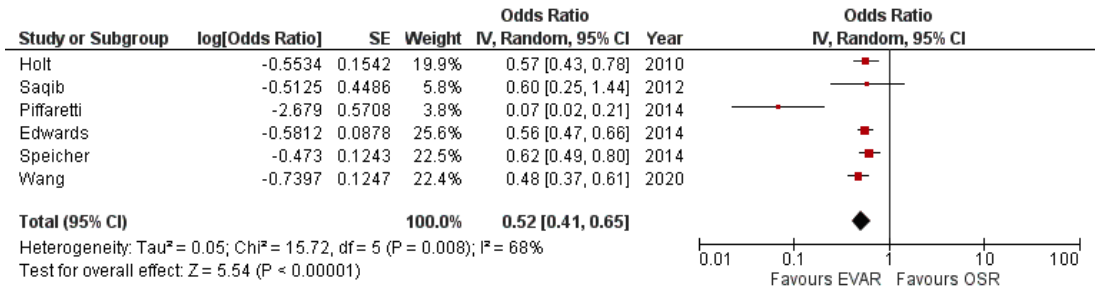
Electronic databases (MEDLINE and Embase) were searched in January 2021. Eligible studies compared endovascular versus open repair for rAAA using propensity-matched cohorts. Pooled estimates of perioperative outcomes were calculated using odds ratio (OR) or mean difference (MD), and 95% confidence interval (CI) using the random-effects model. Time-to-event data meta-analysis was conducted using the inverse-variance method and reported as summary hazard ratio (HR) and associated 95% CI.

Results

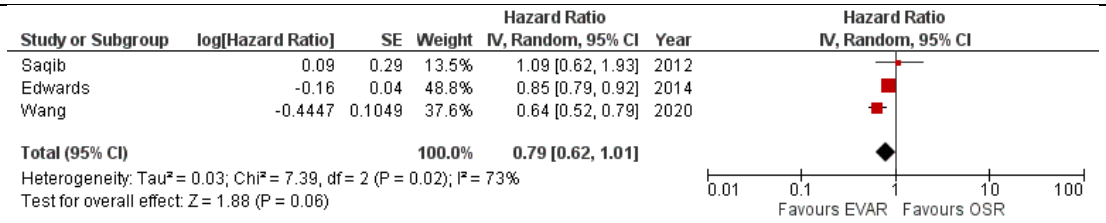
Six recently published studies were selected for qualitative and quantitative synthesis (total 6731 patients). The odds of perioperative mortality after endovascular aneurysm repair (EVAR) were significantly lower than after open surgical repair (OSR). The hazard of overall mortality during follow-up was lower, although not significantly, after EVAR. The odds of acute kidney injury and early aneurysm-related reintervention were significantly lower after EVAR. Patients treated with EVAR stayed in hospital for significantly less time than those treated with OSR. Figure 1 summarises the findings.

Conclusion

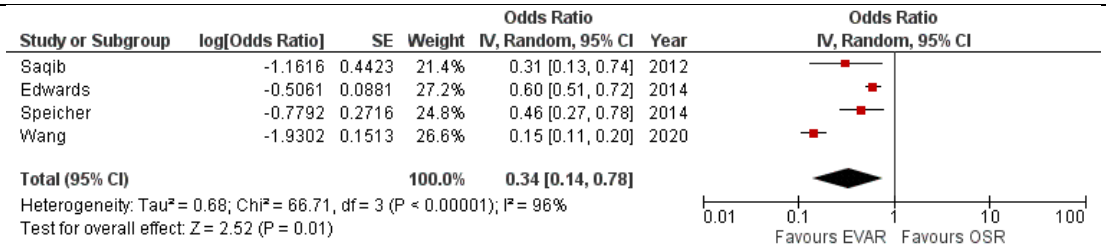
The evidence suggests that EVAR confers a significant benefit on perioperative mortality.



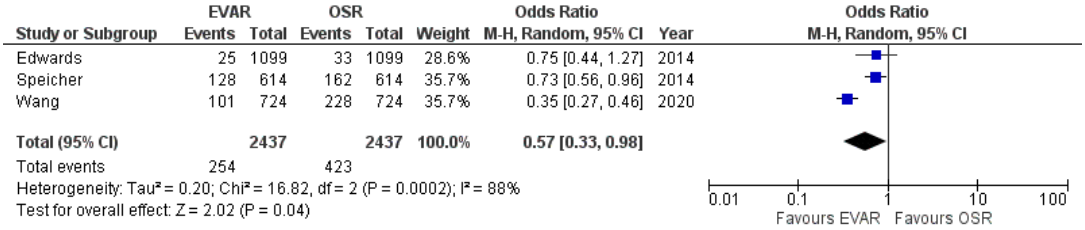
a) Perioperative mortality



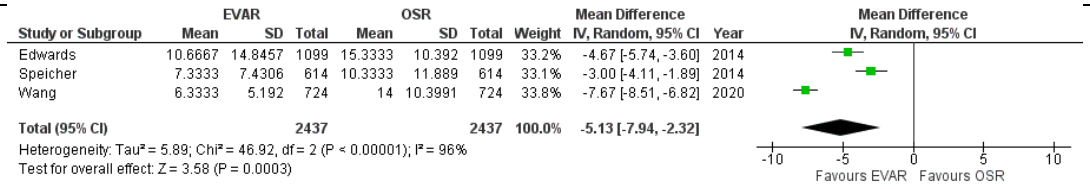
b) Overall mortality



c) Acute kidney injury



d) Aneurysm-related reintervention



e) Length of hospital stay

Figure 1 – The forest plot comparisons of (a) perioperative mortality, (b) overall mortality, (c) acute kidney injury, (d) aneurysm-related reintervention, and (e) length of hospital stay. The classification of acute kidney injury was not adequately defined in original studies. Aneurysm-related reintervention included operation for rebleeding, or an unplanned return to surgery. *CI*: Confidence Interval; *EVAR*: *E*ndovascular Aneurysm Repair; *IV*: Inverse Variance; *M-H*: mantel Haenszel; *OSR*: Open Surgical Repair; *SE*: Standard Error.

VAO9

A systematic review and meta-analysis of enhanced recovery for open abdominal aortic aneurysm surgery

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Introduction
Open abdominal aortic aneurysm (AAA) surgery is associated with significant morbidity, mortality and high length of stay (LOS). Enhanced recovery is now commonplace and has been shown to decrease these in other non-vascular surgery settings.
This systematic review and meta-analysis aimed to assess the benefits of enhanced recovery in aortic surgery (ERAS).

Method
PRISMA guidelines were used to undertake a systematic review via Ovid MEDLINE and Embase on 10.07.2021. The search terms were "aortic aneurysm" and "fast track" or "enhanced recovery". Data was obtained on major complications, 30 day mortality and LOS.

Results
107 papers were identified and 9 papers included for meta-analysis.
Complication rates were significantly reduced with ERAS compared to non-ERAS protocols (ERAS n=709, non-ERAS n=930) (odds ratio 0.38, 0.22 to 0.65: p=0.0005). LOS was also significantly reduced with an ERAS protocol (ERAS n=708, non-ERAS n=956) with a mean reduction of 3.06 days (-4.9 to -1.22 days) (p=0.001: I^2 96%). There was no significant difference however in 30 day mortality (p=0.92).

Conclusion
This meta-analysis demonstrates significant benefits to an enhanced recovery programme in open AAA surgery. There is a need for a multi-centre randomized controlled trial to assess this further.

VAO10

Are we doing enough for the secondary prevention of cardiovascular disease in patients with abdominal aorta aneurysms in hospital surveillance?

Dr Jing Yi Kwan[1,2], Dr Steve, Hin Ming Tang[1], Mr Tom Wallace[1], Miss Penelope Sucharitkul[1], Prof Julian Scott[1], Dr Marc Bailey[1]

[1]Leeds Teaching Hospitals NHS Foundation Trust, Leeds, United Kingdom, [2]Bradford Teaching Hospitals NHS Foundation Trust, Bradford, United Kingdom

Background

Due to significantly increased risks of cardiovascular events, the European Society for Vascular Society 2019 guideline recommends consideration of antiplatelet therapy and statins in all abdominal aortic aneurysm (AAA) patients. NICE UK suggests high intensity statin treatment with a target of non-HDL-C <2.5mmol/L or LDL-C <1.8mmol/L, and commencement on PSCK9i if LDL-C >3.5mmol/L.

Methods

This retrospective cross-sectional audit utilized electronic records of 634 patients enrolled in the AAA surveillance programme of a tertiary vascular unit from 1-Jan-2018 to 31-Dec-2020. 612 medication records were accessible, whilst 384 and 397 patients had available serum non-HDL-C and LDL-C results respectively.

Results

21% of patients were not on any anti-thrombotic therapy. Only 53% of patients were on the national recommended dose of high intensity statins. Median non-HDL-C was 2.8mmol/L (2.2-3.6 IQR) with 36% of the cohort reaching the target of <2.5mmol/L. Median LDL-C was 2.0mmol/L (1.6-2.7 IQR) with 35% reaching the target of <1.8mmol/L (Fig 1). None of the 34 patients with LDL-C >3.5mmol/L were prescribed PSCK9i.

Conclusion

Lipid modification and provision of anti-thrombotic therapies is sub-optimal in this in-hospital AAA surveillance group. AAA surveillance provides an easy opportunity to ensure that secondary prevention is prescribed and optimized at each visit.

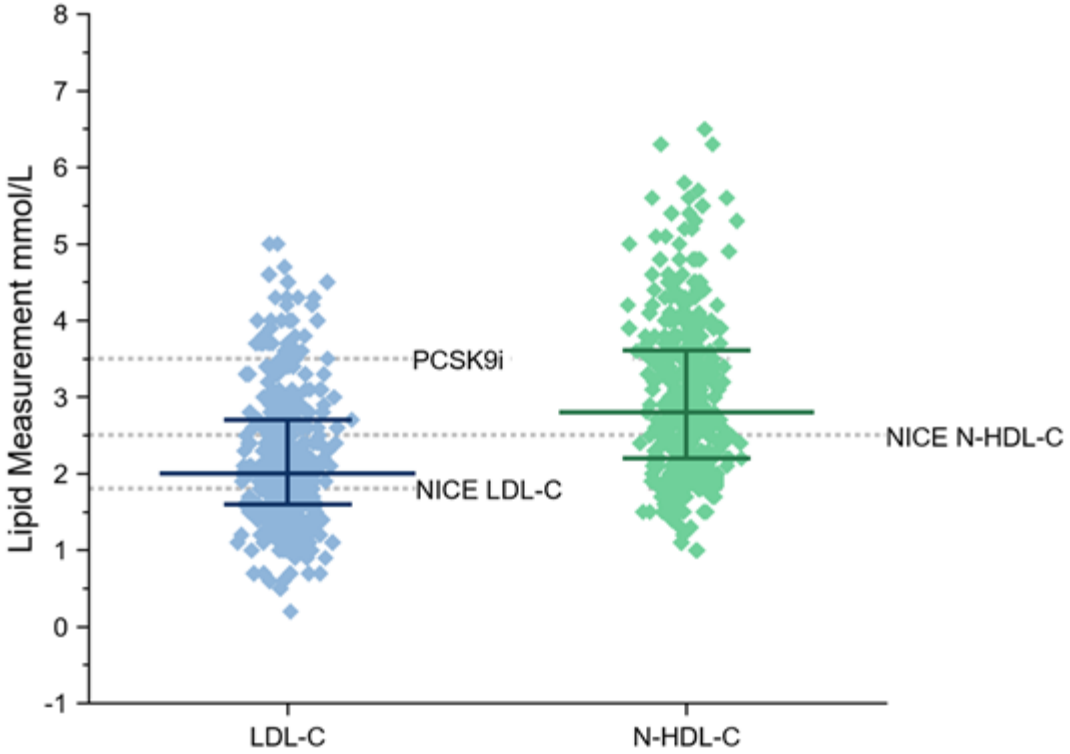


Figure 1. LDL-C and N-HDL-C measurements of the AAA cohort. Median and IQR. LDL-C 2.0 (1.6-2.7 IQR). N-HDL-C 2.8 (2.2-3.6 IQR). PCSK9i= NICE LDL-C referral threshold and NICE lipid targets, 2.5 N-HDL-C,1.8 LDL-C.

VAO11

Endovascular versus open abdominal aortic aneurysm repair in periods of high COVID-19 prevalence – evaluating patient outcomes

Dr Immerjeet Kular[1], Dr Carolynn Wai[1]
[1]*Lancashire Teaching Hospitals Nhs Trust, Preston, England*

Introduction
COVID-19's impact on emergency and elective abdominal aortic aneurysm (AAA) repair was observed with loss of cardiopulmonary exercise testing (CPET) and critical care capacity. COVID-19 infection remains a significant risk in physiologically vulnerable patients. Our study reviewed patient outcomes in open versus endovascular aneurysm repair (EVAR) during 2020.

Methods
A retrospective casenote review of patients undergoing AAA repair in 2020 was performed. Demographics, complications, length of stay and COVID-19 infection were considered.

Results
AAA repairs in 2020 consisted of 19 emergencies (4 open, 15 EVARs) and 65 elective cases (23 open, 42 EVARs).

In elective cases - mortality and mean hospital stay were lower in the EVAR group compared to the open group (0% vs 4.3%, 4 vs 10 days). 8.7% contracted COVID-19 post-operatively in the open group compared with 0% of EVARs.

In emergencies - mortality and mean hospital stay were lower in EVAR compared to open (10% vs 100%, 8.6 vs 48.8 days). 75% of open repairs contracted COVID-19 post-operatively compared with 5% of EVARs.

Conclusion
EVAR showed better outcome than open repair in periods of high COVID-19 prevalence, especially in emergencies. Due to increased length of hospital stay, nosocomial COVID-19 risk was greater with open procedures.

VAO12

Cardiovascular Risk Modification in Patients Managed with Elective Abdominal Aortic Aneurysm Repair

Miss Larissa Dearie[1], Mr Daniel Riding[2], Miss Valeria Wyszynski[2], Professor Julie Brittenden[1], Mr Keith Hussey[1]

[1]Nhs Greater Glasgow And Clyde, Queen Elizabeth University Hospital , Scotland, [2]Glasgow University Medical School, Glasgow, Scotland

Aim

The 15-year outcomes from the EVAR-1 trial described all-cause mortality during the follow-up period. Deaths related to cardiovascular disease (composite group of coronary heart disease, stroke and other vascular disease) were common. We have explored smoking cessation and prescription of an antiplatelet agent/statin in patients admitted electively for aneurysm repair.

Methods

Retrospective analysis of patients admitted to a single Scottish Health board using National Vascular Registry returns. The dataset was completed using the CHI number and case linkage. Specific outcome measures of interest included current smoking and the prescription of both antiplatelet agents and statins.

Results

There were 333 interventions performed for aneurysm. There were 225 patients eligible for inclusion (108 were excluded because the intervention was performed for either symptomatic or ruptured aneurysm). The mean age at the time of treatment was 72-years, 206 were men and 79 had a pre-existing diagnosis of ischaemic heart disease. At the time of treatment 59 were still smoking, 114 patients were prescribed an antiplatelet and 148 patients a statin.

Conclusion

In this group of patients cardiovascular risk modification is poor.

VAO13

An Analysis of Aortic Arch Anatomical Variations in 'Non-Dissecting' Acute Aortic Syndromes

Mr Will Selway[1], Mr Alex Rolls[2,3], Professor Peter Holt[1], Professor Ian Loftus[1]
[1]St George's Vascular Institute, London, United Kingdom, [2]St Marys Hospital Department of Vascular Surgery, London, United Kingdom, [3]Department of Vascular Surgery, Fiona Stanley Hospital, Perth, Australia

Objective
To examine the frequency of aortic arch variants in patients presenting with penetrating aortic ulcer (PAU) and Type-B intramural haematoma (IMH).

Methods
PACS databases from three major vascular centres were interrogated using pre-defined search terms. Cross-sectional images from 181 patients with PAU and Type-B IMH were identified and scrutinised for variations on normal arch branch anatomy. Arch angulation was evaluated to determine type 1, type 2 or type 3 arch prevalence. Results were compared against a control group of 200 patients identified through the search found not to have aortic pathology.

Results
Of 181 patients with PAU and IMH, 30% (n=54) had variant arch anatomy compared to 34% (n=68) in the control cohort. Bovine arch incidence between cohorts was equivocal, 27% (n=48) in the PAU and IMH group and 28% (n=56) in the control group. There was a significant difference in the proportion of type 3 arches in the PAU and IMH group with 60% (n=109) compared to 28% (n=56) amongst the control group (p=<0.001).

Conclusions
The higher prevalence of type 3 arch in the PAU and IMH cohort is suggestive that increased angulation of the aortic arch could be viewed as a risk factor for developing these pathologies.

VAO14

The role of cardiopulmonary exercise testing (CPET) in patient selection for standard endovascular aneurysm repair (EVAR).

Miss Imama Nasir[1], Miss Sarah McAnelly[1], Dr Kerry Foley[1], Mr Mohamed Banihani[1]
[1]*Lancashire Teaching Hospitals NHS Foundation Trust, Preston, UK*

Despite the widespread use of cardiopulmonary exercise testing (CPET) in the pre-operative assessment for major surgery, its use in endovascular aneurysm repair (EVAR) is less well established. The aim of this study is to determine whether the achieved CPET variables correlate with medium/long-term survival.

A retrospective review of regional vascular centre database was carried out for the period between August 2013 and March 2019. Data collected included patient demographics, BMI, type of stent used, survival (months) and CPET parameters. Simple averages and non-parametric tests were used to identify any significant differences between groups.

204 patients were included. Around 22% of patients undergoing EVAR did not survive 24 months. Only two variables were associated with reduced long-term survival. An Oxygen ventilatory equivalent (VE/VO2) of 35 or above (p=0.008) and an anaerobic threshold (AT) of <10.3ml/kg/min (p=0.001).

There is still a room for improvement in patient selection for EVAR. In our local population, CPET parameters, especially VE/VO2 and AT can be used to assist decision making in those complex cases.

VAO15

The role of submaximal or inadequate cardiopulmonary exercise testing in risk stratification and patient selection for endovascular abdominal aortic aneurysm repair

Dr Immerjeet Kular[1], Mr Mohamed Banihani[1], Miss Ellen Waller[1]
[1]*Lancashire Teaching Hospitals NHS Trust, Preston, England*

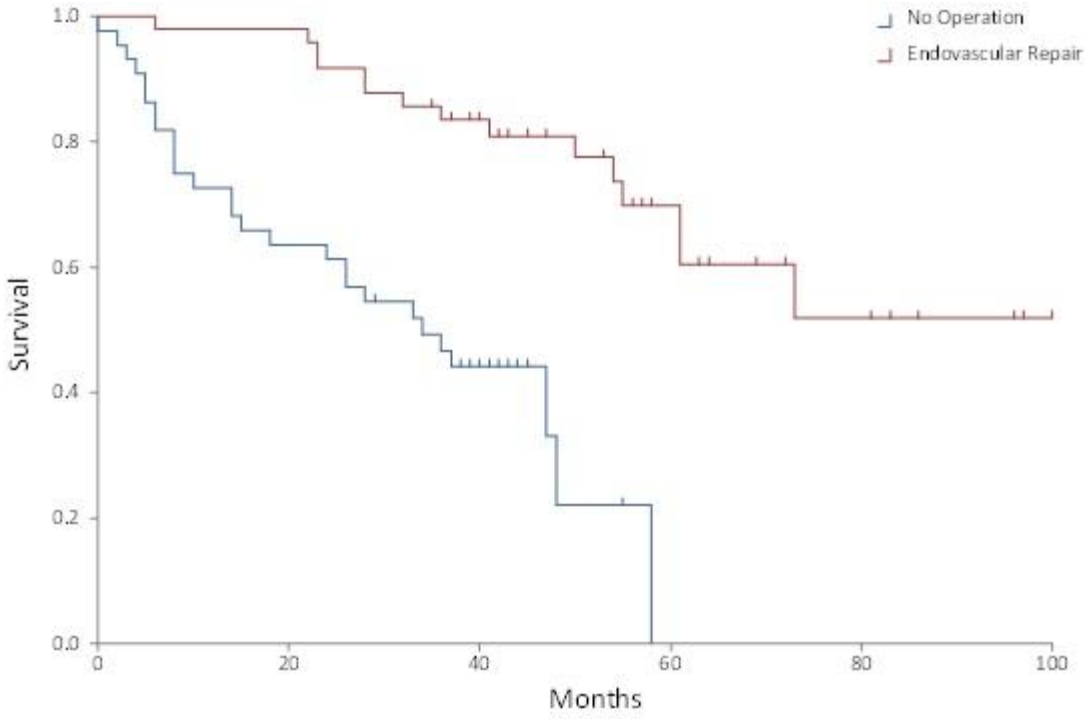
Background
Cardiopulmonary Exercise Testing (CPET) provides a reliable method of assessing functional capacity prior to Abdominal Aortic Aneurysm (AAA) repair when performed to maximal exertion. We aimed to assess the impact of CPET-derived values from submaximal/inadequate tests on 24-month and long-term mortality.

Methods
Retrospective analysis of regional vascular unit CPET database for AAA patients over a 5 year period including all patients who achieved submaximal or inadequate test. Data collected included patient demographics, CPET parameters, causes of inadequate/submaximal test and 24-month mortality.

Results
Of the 115 patients included, 65 underwent No Operation and 50 underwent EVAR. 24-month survival amongst patients who underwent EVAR was 92% vs 65% within the No Operation group. In the EVAR subgroup, 24-month survival was highest amongst patients who achieved an anaerobic Threshold (AT) of ≥10.2 and patients who achieved a VE/VCO2 ≤42.

Conclusion
Submaximal/Inadequate CPET-derived values can still aid patient selection for EVAR. Even with submaximal performance, patients who reach an AT ≥10.2 and VE/VCO2 ≤42 have the best survival benefit on medium and long term.

Figure 1: Kaplan-Meier survival analysis (all-cause long-term mortality) for Endovascular Repair vs No Operation.


No Operation
Endovascular Repair
Survival
1.0
0.8
0.6
0.4
0.2
0.0
0
20
40
60
80
100
Months

VAO16

Outcomes of Scottish patients with abdominal aortic aneurysms deemed unfit for surgery: national database figures

Dr Larissa Dearie[1], Ms Salomi Barkat[2], Ms Judith Tait[2], Mr Keith Hussey[1], Mr Douglas James Orr[1]
[1]NHS Greater Glasgow and Clyde, Glasgow, Scotland , [2]Public Health Scotland , , Scotland

Introduction
Abdominal aortic aneurysm (AAA) screening has reduced aneurysm-related mortality, but it is recognised that survival needs to exceed two years to benefit from repair. Some patients are identified as unfit for surgical repair. We investigated outcomes of those turned down at one, three and five years.

Method
Men turned down for surgery were identified via the Public Health Scotland AAA screening data set, from implementation of the program in 2012 until 31st March 2021. Using case linkage, survival and cause of death were assessed at the selected time points.

Results
15.1% (n=106) of men referred to vascular services with a screen-detected AAA, above threshold, were turned down for surgery. At one, three and five years cumulative mortality rates were 26% (n=26), 61.7% (n=37) and 78.8% (n=26) respectively. A total of 33.3% (n=21) of deaths were aneurysm-related, with 66.7% (n=42) attributed to other comorbidities: cardiovascular disease 28.6% (n=18); malignancy 17.7% (n=11); respiratory disease 15.9% (n=8) and other causes for the remaining 7.9% (n=5).

Conclusion
Mortality is high for men turned down for intervention for screen detected AAA, with only one third related to aneurysmal disease. This demonstrates clinicians are correctly identifying patients unfit for surgery in a co-morbid patient group.

VAO17

Accurate automatic 3-dimensional (3D) segmentation of aortic anatomy using a convolutional neural network improves EVAR planning workflow efficiency

Mr Tomasz Bartczak[1], Dr Adam Klimont[1], Mr Goncalo Figueira[1], Mr Matt Waltham[1], Dr Rachel Clough[1], Dr Graeme Penney[1], **Mr Tom Carrell[1]**
[1]Cydar Ltd, Cambridge, UK

Introduction
Pre-operative anatomy and disease morphological appraisal is key to successful endovascular planning. We assessed automatic vessel segmentation performed by Cydar EV, a software-as-a-medical-device utilising artificial intelligence (AI)-driven cloud image processing.

Methods
A modified 3D U-Net, a deep convolutional neural network, implemented in TensorFlow, an open-source machine-learning framework, was trained with anonymised pre-operative CT 3D image data.

The neural net iterated 200 times a 1200-scan dataset using a stochastic gradient descent technique. Augmenting the data by varying brightness, contrast, and rotation reduced network overfitting. After iterations the output was compared to ground truth, a loss function calculated and back-propagated to update network parameters. Validation was performed using a further 150 scans after each iteration to confirm network generalisation.

Final models were evaluated against ground truth segmentations. Accuracy was assessed automatically using 150 separate test scans and manually by expert observers.

Results
Final segmentation was highly accurate (Dice coefficient>0.9) with a false-negative rate of 0.11 and false-positive rate of 0.08. Manual observations confirmed absence of significant errors. After each version paired t-tests of Dice coefficients improved ($P<0.05$) compared to previous.

Conclusion
Automation of planning workflow improves efficiency. Cydar EV is advancing accurate and detailed automatic vessel segmentation reducing endovascular planning burden.

VAO18

Evaluating the efficacy and efficiency of AAA surveillance – Analysis of a Teaching Hospital programme

Mr Steve Tang[1], Dr Jing Kwan[2], Mr Marc Bailey[1], Professor Julian Scott[1], Mr Tom Wallace[1]
[1]Leeds Teaching Hospital Trust, Leeds, United Kingdom, [2]Bradford Royal Infirmary, Bradford, United Kingdom

Introduction
Our unit AAA surveillance programme has mirrored NAAASP protocols for some years. Reduced service capacity in the face of COVID-19 prompted review. Objectives were to assess efficacy and efficiency, and potential viability of tailored surveillance, particularly in the elderly.

Methods
Cross-sectional analysis of all patients on active AAA surveillance, 2018 – 2020. Outcomes included AAA size, growth-rate, comorbidity, and fate of the patients.

Results
681 patients (75% male, median age 79 years) were on surveillance. Median AAA size on enrolment was 35mm. 48% patients were aged 80+ years; median aneurysm size (growth rate, mm/year) in the 80-84, 85-89 and 90+ age groups was 41mm (1.00), 42mm (1.32) and 42mm (1.43) respectively.
65 patients reached treatment threshold; after MDT assessment 24 patients underwent elective intervention, 20 patients were turned down, 13 had threshold deferral, 7 declined intervention. 83 patients died on surveillance; 5 due to ruptured AAA, all previously deemed unsuitable for elective repair.
Tailored surveillance in our programme would have saved up to 450 scans per year, depending on criteria, without apparent risk of harm.

Conclusion
Current surveillance guidelines may not represent effective resource utilisation. Tailored surveillance, with periodic review of appropriateness, conceivably reduces resource utilisation and patient burden.

VAO19

Circulating micro-RNA expression in patients with acute aortic syndrome

Mr Maaz Syed[1], Dr John Tranter[1], Dr Alexander Fletcher[1], Mr Samuel Debono[1], Dr Ken Lee[1], Professor Marc Dweck[1], Dr Martin Denvir[1], Mr Orwa Falah[2], Mr Andrew Tambyraja[2], Professor Nicholas Mills[2], Professor James Dear[1], Professor David Newby[1]

[1]BHF Department for Cardiovascular Sciences, University of Edinburgh, Edinburgh, United Kingdom, [2]Department of Vascular and Endovascular Surgery, NHS Lothian, Edinburgh, United Kingdom

Background

Interrelated pathological processes cause medial degeneration in acute aortic syndrome (AAS) which manifest as intramural haematoma, penetrating aortic ulcer or aortic dissection. Micro-RNAs (miRNA) are recently discovered non-coding modulators of post-transcription protein function. We investigate serum miRNAs in patients with acute aortic syndrome.

Methods

miRNAs that interact with at least 5 genes associated with thoracic aortopathy were measured in the serum of patients with AAS. Serial computed tomography was used to measure aortic diameter and Agatston score. A linear discriminant analysis (LDA) weighted individual miRNA expression to obtain a per-patient miRNA-LDA score. This was investigated in a Cox regression model for major adverse aortic events (aortic repair, aortic rupture or aortic death).

Results

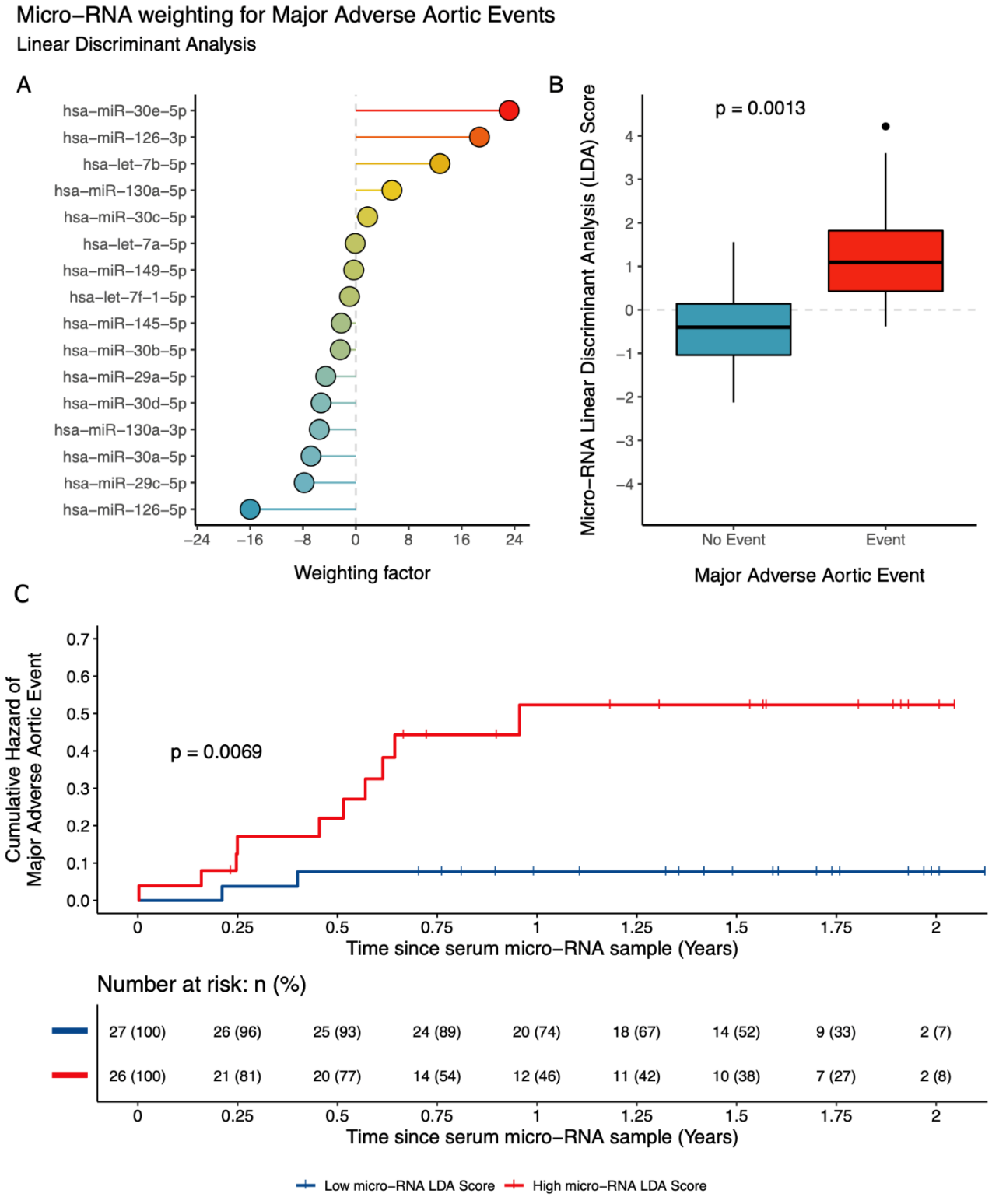
A total of 16 serum miRNAs were tested in 53 patients and 20 controls. Serum hsa-miR-29c-5p and -30b-5c were associated with aortic diameter whereas hsa-miR-130a-5p, -30a-5p, -30c-5p and -30d-5p were related to aortic expansion. Serum hsa-miR-130a-5p and 29a-5p were associated with progression in aortic Agatston score. miRNA-LDA score predicted major adverse aortic events (Figure) independent of aortic diameter (Table, $p<0.001$).

Conclusion

Circulating miRNAs are associated with disease progression in acute aortic syndrome. Determining a miRNA signature in patients with acute aortic syndrome may improve risk stratification.

	Hazard Ratio	95% Confidence Interval				p
Micro-RNA LDA Score	3.32	(	1.71	-	6.46	) <0.001*
Age (per year)	1.05	(	0.98	-	1.12	) 0.166
Sex (Male)	0.25	(	0.07	-	0.90	) 0.034*
Aortic Diameter (per 5mm)	1.08	(	0.76	-	1.54	) 0.659
Systolic Blood Pressure (per 10mmHg)	1.18	(	0.77	-	1.82	) 0.451
Time since acute aortic syndrome (per year)	0.79	(	0.52	-	1.19	) 0.262

Major Adverse Aortic Events following Acute Aortic Syndrome. Proportional Hazards Cox Regression Model


Micro−RNA weighting for Major Adverse Aortic Events
Linear Discriminant Analysis
A
hsa−miR−30e−5p
hsa−miR−126−3p
hsa−let−7b−5p
hsa−miR−130a−5p
hsa−miR−30c−5p
hsa−let−7a−5p
hsa−miR−149−5p
hsa−let−7f−1−5p
hsa−miR−145−5p
hsa−miR−30b−5p
hsa−miR−29a−5p
hsa−miR−30d−5p
hsa−miR−130a−3p
hsa−miR−30a−5p
hsa−miR−29c−5p
hsa−miR−126−5p
−24 −16 −8 0 8 16 24
Weighting factor
B
p = 0.0013
Micro−RNA Linear Discriminant Analysis (LDA) Score
No Event
Event
Major Adverse Aortic Event
C
Cumulative Hazard of Major Adverse Aortic Event
p = 0.0069
Time since serum micro−RNA sample (Years)
Number at risk: n (%)
27 (100) 26 (96) 25 (93) 24 (89) 20 (74) 18 (67) 14 (52) 9 (33) 2 (7)
26 (100) 21 (81) 20 (77) 14 (54) 12 (46) 11 (42) 10 (38) 7 (27) 2 (8)
Time since serum micro−RNA sample (Years)
Low micro−RNA LDA Score
High micro−RNA LDA Score

VAO20

Fenestrated-branch endovascular repair after total aortic arch replacement with frozen elephant trunk in patients with multi-level arch and thoraco-abdominal aortic aneurysms

Mr Ahmed Shalan[1], Dr Emanuel Tenorio[3,4], Mr Jorge Mascaro[1], Mr Maciej Juszczak[1], Mr Martin Claridge[1], Dr Andrea Melloni[5], Dr Luca Bertoglio[5], Dr Roberto Chiesa[5], Dr Gustavo Oderich[3,4], Mr Donald Adam[1]
[1]University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK, [2]University of Birmingham, Birmingham, UK, [3]Mayo Clinic, Rochester, US, [4]The University of Texas Health Sciences Centre, McGovern Medical School, Houston, US, [5]Division of Vascular Surgery, IRCCS San Raffaele Scientific Institute, Vita-Salute San Raffaele University, Milan, Italy

Objectives
To report outcomes of fenestrated-branch endovascular repair (F/BEVAR) after total aortic arch replacement with frozen elephant trunk (TAR+FET) in patients with arch and thoraco-abdominal aortic aneurysms (TAAA).

Methods
Consecutive patients with distal F/BEVAR after TAR+FET between August 2013 and September 2020 from four high-volume aortic centres were included. Primary endpoint was 30-day/in-hospital mortality. Secondary end points were technical success, mid-term patient survival and freedom from re-intervention.

Results
We identified 39 patients (21 men; median age, 73 (67-75)] with degenerative (n=22) and post-dissection TAAAs (n=17; median diameter 71mm (61-78)). Median interval between TAR+FET and F/BEVAR was 17.3 months (10.3-34.8); 31 patients had a two (n=24) or three stage (n=7) distal repair. Early primary and secondary technical success were 92% and 97%; 30-day/in-hospital mortality was 2.6%. Six survivors developed SCI associated with complete recovery (n=4), or partial recovery (n=2) at hospital discharge. Median follow-up was 30.5 months (23.7-49.7). Eleven patients required 16 late reinterventions. Estimated 3-year patient survival and freedom from re-intervention were 84±6% and 63±10%.

Conclusions
F/BEVAR after TAR+FET is associated with low early mortality. SCI risk is high, but most patients recover. Mid-term patient survival is good; late re-interventions are relatively frequent, but not associated with procedural mortality.

VAO21

Frailty assessment may aid clinical decision making and help personalise care in patients with aortic aneurysms

Dr Kathryn Brown[1], Ms Samantha Cheng[2], Ms Sarah Harley[1], Mr Clive Allen[1], Dr Dariusz Rudzki[1], Dr Jonathan Wright[1], Mr Hosaam Nasr[1], Mr Martin Claridge[1,2], Mr Donald Adam[1], Mr Maciej Juszczak[1,2]
[1]University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK, [2]University of Birmingham, Birmingham, UK

Background
Frailty is a multi-domain syndrome defined/characterised by reduced ability to cope with physiological stressors and associated with worse outcomes after surgery. The aim of this study was to report on potential clinical usefulness of assessment of frailty in supporting decision-making in patients with aortic aneurysms.

Methods
All consecutive patients seen in the specialist aortic clinic between Jul 2019 and Apr 2020 were assessed for frailty (using Rockwood Clinical Frailty Scale), cognitive status, quality of life and were screened for sarcopenia (SARC-F questionnaire). The primary outcome was fitness for surgery as indicated by Multi-Disciplinary Team (MDT), based on objective assessment of fitness. MDT members were blinded to frailty assessment.

Results
We assessed 89 patients (median age 75 [72,82], 85% male; median aneurysm diameter 6cm [5.8,7.0]; 22% infrarenal, 46% juxtarenal and 32% thoracoabdominal aneurysms). Seventeen patients were deemed not fit for surgery; 41% of these were frail compared with 14% out of those who were deemed fit. Frailty was independently associated with higher risk of dying within a year of assessment irrespective of management strategy (OR 10.3, 95%CI 1.8-57.9, p=0.009).

Conclusions
Assessment of frailty may be useful in deciding on appropriateness of surgical intervention in patients with aortic aneurysms.

VAO22

Complex endovascular repair of paravisceral infective native aortic aneurysms

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Objective

To report the early and mid-term outcome of complex endovascular repair (cEVAR) for paravisceral infective native aortic aneurysms (INAA).

Methods

All consecutive non-elective cEVARs for paravisceral INAAs between 2013 and 2020 were identified; patients who had prior aortic repair were excluded.

Results

Twenty-six patients (19 men; mean age 67±11); median diameter 60mm [IQR 55-73]) with acute symptomatic (n=24) or contained ruptured (n=2) aneurysms underwent surgeon-modified fenestrated EVAR (SM-FEVAR; n=24) or chimney-periscope EVAR (CHIMPS; n=2). Median follow-up was 36.2 months (18.3-53.5). Nine patients had positive venous blood cultures; seven patients had recent or concomitant infection; all received pre- and post-operative antibiotic therapy and rifampicin-soaked endografts. The 30-day/in-hospital mortality was 11.5% (n=3); the estimated 1- and 3-year survival (±SE) was 85% (7%). Infection-related complications (IRCs) occurred in two patients: both developed new INAA within 30 days of index repair and were treated by EVAR with no mortality. Estimated 3-year freedom from late re-intervention was 100%. One patient required infrarenal EVAR for a non-infective aneurysm at 43 months.

Conclusion

Complex EVAR for paravisceral INAAs provides acceptable early and mid-term outcomes; patients can be successfully managed with long-term antimicrobials, impregnation of graft material with rifampicin, and rigorous post-operative surveillance.

VAO23

Endovascular repair of extent I-III thoracoabdominal aneurysms without prophylactic cerebrospinal fluid drainage is safe with low rates of permanent paraplegia

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Purpose

Prophylactic cerebrospinal fluid drainage (CSFD) is used widely during endovascular thoracoabdominal aortic aneurysm (TAAA) repair. This study assesses the outcomes of fenestrated-branched endovascular aortic repair (FBEVAR) of extent I-III TAAAs without prophylactic CSFD.

Methods

Consecutive patients with extent I-III TAAA undergoing elective FBEVAR without prophylactic CSFD in 7 academic centres were identified. End-points were any spinal cord ischaemia (SCI), permanent paraplegia, and response to rescue protocol.

Results

541 patients (357 male, mean age 71(9) years; 22 extent I, 240 extent II, 279 extent III) were treated. Thirty-day/in-hospital mortality was 3%. SCI occurred in 45 (8%) patients; immediate in 17 (3%), delayed in 28 (5%); paraparesis in 27 (5%), paraplegia in 18 (3%). Rescue treatment using permissive hypertension in all patients with salvage CSFD in 21 (4%) lead to improvement in 33 (73%) patients. Two of the 21 patients with salvage CSFD had major drain-related complications. Nine (1.5%) patients had permanent paraplegia on hospital discharge.

Conclusion

FBEVAR of extent I-III TAAAs without prophylactic CSFD is associated with low mortality and low rates of permanent paraplegia. Overall, only 4% of patients required salvage CSFD and there was an almost 10% incidence of major drain-related complications in this group.

VAO24

Long term clinical implications of failure of aneurysm sac regression post endovascular aneurysm repair - a marker of therapeutic failure

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Introduction
EVAR durability has been highlighted as a concern. We aimed to study the relationship between sac size change post EVAR and long-term durability and survival.

Methods
A retrospective review of 893 EVAR patients was performed. Sac size change trajectories were determined using local polynomial regression. Outcomes of sac regression versus failure of regression were analysed using Kaplan Meier survival analysis and adjusted cox proportional hazards. Durability complications were either type 1 or 3 endoleak, rupture preventing re-intervention or rupture. Classifying patients by sac behaviour one-year post-EVAR was assessed.

Results
Freedom from durability complications was 66% (95% CI 60-74) with failure of regression versus 85% (95% CI 79-91) for sac regression 8 years post EVAR. Eight-year survival was 56% (95% CI 50-63) and 88% (95% CI 84-92) for failure of regression and sac regression groups respectively. Adjusted HR of death with failure of regression was 1.48 (95% CI 1.22, 1.79; $p<0.01$). One-year classification discriminated the risk of a durability complication (failure of regression versus regression: OR 1.97, 95% CI 1.06-3.65; $p<0.05$).

Conclusion
Failure of sac regression confers increased risks of long-term EVAR durability complications and worse survival. Post-EVAR sac behaviour at 1 year has promising potential for surveillance risk stratification.

VAO25

Aneurysm sac size change can be used to develop a dynamic personalised risk prediction model of long-term endograft complications after EVAR

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Background
Surveillance strategies have failed to mitigate late endograft failure. We studied the utility of post EVAR aneurysm sac size change in informing personalised risk predictions of endograft failure.

Methods
The ENGAGE EVAR registry was retrospectively analysed. Trajectories of post-operative sac size change were modelled with reference to a composite outcome of type 1 or 3 endoleak, rupture preventing re-intervention or rupture, Kaplan Meier analysis was performed to establish probabilities of endograft complications. Joint Bayesian modelling was used to produce individualised dynamic risk predictions of EVAR complications. K-fold cross validation assessed model discrimination and precision.

Results
Of 1151 patients, 60% had sac regression, 30% had a stable sac and 10% had sac expansion post EVAR with 5-year event-free probabilities of endograft complications of 92% (95% CI 90-94), 84% (95% CI 78-90) and 45% (95% CI 35-58) respectively. Informed by changing aneurysm diameters post EVAR, joint Bayesian modelling predicted personalised risk of endograft complications at 5 years with good discrimination and precision (AUC 0.90, prediction error 0.065).

Conclusion
Sac size change post EVAR is a promising marker of EVAR durability. Joint Bayesian modelling using post EVAR sac size changes provide a novel approach for individualised dynamic risk predictions of endograft complications.

VAO26

The magnitude of aneurysm size variability when comparing ultrasound using inner-to-inner wall measurement and Computerised tomography scans in screen detected abdominal aortic aneurysms

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Background
The NHS abdominal aortic aneurysm screening programme(NAAASP) uses ultrasound(US) inner-to-inner wall(ITI) measurement for aortic diameter. CT conventionally reports the anteroposterior outer-to-outer(OTO) wall diameter. Previous study in our unit has shown US ITI diameter to significantly vary from the US OTO technique. The diameter size thresholds used for clinical decision-making are based on OTO diameter-based study. The discrepancy in AAA size may therefore have critical consequences. The primary aim is to quantify the magnitude of the difference in NAAASP scan and the CT scan diameter.

Methods
133 paired screening-US and CT scan data was retrospectively collected from the archiving system at our trust. A 5 year period from 2015 was used. The significance of the mean difference in diameter, Δd, was examined using the Wilcoxon signed-rank test. Limits of agreement were recorded.

Results
AAA diameter ranged from 54 to 74 mm on US and from 55 to 88 mm on CT. The average difference in diameter between US and CT was statistically significant at 5.3±3.0mm($p<0.00001$)

Conclusion
The NAAASP ITI scan consistently underestimated aneurysmal size by an average of 5.3 mm relative to CT. Adapting the NAAASP to record
OTO diameter would avoid delay in intervention and provide data for more evidence-based clinical decision making.

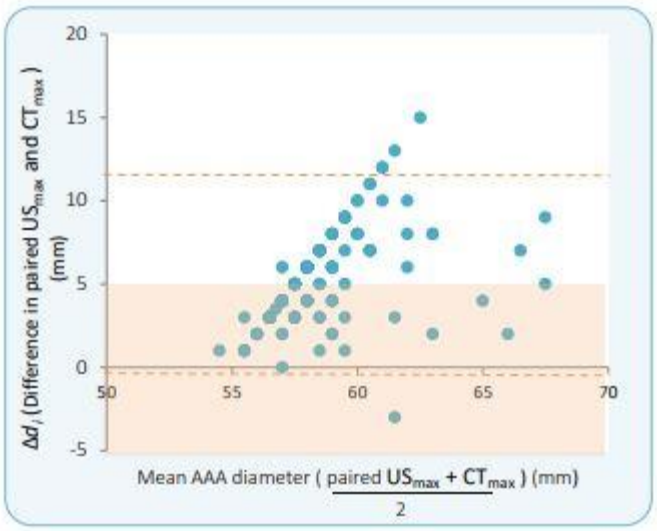

Figure 4. Bland-Altman plot depicting the relationship between mean AAA diameter and the discrepancy in US versus CT diameter. The dashed lines represent the upper and lower limits of agreement for the data in this study set. The dashed area represents the area contained in the clinically acceptable confidence interval range.

VAO27

Medical treatment of abdominal aortic aneurysms: insights from the UK Aneurysm Growth Study

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Background
The management of patients with sub-threshold abdominal aortic aneurysms is expectant. However, animal and human studies have identified pathophysiological processes that if halted via pharmacological means, can arrest aneurysm growth. We investigate the role of medical treatment on aneurysm growth using data from the United Kingdom Aneurysm Growth Study

Methods
Men attending the National Abdominal Aortic Aneurysm Screening programme between 2011 and 2019 were recruited. Baseline demographics and past medical history was obtained, as was a list of medications. Aortic diameters were measured longitudinally.Linear mixed effects models were used to assess for the effect of different medication classes on aneurysm growth.

Results
A total of 3626 participants were included. Angiotensin-Converting Enzyme (ACE) inhibitors (effect on growth: -0.265 mm/year, $p < 10\text{-}3$), biguanides (effect on growth: -0.532 mm/year, $p < 10\text{-}5$) and Sulfonylureas (effect on growth: -0.829 mm/year, $p < 10\text{-}4$) were associated with slower aneurysm growth. Antiplatelet agents were found to have a positive effect onto be associated to a small degree with faster aneurysm growth (effect : +0.104 mm/year, $p < 10\text{-}5$).

Conclusions
Therapy with ACE inhibitors, a-blockers, thiazide diuretics and biguanides was associated with a reduction in AAA progression.

VAO28

A novel algorithm for pre-operative prediction for the development of post-operative paraplegia after thoracoabdominal aortic aneurysm repair

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[1]*Kings College London, London, United Kingdom*

Introduction
Paraplegia post-thoracoabdominal aortic aneurysm repair is an unpredictable and devastating complication. Identification of risk factors has proved controversial and predicting operative risk of paraplegia challenging. This paper aimed to identify risk factors in the development of paraplegia and create a novel algorithm to provide more personalised, accurate risk-stratification of this debilitating complication.

Methodology
Patients undergoing thoracoabdominal aortic aneurysm repair were recruited across three high volume units into a prospectively maintained database between October 2016- June 2019 (n=107). AA total of 52 variables were recorded. Risk factor identification was achieved using univariate analysis. Pre-operative predictive algorithm was created using multi-logistic regression.

Results
8 patients were diagnosed with permanent paraplegia. 4 independent risk factors were identified in development of paraplegia namely; pre-operative creatinine, pre-operative patency of the left and right internal iliac and left subclavian arteries. A predictive algorithm incorporated these variables and coverage of aorta using a multi-logistic regression. Area under the receiver-operator curve was found to be 0.93.

Conclusion
This paper has identified risk factors for the development of paraplegia post-TAAA repair and demonstrated patency of each internal iliac as independent factors. We have created a novel algorithm for clinicians to pre-operatively stratify a patient's individual risk of paraplegia.

VAO29

Development of novel patient selection criteria for a short stay fenestrated endovascular aneurysm repair pathway.

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Objectives
Short Stay (SS) Endovascular Aneurysm Repair (EVAR) pathways offer the potential to improve service efficiency and patient satisfaction by reducing length of stay. This study aims to assess previously validated SS-EVAR criteria in fenestrated endovascular aneurysm repair (FEVAR).

Methods
Pragmatic and conservative risk criteria based on patient comorbidities (see table 1), were applied retrospectively to cases between January 2017 and 2020 at a tertiary centre. Rate and timings of postoperative complications, reinterventions and unplanned readmissions were assessed.

Results
Sixty-two patients were identified (92% male, mean age 73.1 +/- 7.39). Twelve (19.4%) met the conservative criteria. Three (25%) had an in-patient complication, one (8.3%) occurred post 24 hours (haematuria requiring irrigation), which would have required readmission. Forty (64.5%) met the pragmatic criteria. Ten (25%) had an in-patient complication with five occurring after 24 hours, two (5%) would have required readmission (haematuria and abdominal pain requiring diagnostic angiogram). There were no readmissions in either cohort.

Conclusions
The application of the pragmatic patient selection criteria allows patients with limited co-morbidity to be safely selected, in good number, for SS-FEVAR, without exposure to greater than national average rates of readmission. Adoption of this pathway could improve resource efficiency, whilst maintaining patient safety.

Table 1: patient selection criteria for SS-FEVAR

	Conservative risk criteria	Pragmatic risk criteria
Social	Transport available Adult observer available for 24 h post-discharge Absence of significant immobility	
Distance	<100km	< 100km
Age	<80 years	<90 years
Body mass index (kg/m2)	<35	<35
ASA grade	<=3	<=3
Advanced liver disease	Absent	Absent
Cognitive impairment	Absent	Absent
eGFR (mL/min/1.73m2)	>60	>= 45
Ischemic heart disease	No history of ischemic heart disease	No myocardial infarction in past 6 months
Cerebrovascular disease	No history of stroke or transient ischemic attack	No stroke in past 1 year
Heart failure	No heart failure	No severe heart failure (ejection fraction <40%)
Chronic lung disease	No chronic lung disease	No severe COPD (FEV1 <50%) or other severe respiratory disease.
Diabetes	No history of diabetes	No insulin-dependent diabetes

SS-FEVAR: short-stay fenestrated endovascular aneurysm repair; ASA: American Society of Anaesthesiologists; eGFR: estimated glomerular filtration rate; COPD: chronic obstructive pulmonary disease; FEV1: forced expiratory volume in 1 s.

VS Oral Abstracts (PAD, Renal Access, Carotid)

VPO1

Variation in rehabilitation referral rates and clinical outcomes following major lower limb amputation in the UK National Vascular Registry (NVR)

Dr Richard Armstrong[1,2], Dr Ronelle Mouton[2,3], Dr Shigong Guo[3], Louise Hichens[3], Mr Christopher Twine[2,3], Professor Robert Hinchliffe[2,3]

[1]Severn Deanery, Bristol, UK, [2]University of Bristol, Bristol, UK, [3]North Bristol NHS Trust, Bristol, UK

There are no guidelines on who should be referred for rehabilitation following major amputation and few data on the proportion, characteristics and outcomes of patients referred in the UK.

Patients recorded in the NVR undergoing major amputation 2014-6 were identified and their data linked to HES up to 12 months post-operatively. Patients were grouped by rehabilitation referral status, as recorded in NVR. Analyses were performed using R.

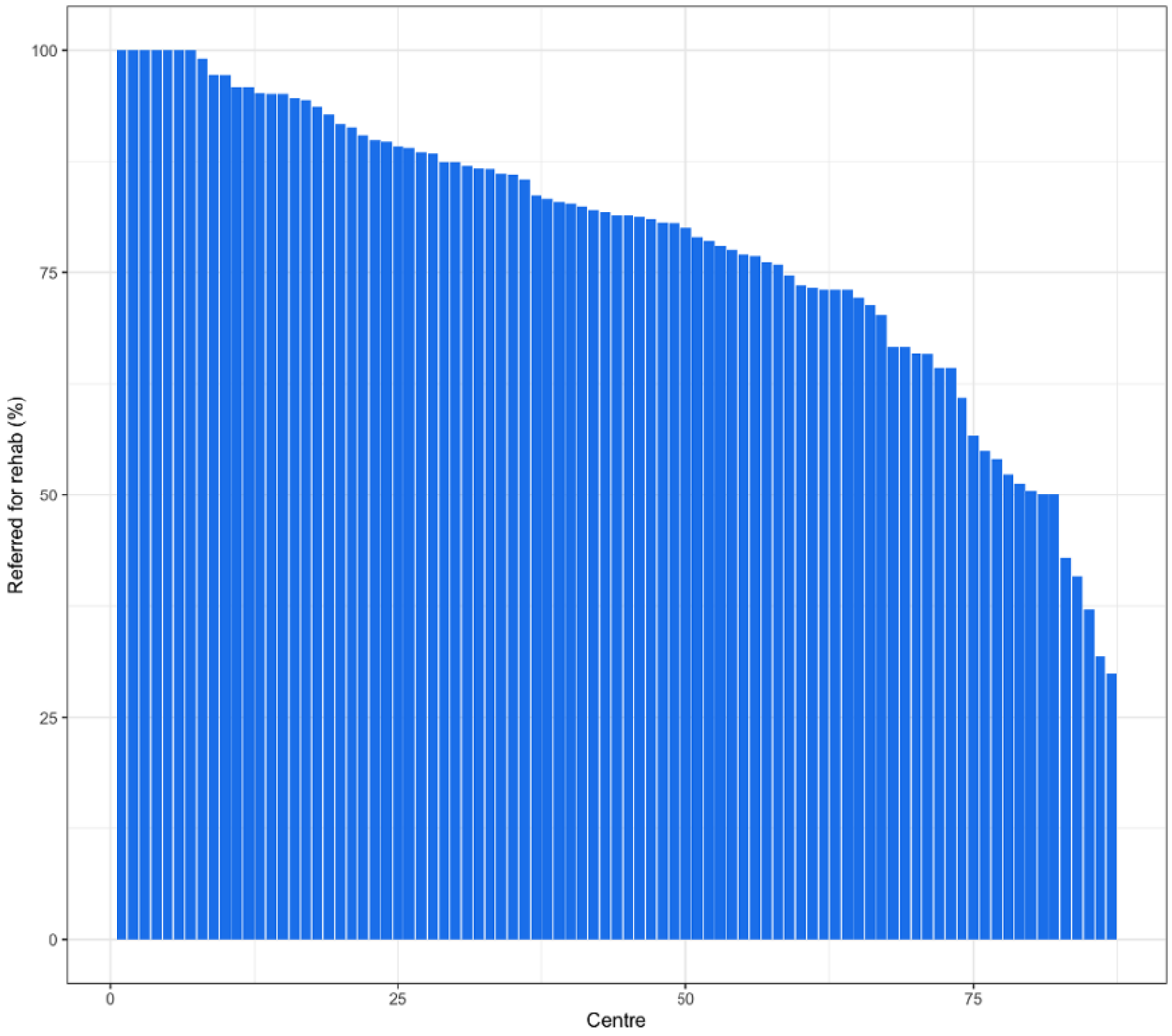
3,850 (51.9%) of 7,416 patients discharged alive with referral status recorded were successfully linked to HES. In centres performing ≥5 cases, referral rates varied from 29.9-100% (median 81.4%, Figure 1). Patients referred were less likely to have tissue loss or transfemoral amputation and more likely to be younger, male and with fewer comorbidities (Table 1). Unadjusted 12-month mortality was lower in those referred (18.4% vs 31.0%; p<0.001). This difference persisted after adjustment for age, gender, ASA, anaesthesia, admission type and hospital (adjusted HR 0.71 [0.62-0.83], p<0.001).

We have confirmed that patients referred for rehabilitation have better 12-month outcomes. However, there is wide variation in the proportion of patients referred across UK vascular centres. Further research should focus on reducing variation in referral rates and identifying those patients who derive most benefit.

Table 1: Characteristics and 12-month outcomes of patients referred and not referred for rehabilitation

(Values are n (%) unless otherwise stated)

	Referred	Not referred	p
Overall	5771 (77.8)	1645 (22.2)	
Age (mean (SD))	67.79 (13.45)	71.63 (12.44)	**<0.001**
Female	1612 (27.9)	542 (32.9)	**<0.001**
Weight (mean (SD))	78.88 (21.47)	74.92 (23.11)	**<0.001**
BMI (mean (SD))	27.60 (9.90)	26.56 (9.29)	**0.002**
Current smoker	1771 (30.7)	461 (28.0)	**0.089**
ASA grade			**<0.001**
1	76 (1.3)	5 (0.3)	
2	544 (9.4)	89 (5.4)	
3	3909 (67.7)	1032 (62.7)	
4	1223 (21.2)	513 (31.2)	
5	19 (0.3)	6 (0.4)	
Comorbidities			
Diabetes	3129 (54.2)	853 (51.9)	**0.095**
Hypertension	3477 (60.2)	994 (60.4)	**0.920**
Chronic lung disease	1091 (18.9)	370 (22.5)	**0.001**
Ischaemic heart disease	2175 (37.7)	736 (44.7)	**<0.001**
Heart failure	561 (9.7)	199 (12.1)	**0.006**
Chronic kidney disease	1149 (19.9)	370 (22.5)	**0.024**
Stroke	577 (10.0)	242 (14.7)	**<0.001**
Indication			**<0.001**
Acute limb ischaemia	920 (15.9)	237 (14.4)	
Aneurysm	30 (0.5)	9 (0.5)	
Chronic limb ischemia	1237 (21.4)	299 (18.2)	
Neuropathy	91 (1.6)	12 (0.7)	
Tissue loss	2023 (35.1)	778 (47.3)	
Trauma	69 (1.2)	9 (0.5)	
Uncontrolled infection	1401 (24.3)	301 (18.3)	
Transfemoral amputation	2293 (39.7)	929 (66.5)	**<0.001**
Mode of anaesthesia			**0.003**
GA (+/- PNB)	3558 (61.7)	980 (59.6)	
GA + RA	465 (8.1)	108 (6.6)	
LA	18 (0.3)	12 (0.7)	
RA (+/- PNB)	1730 (30.0)	545 (33.1)	
12-month outcome data	3035 (52.6)	815 (49.5)	
All-cause mortality	557 (18.4)	253 (31.0)	**<0.001**
Readmission (any reason)	2251 (74.2)	593 (72.8)	**0.443**
Reoperation	229 (7.5)	72 (8.8)	**0.253**


100
75
50
25
0
Referred for rehab (%)
0
25
50
75
Centre

VPO2

A national study of longer-term outcomes after major lower limb amputation in the UK National Vascular Registry (NVR)

Dr Richard Armstrong[1,2], Dr Ronelle Mouton[2,3], Dr Shigong Guo[3], Louise Hichens[3], Mr Christopher Twine[2,3], Professor Robert Hinchliffe[2,3]

[1]Severn Deanery, Bristol, UK, [2]University of Bristol, Bristol, UK, [3]North Bristol NHS Trust, Bristol, UK

Few contemporary data exist on medium-long term outcomes following major amputation in the UK. We aimed to record these outcomes.

All patients in the NVR undergoing major amputation from 2014-16 were eligible. Data linkage with HES was attempted up to 12 months post-operatively. Outcome measures include 1-year mortality, readmission and reintervention. Analyses were performed using R.

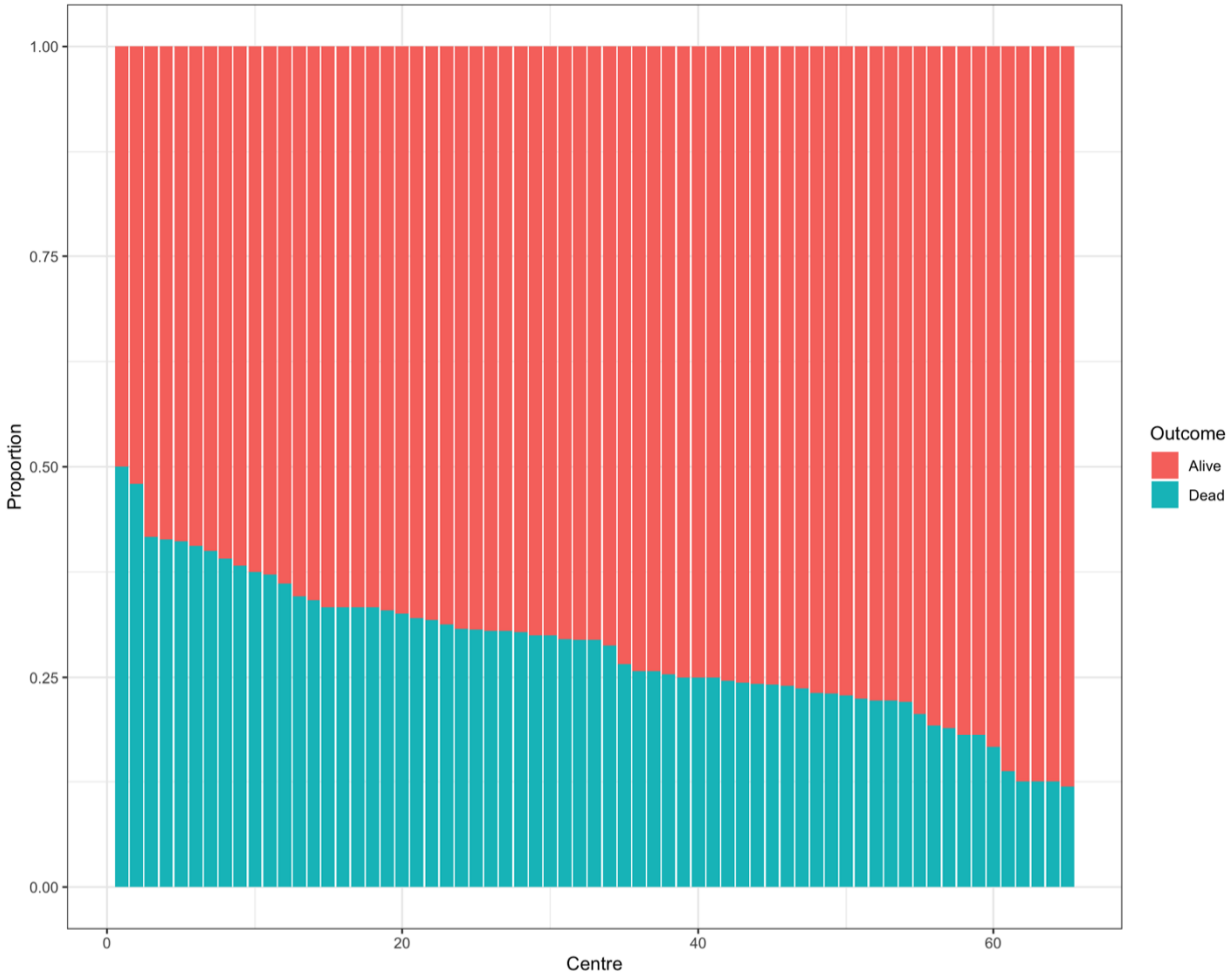
4,267 patients (49.7%) were successfully HES-linked. 12-month mortality was 28.3% (range 11.9-50% across centres performing >5 cases (Figure 1)), with no significant relationship between case volume and mortality (p=0.18). Rates were higher in transfemoral amputation and acute limb ischaemia. On average, patients who died were more likely to be older, female and have multiple comorbidities. Modifiable risk factors associated with mortality included chronic lung disease, ischaemic heart disease and heart failure (Table 1). Readmission and reoperation (on ipsilateral limb) rates were 67.3% and 7.1%, highest in chronic limb ischaemia and tissue loss.

This first report of longer-term clinical outcomes after major amputation in the UK demonstrates substantial mortality, with wide between-centre variation. The reasons for this variation, and measures to reduce it, should be explored. Only half of patients were successfully linked to HES. Routine NVR-HES linkage will help to improve reporting in future.

Table 1: Patient characteristics by 12-month survival status.

(Values are n (%) unless otherwise stated)

	Alive	Dead	p
Overall	3059 (71.7)	1208 (28.3)	
Age (mean (SD))	67.28 (13.38)	74.56 (11.25)	<0.001
Female	883 (28.9)	392 (32.5)	0.023
Weight (mean (SD))	79.54 (21.63)	73.76 (19.81)	<0.001
BMI (mean (SD))	27.49 (7.83)	26.05 (9.13)	<0.001
Current smoker	916 (29.9)	305 (25.2)	0.009
ASA grade			<0.001
1	48 (1.6)	1 (0.1)	
2	302 (9.9)	58 (4.8)	
3	2114 (69.1)	649 (53.7)	
4	587 (19.2)	478 (39.6)	
5	8 (0.3)	22 (1.8)	
Comorbidities			
Diabetes	1680 (54.9)	625 (51.7)	0.065
Hypertension	1897 (62.0)	788 (65.2)	0.054
Chronic lung disease	557 (18.2)	331 (27.4)	<0.001
Ischaemic heart disease	1112 (36.4)	546 (45.2)	<0.001
Heart failure	245 (8.0)	204 (16.9)	<0.001
Chronic kidney disease	573 (18.7)	371 (30.7)	<0.001
Stroke	308 (10.1)	154 (12.7)	0.013
Indication			<0.001
Acute limb ischaemia	425 (13.9)	237 (19.6)	
Aneurysm	9 (0.3)	4 (0.3)	
Chronic limb ischemia	615 (20.1)	227 (18.8)	
Neuropathy	52 (1.7)	4 (0.3)	
Tissue loss	1182 (38.6)	492 (40.7)	
Trauma	41 (1.3)	2 (0.2)	
Uncontrolled infection	735 (24.0)	242 (20.0)	
Mode of anaesthesia			0.008
GA (+/- PNB)	1968 (64.3)	733 (60.7)	
GA + RA	253 (8.3)	83 (6.9)	
LA	15 (0.5)	6 (0.5)	
RA (+/- PNB)	823 (26.9)	386 (32.0)	
Transfemoral amputation	1258 (41.1)	695 (57.5)	<0.001
Readmission	2176 (71.1)	695 (57.5)	<0.001
Reoperation	242 (7.9)	62 (5.1)	0.002


1.00
0.75
0.50
0.25
0.00
Proportion
0
20
40
60
Centre
Outcome
Alive
Dead

VPO3

Outcomes following Through-Knee versus Above-Knee Amputation: an analysis of UK Vascular Practice

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Through-Knee amputation (TKA) is less commonly performed than Above-Knee amputation (AKA) due to poor healing and limb fitting post-surgery. The National Vascular Registry (NVR) collects data on major amputations. The aim of this study was to determine the differences in post-operative outcomes between TKA and AKA recorded by the NVR.

NVR data for unilateral TKA and AKA procedures from Jan 2016 to Dec 2019 were obtained (approval HQIP356), validated, and analysed within IBM SPSS.

Data was included from 497 and 6757 patients undergoing TKA and AKA, respectively. TKA was more commonly performed in patients with diabetes (50% vs 43%) and during core hours (96% vs 93%). The outcomes following TKA were better including cardiac complications (5.2% vs 8.2%; p=0.020), respiratory complications (6.9% vs 10.5%; p=0.010), discharged to own residence (51.4% vs 43.9%; p=0.049), 30-day mortality (6.6% vs 11.9%; p=0.004) and rehabilitation referral (70.8% vs 61.2%; p<0.001). There was no significant difference in wound complications or return to theatre.

Accepting the limitations of registry data, this analysis suggests that TKA is potentially associated with higher rates of function, reduced complications and 30-day mortality compared to AKA. Prospective studies are needed to compare these two options in patients technically suitable for both.

VPO4

The effect of the COVID-19 pandemic on outcomes of patients undergoing lower limb revascularisation in the UK

Ms Panagiota Birmpili[1,2], Dr Qiuju Li[1,3], Dr Amundeep Johal[1], Mr Sam Waton[1], Mr Jonathan Boyle[4], Professor Ian Chetter[2,5], Mr Arun Pherwani[6], Dr Robin Williams[7], Dr Richard O'Neill[8], Professor David Cromwell[1,3]

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Introduction

The COVID-19 pandemic had significant impact on healthcare delivery globally. The aim of this study was to examine patterns of care and outcomes of lower limb revascularisation procedures in the United Kingdom during the pandemic.

Methods

All patients who underwent lower limb revascularisations in 2019 and 2020 were extracted from the National Vascular Registry. The primary outcome was in-hospital mortality and secondary outcomes were postoperative complications. Multivariable Poisson regression was used to compare excess mortality in 2020 compared to 2019 adjusting for patient and procedure characteristics.

Results

Some 26,850 primary lower limb revascularisation procedures (15,039 endovascular, 11,811 open) were analysed. There was a 23.8% reduction in procedures performed in 2020 compared to 2019 (11,611 vs. 15,239). A higher proportion of bypass procedures were performed under local/regional anaesthesia and elective patients had more severe disease (Table 1). Approximately 2.1% of patients were diagnosed with COVID-19 infection in 2020(n=241), with increased mortality (Table 2). In 2020, in-hospital mortality increased for non-elective bypass procedures and overall adjusted mortality increased 1.2 times (95%CI 1.05,1.44, p=0.010) compared to 2019 (1.92% vs 2.64%)(Table3).

Conclusion

There was marked reduction in elective procedures during the pandemic and mortality was increased, with COVID-19 infection associated with higher mortality.

Figure 1. Adjusted mortality rate ratio (aMRR) of in-hospital mortality for various patient and admission factors. Data points show aMRR and bars show 95% Confidence Intervals.

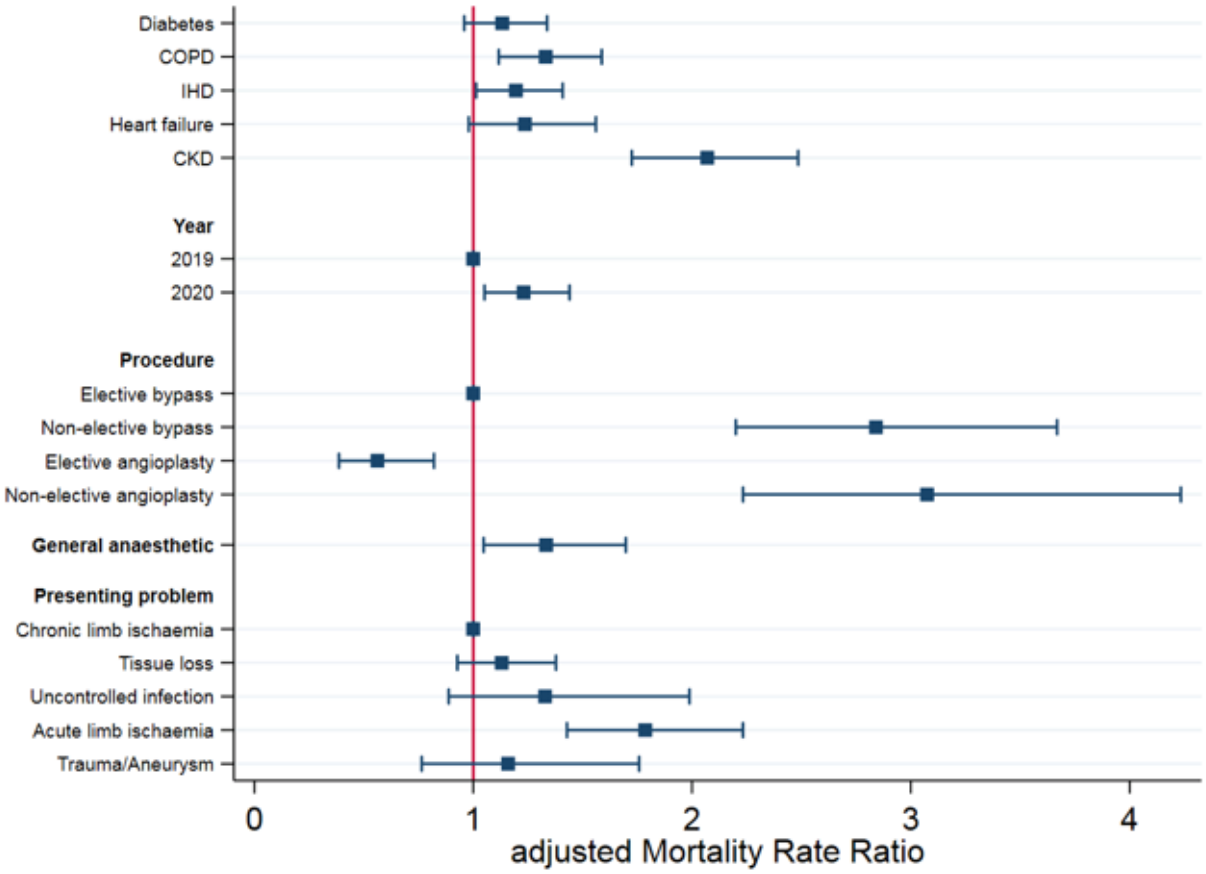

Table 1. Patient characteristics by procedure and time period of admission. Figures in bold were significantly different between the two time periods for that procedure type (p<0.05).

	Angioplasty non-elective		Angioplasty elective		Bypass non-elective		Bypass elective	
	2019	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**
No. of procedures	n=2,529	n=2,137	n=6,172	n=4,201	n=2,470	n=2,478	n=4,068	n=2,795
	%	%	%	%	%	%	%	%
Men	67.7	68.0	67.4	67.8	72.3	71.4	74.6	75.1
Diabetes	**63.1**	**66.1**	**44.0**	**49.1**	40.1	39.6	33.9	35.7
COPD	19.5	18.7	**16.5**	**18.6**	25.5	27.1	24.6	25.9
IHD	**35.1**	**31.9**	30.0	31.8	34.9	35.5	34.7	34.4
Heart failure	12.0	12.5	**6.3**	**8.2**	8.3	7.8	5.9	5.8
CKD	**22.9**	**26.4**	**12.8**	**15.4**	12.3	11.5	9.3	10.3
ASA								
1-2	21.4	24.0	**46.5**	**40.9**	10.7	11.1	**20.8**	**17.4**
3	67.8	66.6	**50.5**	**55.4**	74.6	75.0	**73.7**	**76.4**
4-5	10.8	9.4	**2.9**	**3.6**	14.7	13.9	**5.6**	**6.3**
Indication								
Chronic limb ischaemia	**41.4**	**39.4**	**73.5**	**67.5**	32.9	34.3	**69.2**	**65.5**
Tissue loss	**36.8**	**41.1**	**18.4**	**23.3**	33.2	33.3	**16.0**	**19.1**
Uncontrolled infection	**7.2**	**7.0**	**1.2**	**1.2**	3.0	3.1	**0.9**	**0.9**
Acute limb ischaemia	**13.0**	**10.9**	**5.3**	**6.7**	24.3	23.4	**4.8**	**5.9**
Trauma/Aneurysm	**1.6**	**1.7**	**1.7**	**1.3**	6.7	5.9	**9.0**	**8.6**
Fontaine								
I-II	7.0	6.2	**52.1**	**38.4**	4.0	3.3	**39.1**	**28.7**
III-IV	93.0	93.8	**47.9**	**61.6**	96.0	96.7	**60.9**	**71.3**
Anaesthetic								
Local/regional	89.6	89.2	94.2	93.3	**11.2**	**13.9**	**14.0**	**16.3**
General	10.4	10.8	5.8	6.7	**88.8**	**86.1**	**86.0**	**83.7**
COVID infection	0	3.6	0	0.5	0	4.6	0	1.1
Respiratory compl.	**2.7**	**4.0**	0.2	0.4	**4.5**	**6.9**	2.8	3.1

COPD: Chronic Obstructive Pulmonary Disease, IHD: Ischaemic Heart Disease, CKD: Chronic Kidney Disease

Table 2. In-hospital mortality by COVID-19 infection status for procedures performed in 2020

	Mortality	
	COVID-positive	**COVID-negative**
Elective bypass	16.7% (5/30)	1.5% (42/2765)
Non-elective bypass	21.2% (24/113)	4.0% (95/2365)
Elective angioplasty	35.0% (7/20)	0.7% (28/4181)
Non-elective angioplasty	34.6% (27/78)	3.8% (78/2059)

Table 3. Crude mortality for 2019 and 2020, and unadjusted and adjusted in-hospital mortality rate ratios (MRR) for 2020 using 2019 as baseline, by revascularisation procedure and overall.

	Crude mortality (%, 95% CI)		Unadjusted MRR	Adjusted MRR
	2019	**2020**	**(95% CI)**	**(95% CI)**
Elective bypass	1.03 (0.75, 1.39)	1.68 (1.24, 2.23)	1.63 (1.08, 2.46)	1.60 (1.06, 2.43)
Non-elective bypass	4.37 (3.60, 5.25)	4.80 (3.99, 5.72)	1.10 (0.85, 1.42)	1.16 (0.90, 1.49)
Elective angioplasty	0.52 (0.35, 0.73)	0.83 (0.58, 1.16)	1.61 (0.99,2.59)	1.49 (0.92, 2.42)
Non-elective angioplasty	4.35 (3.59, 5.22)	4.91 (4.04, 5.92)	1.13 (0.87, 1.47)	1.13 (0.87, 1.47)
Total	1.92 (1.70, 2.15)	2.64 (2.35, 2.94)	1.37 (1.17, 1.61)	1.23 (1.05, 1.44)

VPO5

Can Braden scores predict outcomes following lower-limb bypass surgery for chronic limb-threatening ischaemia (CLTI) and are they associated with frailty?

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Background

CLTI is associated with limb-loss, poor survival and a wealth of complications. This study aimed at identifying if routinely collected Braden scores for pressure ulceration may be utilised as a prognostic indicator following revascularisation in CLTI.

Methods

A prospectively maintained database of all patients who underwent lower limb bypass (LLBP) for CLTI between 2016-2018 was reviewed. Patient records were retrospectively analysed to calculate electronic frailty index (eFI) and retrieve Braden scores. Comparative statistics, Kaplan-Meier and Cox-regression were performed.

Results

87 LLBP patients with Braden scores were included. Those with Braden Scores ≤18 (high risk for ulceration) had a greater incidence of baseline sarcopenia (32%vs.12%, p=0.039), a higher rate of limb-loss (53%vs.28%,p=0.048), longer duration of stay (33days vs.14,p=0.039) and more overall complications (58%vs31%,p=0.035).

These patients also had a significantly worse overall survival by Kaplan-Meier (p<0.001) and independently associated with death (HR7.17(2.63-19.5),P<0.001) along with age.

Braden score's significantly correlate with an increasing eFI (p=0.016), with increasingly frail patients having higher limb-loss and re-intervention rates.

Conclusion

Braden scores appear to predict adverse outcomes following LLBP: therefore have the potential to be used as risk-stratification tools warranting validation. Braden scores may also be a widely-utilised surrogate for frailty.

VPO6

Semi-automatic measurement of carotid plaque volume using 3D ultrasound: a potential new clinical tool

Miss Alison Phair[1,2], Mr Jonathan Ghosh[1,2], Professor Charles McCollum[1], Professor Craig Smith[3], Dr Steven Rogers[1,2]

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Background

Stenosis is a poor predictor of stroke, particularly in asymptomatic carotid disease. Carotid plaque volume(CPV), as measured by 3D-ultrasound, may be a better predictor but long analysis time limits clinical utility. This study tested accuracy of Artificial Intelligence derived semi-automatic CPV measurement plus the time saved.

Methods

Semi-automatic CPV(Auto-CPV) was measured from 94 3D ultrasound scans by two blinded operators using the semi-automated software (PIUR imaging, GmbH, Austria). Inter- and intra-rater agreement, accuracy compared with the surgical volume and measurement time compared with previous manual CPV measurement were calculated.

Results

Inter- and Intra-observer error was good with mean difference(±sd)[95%CI] -0.03 (0.19) {-0.40-0.35}cm3 and -0.09(0.13) {-0.33–0.16}cm3 respectively. Both showed excellent correlation and narrow confidence intervals, ICC=0.95;95% CI(0.92-0.96) and ICC=0.97, 95% CI(0.85-0.99). Auto-CPV compared well to the surgical volume with a mean difference(±sd)[95%CI] -0.05 (0.25) [-0.53-0.43]cm3. Correlation was excellent (ICC= 0.91, 95%CI 0.86-0.94). Auto-CPV measurement was faster than previous manual CPV measurement time with median(IQR) 05:39(01:58) minutes compared to 13:05(04:15) minutes, $p<0.01$.

Conclusion

Auto-CPV assessment is accurate, reproducible and significantly faster than previous methods. Improved feasibility means CPV could be routinely assessed prior to surgery or used in large cohort studies to stratify risk in asymptomatic carotid disease.

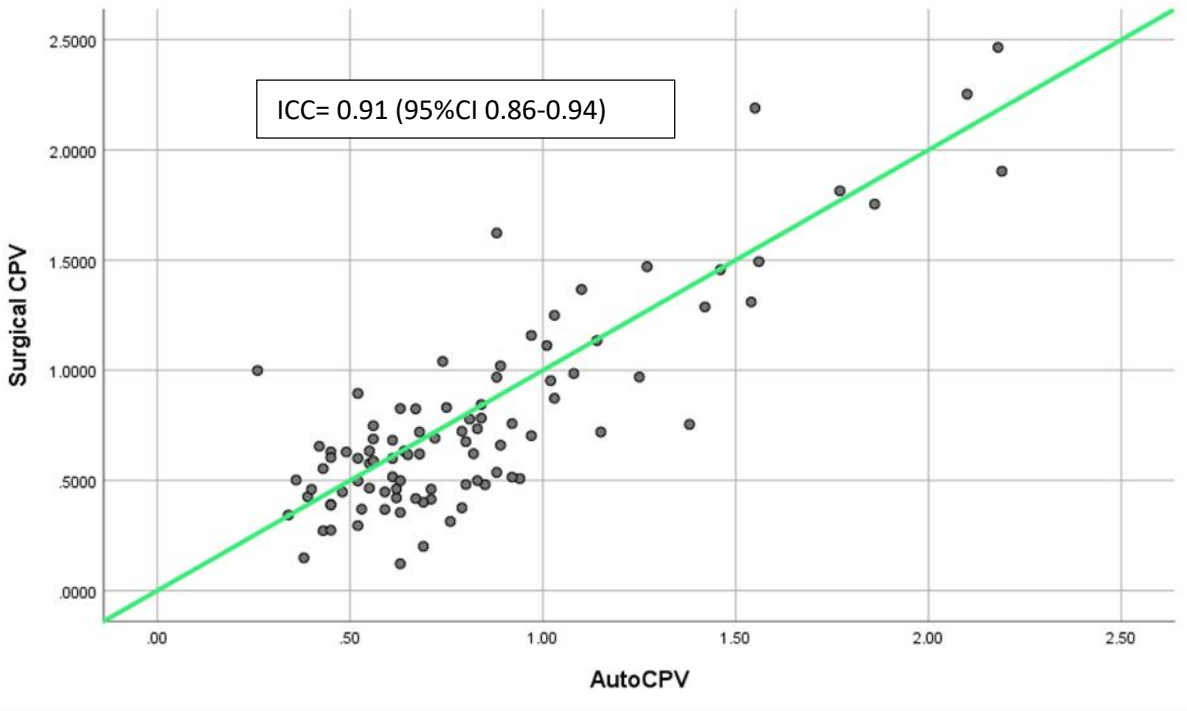

Figure 1: Interclass correlation between the surgical plaque volume and the Auto-CPV.

VPO7

Management of lower limb ischaemia using hybrid techniques: a single centre experience

Mr Manik Chana[1], Dr Sam Leckey[2], Dr Joanna Fisher[1], Mr John Fallon[1], Miss Emily Kirkham[1], Dr Vivek Vardhan[1], Mr Mark Whyman[1], Mr Sharath Paravastu[1], Mr Sachin Kulkarni[1]
[1]Gloucestershire Hospitals NHS Foundation Trust, Gloucester, UK, [2]Bristol Medical School, Bristol, UK

Introduction
Hybrid strategies are used in the management of lower limb ischaemia. This study aims to describe outcomes of hybrid techniques for lower limb revascularisation at a single centre.

Methods
Review of consecutive patients undergoing hybrid revascularisation for critical limb ischaemia (CLI) or intermittent claudication (IC). Any open groin surgical procedure including common femoral endarterectomy (CFE) and/or lower limb bypass, plus any endovascular procedure were recorded. Outcomes measured were tissue healing and/or symptom relief; surgical site infections (SSIs); major amputation rate and mortality.

Results
Total of 74 patients; median age 74 years; 80% male, underwent a hybrid procedure. Treatment for CLI in 68% and IC in 32%.
Tissue healing or symptom relief was seen in 78% of the CLI patients and in 75% of IC patients. Overall graft patency was 85% . Further procedures were required in 4 patients (5%). Major amputation was required in 4 patients (5%). SSI rate was 11% (8/74). Seroma occurred in 5% (4/74). 30 day mortality was 3% (2/74).

Conclusion
Hybrid revascularisation is safe and effective in treating CLI and IC with low risk of SSI. Our short term results suggest that hybrid revascularisation can be the first line approach in patients with multilevel disease.

VPO8

Characteristics and outcomes of patients seen in dedicated limb salvage clinic.

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Introduction
Our centre is an early adopter of the Vascular Society's Peripheral Arterial Disease Quality Improvement Framework (PAD QIF). As part of this, we set up a Chronic limb-threatening Ischaemia Clinic (CLTI). This report presents the characteristics and outcomes of patients attending the clinic.

Methods
A retrospective analysis of patients seen in CLTI clinic between October 2019 and October 2020 (follow up until February 2021) with outcomes of mortality, major limb amputations and failure of initial management against PAD QIF metrics and baseline patient characteristics.

Results
130 patients (90 males, median age 75 years) were seen in the CLTI Clinic. 20 patients died within follow up period and 18 required major limb amputation. 40 patients failed to improve on their initial management plan. Mortality was associated with diabetes (p=0.02), major amputations were more common in patients with a history of stroke (p=0.05). The delay between assessment and intervention increased the risk of major amputation (p=0.006) and failure of initial management (p=0.010). Patients managed conservatively did not have an increased risk of amputation or death but were more likely to require a change in management (p=0.010).

Conclusions
Delay in time to revascularization can lead to worse outcomes in patients with CLTI.

VPO9

Infraclavicular arterio-arterial prosthetic loop is a safe and effective vascular access technique for haemodialysis in frail patients

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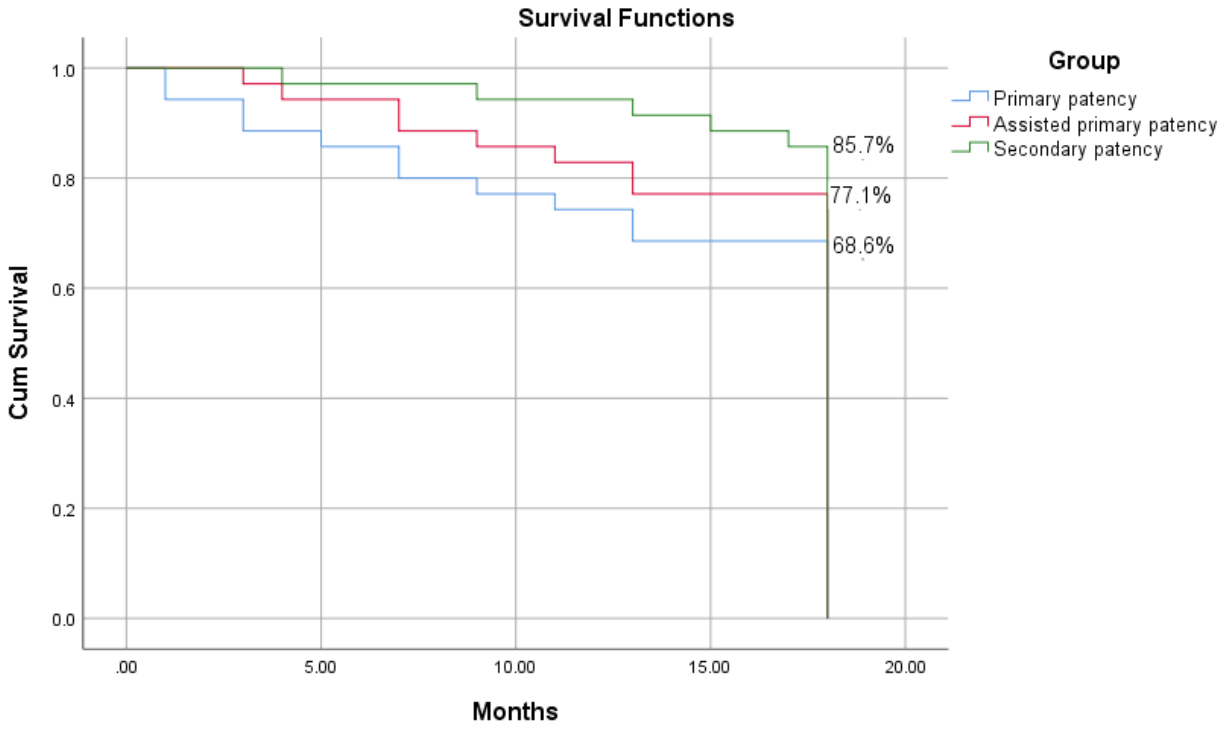
Introduction: This study assesses the short and midterm outcomes of Infraclavicular Arterio-arterial prosthetic loop (IAAPL) as vascular access for haemodialysis in frail patients who have exhausted conventional vascular access methods.

Methods: A prospective observational study of 43 patients undergoing IAAPL was conducted in a single Centre between May 2017 and March 2020. Primary, assisted primary and secondary patency rates were recorded in addition to complications and patient compliance with access.

Results: The achieved primary, assisted primary and secondary patency rates at 6 months are 87.5%, 95%, 97.5% respectively, at one year, corresponding rates were 75%, 83.3%, 94.4% and at 18 months they were 68.6%, 77.1%,85.7% respectively. There was no procedure related mortality and life threatening complications during the study period.

Conclusions: Infraclavicular AAPL is a safe and effective method of obtaining alternative vascular access for hemodialysis in frail patients for whom the conventional vascular access for hemodialysis is not suitable or contraindicated.



VPO10

The Circulation Foundation & Society for Vascular Nursing Joint Intermittent Claudication Study

Mr Matthew Popplewell[1], Miss Ruth Benson[1], Miss Alison Kite[1], Mrs Sarah Milgate[2], Mrs Tuong Vi Magowan[3], Mr Lawrence Tarusan[3], Mr Shivam Joshi[1], Professor Ian Chetter[4], Mr Sean Pymer[4], Mr Michael Jenkins[3], Mr Andrew Garnham[2], Professor Christopher Imray[1]

[1]University Hospital of Coventry & Warwickshire, Coventry, UK, [2]Black Country Vascular Unit, Dudley, UK, [3]St Mary's Hospital, London, UK, [4]Hull Royal Infirmary, Hull, UK

Introduction

Supervised exercise therapy (SET) is still inaccessible to many eligible patients in the UK. We aim to assess uptake and impact of SET in different geographical regions of the UK.

Methods

Eligible patients with intermittent claudication at four UK vascular units were offered 12-weeks of SET. The primary outcome was quality of life as assessed by EQ 5D 5L and VascuQoL at 3-months and 12-months with secondary outcomes of walking distance and adherence to treatment.

Results

In total, 218 patients were entered into the study from an eligible 882 patients screened (24.7%). Common reasons for screen failure included; travel restrictions (13.1%), a stronger preference for home-based therapy (12.6%) and personal reasons (9.9%). Adherence was calculated at 44.6%. In those that completed the study (187 patients, 85.8%) both VascuQoL (median increase 0.52, ($p<.0001$) and EQ 5D 5L (median index increase 0.05, $p<.0001$) significantly improved at 3-months with improvements in both measures sustained out to 12-months ($p<.0001$). Walking distance increased by a median of 90 metres ($p<.0001$), patients could still walk significantly further than baseline at 12-months ($p=.002$).

Conclusions

We have demonstrated sustained improvements out to 12-months in VascuQoL, EQ 5D 5L and walking distance following a 12-week programme of SET.

VPO11

Physical and biomechanical properties of the forefoot plantar fat pad in patients with diabetes

Mr Alexander David Jones[1], Mr Charitha Weerasinghe[1], Miss Precious Jolugbo[4], Professor Anthony Redmond[1,2], Begonya Alcacer-Pitarch[1,2], Dr Heidi Siddle[1,2], Mr David Russell[1,3]
[1]Leeds Vascular Institute, Leeds Teaching Hospitals, Leeds, UK, [2]Leeds Institute of Rheumatic & Musculoskeletal Medicine, University of Leeds, Leeds, UK, [3]Leeds Institute for of Clinical Trials Research, University of Leeds, Leeds, UK, [4]Leeds Medical School, University of Leeds, Leeds, UK

This study aimed to determine the relationship between plantar fat pad (PFP) thickness, stiffness (shear-wave elastography (SWE)) and peak plantar pressure (PPP) in patients with diabetes compared with healthy controls.

Three groups were recruited. Experimental diabetes group (EDG): patients with diabetic peripheral neuropathy and ≥1foot complication; diabetes control group (DCG): patients with diabetes with DPN alone or foot complications without DPN; healthy control group (HCG) without diabetes. Ultrasound was performed to determine weightbearing and resting PFP thickness and SWE to measure stiffness. Measurements were taken at the 1st-5th metatarsal heads. Corresponding PPP was measured using the Novel EMED system.

38 patients were included (EDG n=12; DCG n=11; HCG n=15) . Mean resting PFP thickness was significantly lower in the EDG compared with the DCG, 1.29 versus 1.33cm, p = 0.05. Increased mean resting PFP thickness was associated with reduced PPP: Pearson's Correlation Coefficient (PCC) -0.454, p=0.005. Increased mean weightbearing PFP thickness was associated with reduced PPP: PCC -0.376, p=0.022. No between group differences were reported for PFP stiffness.

Patients in the EDG group had significantly lower mean PFP thickness; lower PFP thickness was associated with greater PPP. This supports PFP atrophy as a contributor to increased PPP.

VPO12

Procedural and 12 month in-hospital costs of primary infra-popliteal bypass surgery, infra-popliteal best endovascular treatment, and major lower limb amputation for Chronic Limb Threatening Ischaemia

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Introduction
The financial consequences of chronic limb threatening ischaemia (CLTI) are considerable, yet few studies have examined this topic. Our aim was to compare the costs of primary infra-popliteal (IP) bypass surgery (BS), IP best endovascular treatment (BET), and major limb major amputation (MLLA).

Methods
We compared procedural human resource (HR) costs and total in-hospital costs for the index admission, and over the following 12-months, in 60 consecutive patients undergoing primary IP BS (n=20), IP BET (n=20), or MLLA (10 transfemoral and 10 transtibial) for CLTI in a single institution.

Results
Procedural HR costs were greatest for BS (BS £2,551, vs. MLLA £1,130, vs. BET £329, p<.001) due to longer procedure duration and greater staff requirement. With regard to the index admission, MLLA was the most expensive due to longer hospital stay (MLLA £13,320, vs. BS £8,714, vs. BET £4,813, p<.001). The total cost of the index admission and in-hospital care over the following 12-months remained least for BET (MLLA £26,327, vs. BS £20,401, vs. BET £12,298, p<.001).

Conclusion
Over a 12-month time horizon, MLLA and IP BS are more expensive than IP BET in terms of procedural HR costs and total in-hospital costs.

VPO13

Long-term effects of acute kidney injury following endovascular femoro-popliteal intervention: insights from a multicentre trial

Mr Emmanouil Katsogridakis[1], Mr Prakash Saha, Dr Athanasios Diamantopoulos, Professor Nikolaos Saratzis, Mr Robert Davies, Mr Hany Zayed, Professor Matt Bown, Associate Professor Athanasios Saratzis
[1]*University Of Leicester, Leicester, United Kingdom*

Background
Acute kidney injury is common after peripheral angioplasty. We examine the association between AKI severity and duration with cardiovascular mortality and whether AKI that confers an increased risk of cardiovascular mortality.

Methods
Retrospective analysis of data, obtained between 2014 and 2019 from three vascular centres. Renal function was followed up for a minimum of 90 days. Primary outcomes were the hazard ratios for cardiovascular death. Propensity score matched analysis was used to establish whether developing AKI is associated with a higher risk of cardiovascular death.

Results
239 pts developed AKI, and this was associated with an increased risk of cardiovascular mortality (Hazard Risk (HR): 4.3, 95% Confidence Intervals (CI): 2.1 – 6.8, p =0.006). This was dependent severity AKI severity (HR 5.4, 95% CI: 2.4 – 7.3, p=0.01) and duration (HR 4.2, 95% CI: 2.3 – 6.2, p=0.04). Propensity score matched analysis showed that even when patients are matched for comorbidity and procedural characteristics, AKI confers an increased risk of mortality (p = 0.04).

Conclusions
Acute kidney injury is common and confers an increased risk of long-term cardiovascular mortality, which is still present when renal decline is transient, and highest for patients with established decline in renal function.

VPO14

Incidence and risk factors for acute kidney injury following endovascular femoropopliteal intervention

Mr Emmanouil Katsogridakis[1], Ms Jess Helm, Mr Prakash Saha, Dr Athanasios Diamantopoulos, Professor Nikolaos Saratzis, Mr Robert Davies, Mr Hany Zayed, Professor Matt Bown, Associate Professor Athanasios Saratzis
[1]*University Of Leicester, ,*

Background
The incidence and risk-factors for Acute Kidney Injury (AKI) following endovascular intervention for peripheral arterial disease (PAD) remain unknown. We assess the proportion of patients with PAD who develop AKI after intervention and explore risk-factors.

Methods
Cohort study using prospectively collected data, on patients undergoing femoro-popliteal endovascular intervention for symptomatic PAD. We investigate the proportion of patients developing AKI within 48 hours and proportion developing the composite Major Adverse Kidney Events endpoints at 30 and 90 days. Multivariate regression analysis is used to assess predictors of AKI and association of AKI with mortality.

Results
Overall, 2,041 patients are included; median follow-up is 2 years. AKI was observed in 239 patients (11.7%), with 47 patients (2.3%) requiring dialysis within 30 days, and 18 (0.9%) requiring ongoing dialysis. The MAKE30 and MAKE90 composite endpoints occurred in 358 (17.5%) and 449 (22.0%) patients respectively. Risk factors for AKI were age, sex, congestive heart failure, chronic limb threatening ischaemia, emergency procedure, and pre-existing chronic kidney disease. AKI, dementia, congestive heart failure, and major amputation were risk factors for medium-term mortality.

Discussion
AKI is a common complication following intervention for PAD and is associated with medium-term mortality. Research should urgently focus on prevention strategies.

VPO15

Adherence to NICE lipid guidelines in the management of peripheral arterial disease (PAD) at a tertiary vascular centre

Nawaz Safdar[1,3], Penelope Sucharitkul[1,3], Kinshuk Jain[1,3], Keely Jones[1], Benoit Jauniaux[1,3], Ryan Laloo[1], DJA Scott[1], Marc Bailey[1,2,3]

[1]Leeds Vascular Institute, Leeds, UK, [2]Leeds Institute of Cardiovascular and Metabolic Medicine, Leeds, UK, [3]University of Leeds, Leeds, UK

Background

Previous literature on peripheral artery disease (PAD) represents 25% of global cardiovascular disease (CVD) burden. Secondary prevention is under-utilised and PAD has worse outcomes than its CVD peers (1). For lipid therapy, NICE PAD guidelines recommend high-intensity statin therapy. Recently, NICE lipid guidelines (2020) recommend treatment down to a target low-density lipoprotein cholesterol (LDL-C) of <1.8mmol/L or 40% reduction from baseline (2).

Methods

This retrospective audit collated patient information for new PAD referrals, between 1-Jan-17 to 1-Mar-20, on demographics, co-morbidities and, baseline and 1-year follow-up (FU) data on LDL-C and statin prescriptions to audit against UK NICE lipid guidelines.

Results

376 patients were included. Mean age was 68.3 (±10.4) and 68.1% of the cohort was male. 46% were on high-intensity statins at baseline, which increased to 66% at FU ($p<0.001$). At baseline, median LDL-C was 2.2mmol/L, with a 13.6% reduction to 1.9mmol/L at FU ($p<0.001$). 41% and 19% met the LDL-C targets of <1.8mmol/L and 40% reduction from baseline, respectively.

Conclusion

Although there was evidence of increased use of high-intensity statin prescription after the initial vascular clinic visit in PAD patients, LDL-C reductions are suboptimal. A move to a treat to target LDL-C approach is recommended.

VPO16

A home-based walking behaviour change programme for adults with peripheral arterial disease: Findings from the MOSAIC randomised controlled trial

Professor Lindsay Bearne[1,2], Dr Brittannia Volkmer[1], Professor Janet Peacock[1,4], Dr Abdel Douiri[1], Ms Dina Farran[1], Mr Graham Fisher[1], Dr Melissa Galea Holmes[1,5], Professor Bijan Modarai[1,3], Mr Sanjay Patel[3], Professor Catherine Sackley[1], Professor John Weinman[1,6], Dr Julie Bieles[1,6]

[1]King's College London, London, United Kingdom, [2]Kingston University & St Georges, University of London, London, United Kingdom, [3]Guy's and St Thomas' Hospital NHS Foundation Trust, London, United Kingdom, [4]Dartmouth College, Hanover, United States, [5]University College London, London, United Kingdom, [6]University of Nottingham , Nottingham, United Kingdom

Introduction

Walking exercise is a first-line treatment for adults with intermittent claudication (IC), but participation is low. This trial investigated whether the MOtivating Structured walking Activity for Intermittent Claudication (MOSAIC), a new, physiotherapist-led, home-based, walking behaviour change programme, improved walking capacity compared to usual care.

Methods

This multicentre, parallel group, randomised controlled trial enrolled adults aged over 50 years with IC between January 2018-March 2020. The primary outcome was six-minute walk distance (6MWD, metres) at three-months. Secondary outcomes included: pain-free walking time (seconds); Walking Estimated-Limitation Calculated by History (range 0-100); Nottingham Extended Activities of Daily Living Questionnaire (range 0-66); and Vascular Quality of Life Questionnaire-6 (range 6-24). Outcomes were evaluated on an intention-to-treat basis using multiple regression with baseline value and stratification factors as covariates.

Results

190 consenting participants (mean age 68 years, 30% female, 79% White) were recruited. At three-months, the MOSAIC group had greater mean 6MWD, pain free walking, self-reported walking limitation, activities of daily living, but not quality of life, compared to the usual care group (Table 1). Thirty-seven adverse events were reported (25 MOSAIC 12 usual care).

Conclusions

Among adults with IC, MOSAIC improves walking capacity and activities of daily living compared to usual care.

VPO17

Experiences and outcomes from a Vascular Limb Salvage (VaLS) clinic during the first year of the COVID-19 pandemic

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[1]Department of Cardiovascular Science, University of Leicester, UK, [2]Leicester Vascular Institute, University Hospitals of Leicester NHS Trust, UK

Introduction
Vascular limb salvage (VaLS) clinics improve patient outcomes in chronic limb-threatening ischaemia (CLTI). We assessed the resilience of the VaLS model to the first year of the coronavirus SARS-CoV-2 (COVID-19) pandemic.

Methods
A retrospective review of a prospectively maintained database of all patients assessed in the VaLS clinic between March 2020 and April 2021 was performed. This was cross referenced to national and loco-regional Governmental COVID-19 data. Individuals with CLTI were further analysed to determine PAD-QIF (Peripheral Arterial Disease – Quality Improvement Framework) compliance.

Results
Seven hundred and ninety-one patients attended for 1088 assessments [Male n = 483, 61%; Age 70.8 ± 13.9; White British n = 645, 81.5%]. In total, 482 assessments were for new CLTI (44.3%) of which 258 revascularisation procedures (endovascular n=169; hybrid n=55; open surgery n=33) and 33 major limb amputations occurred. Median referral to assessment time was 3 days in all assessments (IQR 1-5). Median assessment to intervention and referral to intervention times were 7 days (IQR 4-15) and 10 days (IQR 7-16), respectively.

Conclusion
The VaLS model has demonstrated strong resilience to the COVID-19 pandemic with rapid treatment timelines maintained for patients with CLTI.

VPO18

Selecting an optimal device for PAD screening within NHS AAA screening programmes

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Background

There are no current screening programmes for peripheral arterial disease (PAD). The NHS Abdominal Aortic Aneurysm (AAA) screening programmes are well attended and represent an opportunity to screen for other diseases with minimal additional effort/cost. A range of automated and semi-automated devices have emerged to detect PAD that would be suitable for such a programme.

Methods

Diagnostic accuracy systematic review of portable PAD screening devices, hands-on device evaluation by AAA screening programme staff and consensus conference.

Results

Six potentially suitable devices were identified in a scoping review. Published diagnostic accuracy data in comparison to ABPI, colour duplex or angiography was identified for three of these: MESI ABPI MD: sensitivity 57-74%, specificity 97-99% (X studies); Atys Systoe: sensitivity 94%, specificity 82% (Y studies); Huntleigh Dopplex: sensitivity 70% specificity 96% (Z studies). Hands-on testing with AAA screening staff identified a preference for portability, operational simplicity and full automation of PAD screening devices. The consensus conference identified the MESI device as the preferred device for PAD screening alongside AAA screening.

Conclusion

MESI ABPI MD device is the preferred choice for a PAD screening programme due to ease of use and sufficient diagnostic accuracy.

VPO19

Outcome of interventions for popliteal aneurysms: A single center 5-year experience

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Introduction
Open repair of popliteal artery aneurysms is associated with 79.4% primary patency compared to 68.2% for stenting at 3 years.

We aimed to compare the outcome of open versus endovascular repair in our institution over 5 years.

Methodology
Symptomatic and asymptomatic popliteal aneurysms exceeding 2cm that underwent repair, were retrospectively analysed. Technical success, patency and amputation rates were assessed.

Results
31 male & 3 female patients incorporating 45 limbs were included. 15 limbs were stented and 30 had open interventions (24 vein / 5 PTFE bypasses; 1 primary amputation). The mean age and diameter were 73.49 years and 35.5 mm respectively. 26.1 % had urgent repair for symptomatic disease. 3 bypass patients had wound dehiscence. The mean hospital stay was 4.8 days for open repair compared to 1.9 days for stenting.

One-year primary patency was 48% in the endovascular group compared to 90% in the open group. 3-year rates remained at 89% in the open group & declined to 24% in the endovascular group.

Conclusion
Open repair was associated with higher patency rates, however had the disadvantages of more wound complications and longer hospital stay when compared to endovascular repair.

VPO20

A systematic review of arterial thromboembolism and acute limb ischaemia in patients with COVID-19

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Introduction
COVID-19 causes endothelial dysfunction, systemic hyperinflammation, hypercoagulability and elevated proinflammatory cytokines., which combined with immobilisation has led to a significant risk of arterial thrombosis (AT). This study aimed to review the literature on COVID-19, AT and acute limb ischaemia.

Methods
Multidatabase literature search was undertaken according to PRISMA guidelines using the search terms acute limb ischaemia OR arterial thrombosis OR thrombectomy OR embolectomy AND COVID-19.

Results
Literature search identified 361 studies. Following review 30 case series and 50 case reports were included totalling 295 cases. The incidence of AT was reported as high as 15% with a significant proportion having underlying comorbidities including atrial fibrillation and CKD. AT does not appear to be associated with COVID-19 severity, and is reported in up to 19% of patients on therapeutic anticoagulation. In-hospital mortality was reported in up to 40% of cases with acute limb ischaemia, with a significant proportion undergoing primary amputation or palliative care. Approximately a third of patients undergoing revascularisation subsequently re-occluded. Amputation free survival remains as low as 25%.

Conclusion
Arterial thromboembolism is a complication in not only hospitalised COVID-19 patients but also in those with mild symptoms. Those presenting with acute limb ischaemia have poor outcomes.

VPO21

Service provision and outcomes of a Multidisciplinary Diabetic Foot Service during the COVID-19 pandemic

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The COVID-19 pandemic has had profound consequences on vascular services and outcomes globally. The effect of the pandemic on the inpatient service provision and outcomes of a Multidisciplinary Diabetic Foot Service (MDFS) were reviewed.

A retrospective analysis of a prospective database from September 2019 to November 2020 (563 admissions) was carried out. Service provision and patient outcome parameters were assessed in the following time periods: 1. September '19 – January '20, full MDFS; 2. February '20 – June '20, reduced service during COVID-19 1st wave; 3. July '20-November '20, resumption of full MDFS.

The volume of work carried out by the MDFS was consistent across the 3 time periods. The proportion of patients receiving podiatry and vascular reviews, revascularisation and amputation during admission were also similar. The length of stay was shorter after the onset of the pandemic; this was associated with an increased 90-day readmission rate. 90-day major amputation and mortality rates were higher for patients admitted in period 2 (3% and 15% respectively).

During the COVID19 pandemic, the MDFS adapted to reduced staffing and resources to continue providing treatment to patients with diabetic foot complications. However, patients presenting during the 1st wave of the pandemic had poorer outcomes.

VPO22

A cohort study of closed incision negative-pressure wound therapy compared to standard wound care in major lower limb amputation (MLLA)

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Background

Nearly, 1 in 3 undergoing MLLA experience a wound-healing complication, with implications for patient recovery. Closed-incision negative-pressure wound therapy (ciNPWT) has been shown to improve wound healing in other body areas. This cohort compares ciNPWT(Prevena), to standard wound care (SWC) dressings following MLLA.

Method

A prospective single-centre cohort of consecutive patients undergoing MLLA (Dec'20–Aug'21) receiving SWC dressings or ciNPWT in theatre. Minimum follow-up was 30-days. Demographics, postoperative outcomes including: wound complications (infection, dehiscence, haematoma, necrosis), wound healing time, readmission, and 30-day mortality were collected.

Results

Presently, 55MLLA patients; 46-SWC and 9-ciNPWT followed-up for 3.6(±1.96) months. Pre-liminary overall wound complication of 36.4% (n=20); 39.1%(n=18) in the SWC-group and 22.2%(n=2) for ciNPWT. To date, no significant difference in type of wound complication was identified, despite haematoma's occurring exclusively within the SWC-group(17.4%). Time to wound healing was significantly lower for ciNPWT with average of 21(±8.5) days compared to 84.7(±36.1) for SWC (p=0.023), but notably these figures are based on low case numbers (n=2 and n=23, respectively). Length-of-hospital stay, re-admission, return-to-theatre and 30-day mortality are also comparable (p>0.05).

Conclusion

MLLA represents a particularly high-risk surgical population that necessitates optimal incisional wound management. These study findings have supported an application for NIHR RfPB funding.

VPO23

Revision rates in major lower limb amputation and associated risk factors

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Introduction
Major lower limb amputations (MLLA) are most often performed due to end-stage peripheral arterial disease and advanced diabetic foot infection. The objective of the study was to evaluate MLLA revision rates in a regional vascular network to identify preoperative risk factors for revision surgery.

Methods
Retrospective analysis of all vascular surgical procedures at a major arterial centre between January 2018-March 2021 was performed. This identified all MLLA performed and subsequent revision surgeries.

Results
MLLA accounted for 416 (12%) operations in 316 patients. 68 patients (22%; mean age: 64 years), underwent revision surgery. 52 patients (16%) with primary definitive MLLA had revision surgery, of which the majority (35 (76%)) had a below knee amputation initially. Patients with revisions had higher rates of previous angioplasty (p=0.04), and peripheral stenting (p=0.03). There was no statistically significant difference in the rates of diabetes, chronic kidney disease and coronary artery disease between both groups.

Conclusion
Extent of peripheral arterial disease appeared to be the chief factor in determining risk of revision after MLLA. The benefit of maintaining the knee joint means that some failed attempts to preserve it are probably acceptable. Detailed clinical assessment and shared decision making remain vital.

VPO24

PERCEIVE: PrEdiction of Risk and Communication of outcome following major lower limb amputation - a collaboratIVE study. Results of 30-day outcomes.

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Introduction
Inaccurate risk prediction in Major Lower Limb Amputation (MLLA) can lead to delay to definitive surgery or undertaking MLLA when not in the patient's best interest. We aim to answer: how accurately do healthcare professionals predict outcomes after MLLA, and how does this compare to existing MLLA-specific prediction models?

Methods
A multicentre prospective observational cohort study was undertaken through the Vascular and Endovascular Research Network. Consecutive data were collected on sequential MLLAs at each centre for up to seven months. Pre-operative outcome predictions by healthcare professionals (surgeons/anaesthetists/specialist physiotherapists) were collected including estimates of patient's mortality, morbidity and ambulation (30 days and 1 year). The accuracy of predictions will be evaluated and compared to pre-existing risk prediction models.

Results
PERCEIVE launched on 01/10/2020 and ended enrolment on 01/05/2021. 41 centres (25 UK, 16 international) have contributed data on over 450 patients, with approximately 1,000 pre-operative predictions made by healthcare professionals. 30-day follow up data were returned for analysis on 15/07/2021. 13 risk prediction models (predicting mortality/morbidity) will be evaluated.

Discussion
This study will determine the accuracy of healthcare professionals' predictions of 30-day outcomes following MLLA and compare this to existing prediction models.

VPO25

The effect of a novel pathway for the management of patients with intermittent claudication in our health board with direct access to a community based exercise programme and how this programme has been affected by the COVID-19 pandemic

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Background
Intermittent claudication (IC) should be managed by referral to Supervised Exercise Therapy (SET). A referral pathway to SET at our health board was introduced in 2018.

Aim
This project studies the impact of the pathway on IC referrals from primary care, and the effect of COVID-19.

Methods
Data were extracted from Clinical Workstation, based on GP referrals (01.04.17-31.12.20). Coding techniques identified 4211 referrals. Key word filtering and application of inclusion/exclusion criteria identified 1251 IC referrals. Data including sex, medications, smoking status, imaging, outpatient appointments, and interventions for each IC referral to secondary care were analysed.

Results
Time had a significant effect on volume of IC referrals (ANOVA $P<0.05$), with a significant decrease in IC referrals between 2017 and 2018 ($P=0.047$). The pandemic had a significant impact on 2020 referrals, with a decrease in IC referrals to secondary care. Initial impact of the pathway plateaued, including no statistical significance 2018-2019.

Conclusions
A novel pathway for patients with IC reduced referrals for IC and reduced referrals from secondary care to SET. The large fall in IC referrals from primary care in 2020 was probably caused by COVID-19. More education on the NERS pathway is needed to build on initial success.

Year	2017 Q1, Q2, Q3, Q4	2018 Q1, Q2, Q3, Q4	2019 Q1, Q2, Q3, Q4	2020 Q1, Q2,Q3, Q4
No. of IC referrals to the Vascular Unit*	NA, 94, 130, 103	85, 94, 101, 76	101, 90, 96, 71	54, 35*, 66, 55
No. of referrals to NERS from the Vascular Unit	NA, 75, 96, 80	59, 62, 77, 55	70, 63, 70, NA	NA

*P<0.05

VPO26

Physical performance outcome measures in vascular amputees: a systematic review of their clinimetric properties

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Introduction
Objective physical Performance Based Outcome Measures (PerBOMs) are essential tools for holistic management of vascular amputees. However, these patients are often non-ambulatory. It is unclear which PerBOMs have adequate clinimetric measurement properties for vascular amputees.

Methods
Systematic review of PerBOMs for vascular amputees (PROSPERO registration number: CRD42019160388),following COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) methodology and Preferred Reporting Items for Systematic reviews and Meta-Analyses guidelines (Appendix A). COSMIN, risk of bias, good measurement properties and GRADE were completed for all studies, PerBOMs, and relevant clinimetric properties.

Results
48 studies were included from 11702 screened records. 35 studies investigated validity, 20 studied predictive validity, 23 investigated reliability or internal consistency and seven studies assessed responsiveness. Of 48 studies, only seven exclusively included vascular amputees.

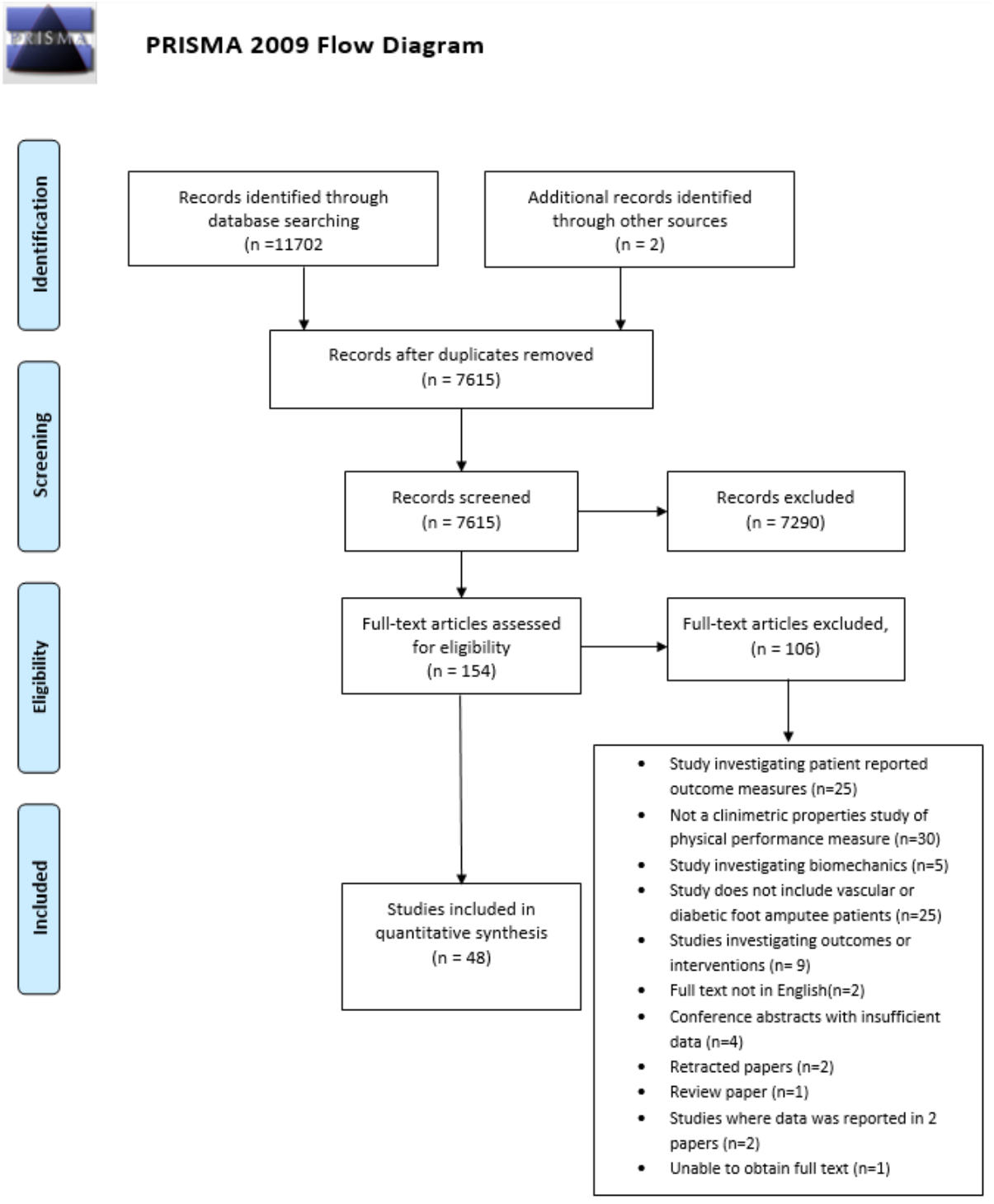
Thirty-four different PerBOMs were identified, of which only four are suitable for non-ambulatory vascular amputees. The Amputee Mobility Predictor no Prosthesis and Transfemoral Fitting Predictor predict prosthetic use only. The only PerBOMs available for assessing physical performance of non-ambulatory vascular amputees are One Leg Balance Test and Basic Amputee Mobility Score.

Conclusion
Very few PerBOMs can currently be recommended for vascular amputees and only two available for measuring physical performance in non-ambulatory individuals.

Physical performance outcome measures in vascular amputees: a systematic review of their clinimetric properties

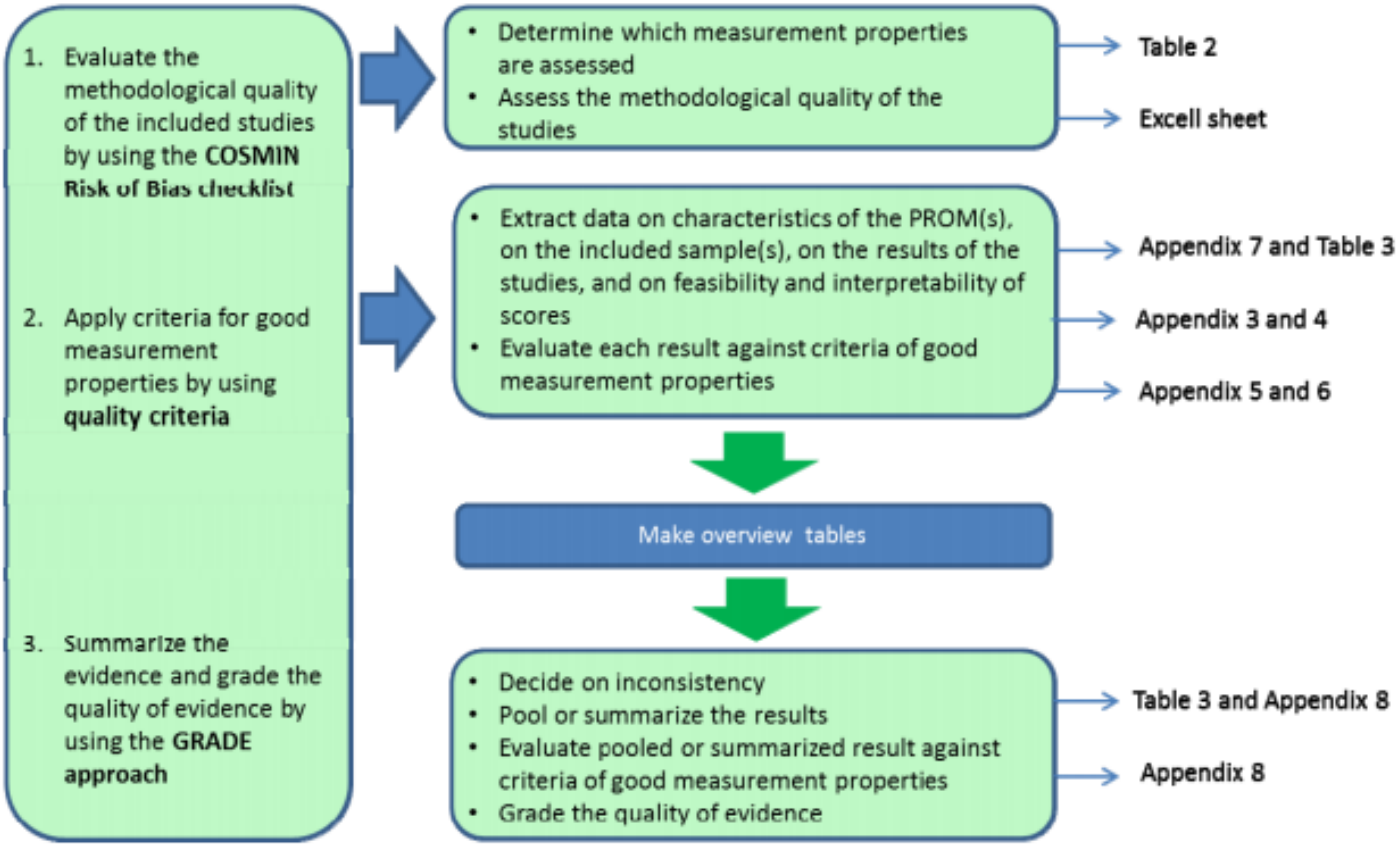
Appendix A

PRISMA flowchart



COSMIN methodology flowchart

The evaluation of each measurement property includes three sub steps (see Figure 4):



Taken from COSMIN handbook
https://www.cosmin.nl/wp-content/uploads/COSMIN-syst-review-for-PROMs-manual_version-1_feb-2018-1.pdf

VPO27

Conversion of below knee amputation to a higher level on patients with peripheral vascular disease

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Patients who has been offered below knee amputation with background of peripheral vascular disease got conversion to higher level of amputation or stump debridement

Methods
Health records of 215 patients underwent BKA on 2014-2021 have been traced and analysed for conversion to higher level or debridement.

Results
Out of 215 patients offered BKA, 43 of them had conversion/debridement as following: 37 patient had conversion to above knee amputation while 4,1,7 patients were offered higher BKA, trans-knee amputation and debridement respectively.

The time interval of conversion from the BKA date was less than 6 months, 1 year and 2 years on 25,10 and 9 patients respectively.

The conversion of amputation level was non-healing stump and infection on 19,9 patients respectively while 9 patients had combined indication of both.

Conclusion
Most conversions happens during the first 6 months and because of non-healing stumps

VPO28

THE COST OF DELAYS IN EMERGENCY DIABETIC OPERATIONS – A PROSPECTIVE COST ANALYSIS

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Background
It is projected that over 6.3 million people will have diabetes by 2035, costing the UK £39.8 billon per annum. Efforts are being made to optimise treatment pathways for diabetic patients as in-hospital delays are known to be common.

Methods
From the 1st of February 2020 to the 12th of March 2020, inpatient episodes for emergency vascular procedures in a tertiary vascular centre were prospectively followed. The primary outcome of interest was the direct costs associated with any delay of surgical intervention.

Results
Over a six-week period, a total of 42 hospital episodes from 23 diabetic patients, underwent emergency vascular procedures. Of these, 15 hospital episodes (35.7%) experienced a delay of more than one day to receiving surgery, from 12 patients (52.3%). Added bed days provided a significant expense, followed by repeat investigations. The median cost per day per patient was £378.21. The total calculated costs equated to £14779.41. Extrapolating this figure, the cost of the hospital trust over one year would be £128,085.

Discussion
Given that there are 7000 diabetic foot amputations, 4310 diabetic major lower limb amputations and 6330 diabetic bypass procedures per year in the UK, this would equate to a national cost of £6.2 million.

VPO29

Hospital frailty risk score and length of stay in lower limb ischaemia patients in England

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Background
Frailty is common in individuals with lower limb ischaemia (LLI) and related to worse outcomes, but association with length of stay (LoS) is less well understood.

Methods
Retrospective analysis of the NHS England Secondary User Service. All admissions of patients aged ≥75 to vascular surgery between January 2018 – December 2019, with a LLI primary diagnosis code, were included. Frailty risk was calculated using the Hospital Frailty Risk Score (HFRS) and classified as low- (<5), intermediate- (5-15) and high-risk (>15). LoS was compared using multivariable negative binomial regression and reported as incidence rate ratios (IRR) with 95% confidence intervals (CI).

Results
28,513 admissions (21,635 patients) were included. 9,351 patient episodes were classified as low-, 8,466 intermediate-, and 10,696 high-risk of frailty. Median LoS was 1 (interquartile range [IQR] 0-4) days for low-, 6 (IQR 1-14) days for intermediate-, and 9 (IQR 1-19) days for high-risk HFRS groups (p <.001).

Patient episodes with intermediate- and high-risk HFRS had a 78% (IRR 1.78; 95%CI 1.72, 1.84) and 157% (IRR 2.57; 95%CI 2.48, 2.66) longer LoS respectively, than low-risk.

Conclusions
Frailty risk is strongly associated with LoS in LLI. Frailty screening may identify those at greatest benefit from interventions to reduce LoS.

VS Oral Abstracts (SRS, Training, Audit)

VSO1

Symptomatic atherosclerotic vascular disease and graft survival in primary kidney transplant recipients – observational analysis of the United Network of Organ Sharing (UNOS) Database

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Recipient atherosclerotic vascular disease is associated with increased mortality rates amongst renal transplant patients. However, its effect on graft survival has not been well studied. The aim of this study was to investigate whether symptomatic atherosclerotic vascular disease (SAVD) was associated with graft survival in primary kidney transplant recipients.

This retrospective observational analysis was performed using data for adult kidney transplant recipients between 11/09/2000 and 28/02/2020 extracted from the UNOS national organ transplantation database. Patients were divided into two groups depending on presence of a history of symptomatic atherosclerotic disease (Angina or Peripheral vascular disease). Risk-adjusted outcomes were assessed by multivariate Cox regression analysis adjusting for both donor and recipient characteristics.

11,771 adult kidney transplant recipients from the UNOS database were eligible for analysis (1,543 had a history of SAVD, 10,228 did not have a history of SAVD). After adjusting for confounders, positive SAVD status was associated with a statistically significant, adverse effect on graft survival at both 1 year (HR 1.35, $p<0.001$) and 10 years (HR 1.15, $p<0.001$).
SAVD should be considered an independent risk factor for poor prognosis in patients undergoing kidney transplant.

VSO2

How effective are temporal artery biopsies in the diagnosis of Giant Cell Arteritis?

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Introduction
Temporal artery biopsies (TABs) are performed to obtain histological diagnosis of giant cell arteritis (GCA), but have low sensitivity. We aimed to assess the utility of TAB in the diagnosis of GCA.

Methods
A retrospective analysis of electronic records was conducted for all patients undergoing TAB between July 2020-March 2021 inclusive (n=54) at our hospital. The primary outcome was the histological result. Data relating to demographics, presenting symptoms, steroid use and laterality were collected. Patients with inadequate samples, unavailable results or non-diagnostic findings were excluded.

Results
Overall, 45 patients (mean age: 72 years) were included, with 23 (51.1%) having left-sided procedures and 22 (48.9%) having a right-sided TAB. There was a female preponderance (n=34; 75.6%). The commonest presenting features were headache (91.1%) and scalp tenderness (62.2%), with 22.2% presenting with visual disturbances and jaw claudication. All patients were commenced on prednisolone pre-TAB with a mean delay of 27 days. Nine (20%) TAB results were positive, requiring 5 procedures for every confirmed diagnosis.

Conclusion
TAB has poor diagnostic yield for GCA, with 80% false negative results. Further investigation is required to evaluate the utility of temporal artery ultrasound as a non-invasive, cheaper and more effective alternative modality in diagnosing GCA.

VSO3

Vascular surgeon burnout and resilience: A report from the Vascular Society Workforce Committee.

Ms Sarah Alzayyat[1], Dr Aine Ryan[1], Dr Fiona Boland[1], Professor Chris Imray[2], Ms Lucy Wales[3], Mr Mike Jenkins[4], Ms Sophie Renton[5], Professor Denis Harkin[1]

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Introduction

Occupational Burnout is a growing concern in frontline roles, such as vascular surgery, and is associated with medical errors and shorted careers. Our aim was to measure burnout and it's risk-factors among United Kingdom (UK) vascular surgeons.

Methods

Nov 2020 to Jan 2021, we surveyed Vascular Society (VS) members electronically and confidentially for Copenhagen Burnout Inventory (CBI), Brief Resilience Scale (BRS), and job-characteristics. Logistic regression analysis investigated risk factors for high burnout.

Results

148 VS members responded (49% response rate), and after excluding retired surgeons and non-consultants, 133 vascular surgeons practicing in the UK were analysed. Mean age was 49.9 ± 7.19 years; the majority (83.5%) were male. 81.3% recorded ethnic identity as White. 93.2% worked full-time; 74.8% were contracted above 10 PAs and 87.9% worked more than 40 hours per week. On-call was 1 in 6, or above, for 87.4%. Overall, 38.4% had high burnout on the CBI. Resilience levels were also high. Univariate regression analysis found no significant risk-factor for burnout.

Conclusions

Vascular surgeons in the UK have high levels of burnout and work long hours, although these do not appear related. However, policy-makers should address factors contributing to excessive working-hours for optimal surgeon and patient safety.

VSO4

Defining quality assessment in Vascular Surgery Training: An expert Delphi process

Miss Hannah Travers[1,5], Mr Andrew Beamish[2], Mr Mark McCarthy[3,5], Mr David Lewis[4,5]
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Introduction
A robust and reproducible way of assessing training should optimise and standardise vascular surgical training. This study describes the development of the vascular training programme assessment in the United Kingdom.

Methods
A Delphi consensus exercise was performed to establish the domains of training that most appropriately assess the quality of a vascular surgery training programme. Fifty-four experts participated, including trainees, training programme directors, and members of the vascular speciality advisory committee (SAC), vascular society executive and education committees.

Results
Thirty-nine experts successfully completed the 3-stage Delphi process over 15 weeks. The domains identified as most appropriate to assess the quality of a vascular training programme were: Joint Committee on Surgical Training (JCST) survey results, clinical experience, regional education programmes, radiology support, timetable, regional support for trainees, trainer support for trainees, opportunities for professional development, trainee-rated quality of consultant teaching and training, and trainee recommendation of the post.

Conclusion
Using a Delphi consensus process, appropriate domains for inclusion in the quality assessment process for a vascular training programme were identified and prioritised.

VSO5

Recruiting future vascular surgeons – the implementation of a vascular foundation teaching programme in a foundation deanery

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Introduction
Vascular surgery is a high turnover, high risk, urgent specialty with multiple referrals seen daily. Undergraduate teaching in vascular is brief and there is no formal postgraduate teaching for foundation doctors currently available, unless members of surgical societies. Moreover, recruitment into vascular surgery is lower than some other surgical specialties[1]. We identified a knowledge gap in the foundation doctors and proposed a six-session teaching series.

Methods
Three sets of teaching were offered to 40 foundation doctors at the beginning of each their surgical 4-month block at a tertiary vascular centre. The sessions were delivered by two post-FY2 vascular clinical fellows. Attendance and feedback was collated on an online tutorial booking system (TuBS). Six sessions on core topics in vascular were devised and delivered via Microsoft Teams out of normal working hours.

Results
Attendance varied from 10-16 foundation doctors per session. On feedback, all sessions were rated 5/5 and doctors felt “more confident” and “more prepared for clinical practice”. Foundation doctors wanted more clinical cases, anatomy and detail on surgical procedures.

Conclusion
Foundation doctors greatly benefit from formal teaching on common conditions in vascular surgery, which should in turn optimise patient care and may foster interest as a career pathway.

References

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VSO6

SIRT1 is decreased in diabetes, accelerating DNA damage-induced vascular calcification

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Vascular calcification (VC), the deposition of a calcified matrix in the vasculature, is an established predictor of cardiovascular risk in the diabetic patient. Recent evidence demonstrates the beneficial role of Sirtuin 1 (SIRT1), an NAD+ -dependant deacetylase, in insulin sensitivity, glucose homeostasis and vascular health; and we have previously shown that systemic SIRT1 levels are reduced in diabetes. We next aimed to establish the potential protective role of SIRT1 in VC and the molecular mechanisms involved. Histological analysis revealed that SIRT1 staining was clearly supressed, whilst DNA damage markers were increased in calcified vessels obtained from diabetic patients with critical limb ischemia compared to non-diabetic and non-calcified controls. Vascular smooth muscle cells isolated from diabetic patients, show increased DNA damage and enhanced senescence in vitro. Interestingly, pharmacological activation of SIRT1 in cultred vascular smooth muscle cells reduced DNA damage and attenuated the associated induced calcification, demonstrating a protective effect. Collectively, this data shows that the suppression of SIRT1 might perpetuate the increased occurrence of VC in diabetes, through an increase in DNA damage within the vessel wall. SIRT1 modulation may provide a therapeutic target for the vascular disease in this patient group.

VSO7

A higher incidence of chromosomal aberrations in operators performing a high volume of endovascular procedures

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Introduction
The biological effects of chronic, low dose radiation, to which endovascular operators are exposed, are unknown. We have previously demonstrated acute DNA damage/repair in lymphocytes from operators performing EVAR but this does not inform chronic damage and genomic instability evidenced by chromosomal aberrations. Using cytogenetic techniques, we examined for chromosomal aberrations in endovascular operators.

Methods
Lymphocytes were isolated from high volume operators performing complex EVAR and age-matched radiation naïve surgeons as controls. Solid staining was used to identify dicentric chromosomes (Fig1A). Translocation and complex chromosomal exchanges were determined by multiplex fluorescence in situ hybridisation (mFISH) (Fig 1B).

Results
Lymphocytes from 18 operators (12 exposed, 6 controls) were analysed. A higher frequency of dicentric chromosomes were found in exposed operators compared with controls (0.0011 vs 0.0004, respectively, P=0.002) after examining 54,000 lymphocytes. Twice as many complex, unstable translocations were seen in endovascular operators compared with controls (0.68% vs 0.32%). Chromosome loss was more frequent in endovascular operators (23 per 100 cells) compared with controls (14 per 100 cells).

Conclusions
We have found a higher frequency of chromosomal aberrations in endovascular operators compared with radiation naïve colleagues. This justifies further individual biological profiling for genomic instability and personalised radiation risk assessment.

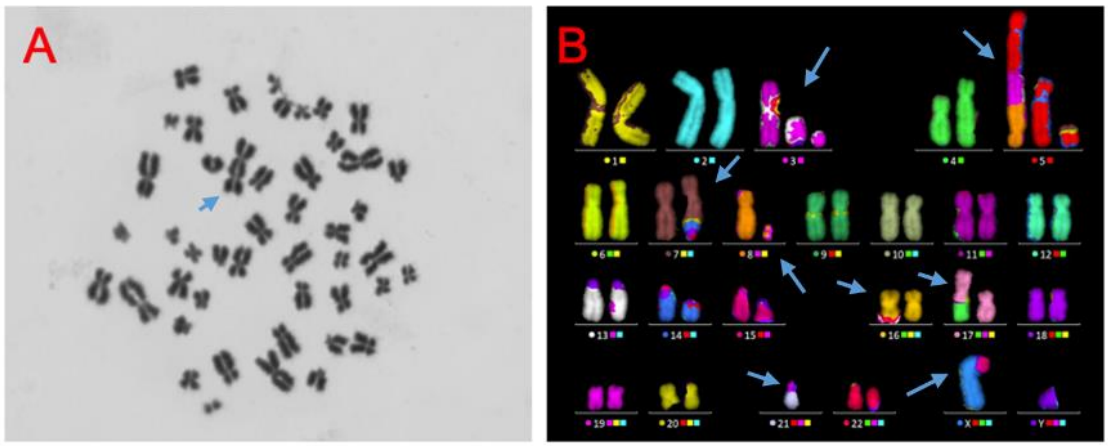


Fig 1. A) Solid staining showing a dicentric chromosome (blue arrow) and B) mFISH demonstrating a complex unstable chromosome rearrangement (blue arrows)

VSO8

Plasma desmosine as a biomarker in patients with acute aortic syndrome

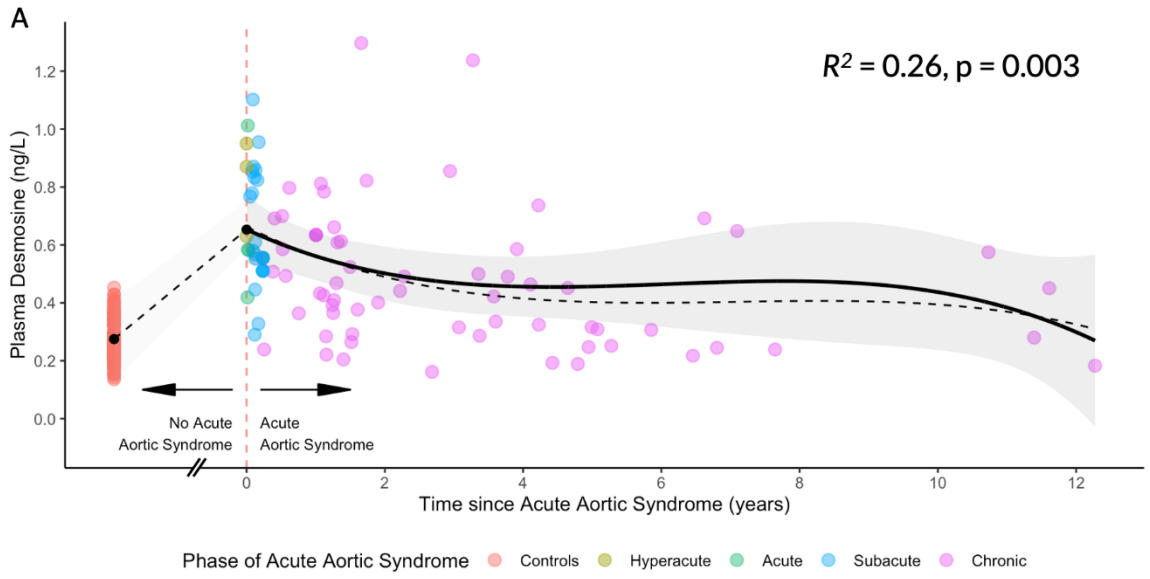
Mr Maaz Syed[1], Dr Alexander Fletcher[1], Dr Zaid Iskander[2], Mr Samuel Debono[1], Dr Calvin Chin[3], Professor Marc Dweck[1], Dr Jeffrey Huang[2], Professor David Newby[1], Dr Anna Maria Choy[2]
[1]BHF Department for Cardiovascular Sciences, University of Edinburgh, Edinburgh, UK, Edinburgh, United Kingdom, [2]Division of Molecular and Clinical Medicine, University of Dundee, Dundee, United Kingdom, [3]National Heart Centre Singapore, Singapore, Singapore

Introduction
Acute aortic syndrome is a degenerative aortopathy encompassing aortic dissection, intramural haematoma and penetrating aortic ulcers. Desmosine is a structural molecule specific to mature elastin. It is released into the circulation following elastin degradation. In this study, we characterise plasma desmosine (pDes) as a novel biomarker in patients with acute aortic syndrome.

Methods
pDes was compared between acute aortic syndrome patients and healthy controls. pDes was characterised with respect to time since the initial aortic event using a polynomial regression model adjusted for age, gender, body mass index, blood pressure and smoking history. A linear regression model for aortic growth incorporated pDes, aortic diameter, aortic Agatston score, time since acute aortic syndrome and intervention.

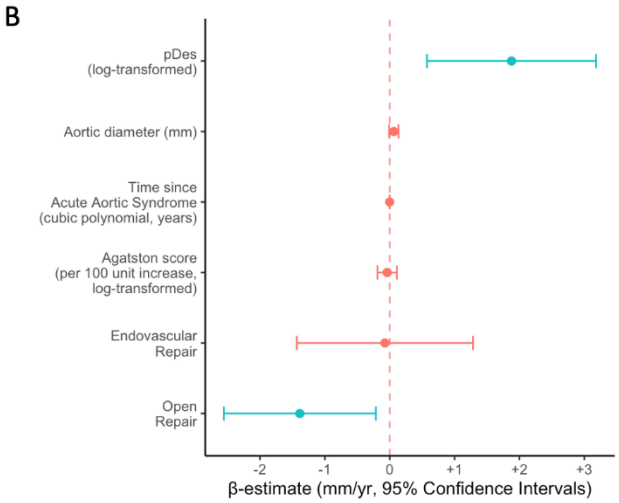
Results
Patients with acute aortic syndrome had a 2-fold increase in plasma desmosine compared to healthy controls (n=53vs106 respectively, pDes 0.58±0.26vs0.27±0.07ng/mL;$p<0.001$). pDes was detectable at presentation and peaked during the acute phase ($R2=0.26$;$p=0.003$). pDes was independently associated with aortic expansion (Beta=+2mm/yr;$p<0.001$).

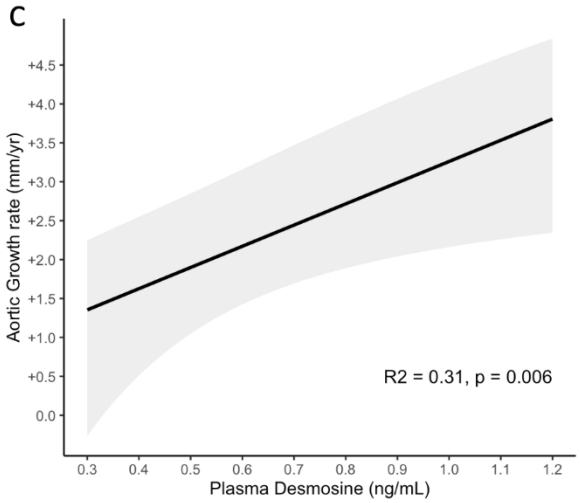
Conclusion
Plasma desmosine is a promising biomarker that is increased in patients with acute aortic syndrome and, thus, may play a role in the early diagnosis of acute aortic syndrome. Plasma desmosine is also associated with aortic expansion and may improve risk stratification.



Predictors of Aortic Expansion following Acute Aortic Syndrome

Linear Regression Model





VSO9

Audit of anticoagulation strategies for secondary prevention of atherothrombotic events in high-risk patients with peripheral and/or cardiovascular disease

Jia Zhe Su[1], Rebecca Chanda[1], Ashish Satish Patel[1]
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Introduction
Low dose rivaroxaban and aspirin is recommended by NICE for secondary prevention of major ischaemic events in high-risk patients with stable cardiovascular or peripheral vascular disease. What is the uptake of this at a tertiary vascular referral unit and what are the main barriers preventing further uptake?

Methodology
We conducted a retrospective audit of 100 patients admitted to our vascular surgery unit and assessed the total number meeting COMPASS eligibility criteria, and the proportion of those eligible without exclusion criteria. Finally, we determined the proportion of patients who were discharged on COMPASS.

Results
69 patients met eligibility criteria, of which 48 patients had valid exclusion criteria and could not receive COMPASS. The most common were long-term therapeutic anticoagulation (24 patients) and dual-antiplatelet therapy (DAPT) following lower limb intervention (16 patients). Of the 21 remaining, 7 patients were discharged on COMPASS. (Fig 1)

Conclusion
We found limited uptake of COMPASS primarily by reason of reasonable clinical exclusion, however the majority of patients who should have received COMPASS ultimately did not (67%). Quality improvement involved building consensus among consultants for use of DAPT to maximise eligibility for COMPASS, and design of a poster promoting its use in clinical environments (Image 1).

Discharging a patient?

Easy as A^3B^2C

Do they have:

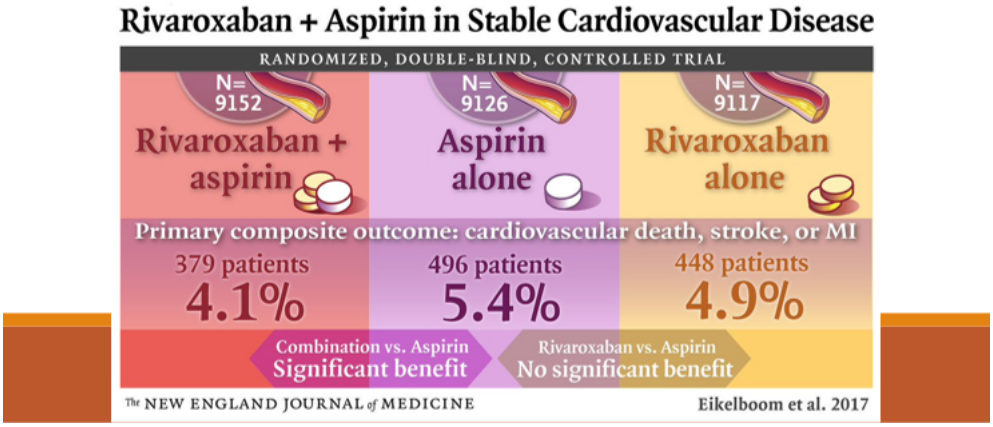
- **A**ge ≥65?
- **A**therosclerotic disease?
- **A**mputation?

And:

- **B**ar dual antiplatelets?
- **B**ar anticoagulation?

Consider **COMPASS:**

- NICE now recommends rivaroxaban 2.5mg + aspirin 75mg for secondary prevention in patients with atherosclerotic disease at high risk for ischaemic events



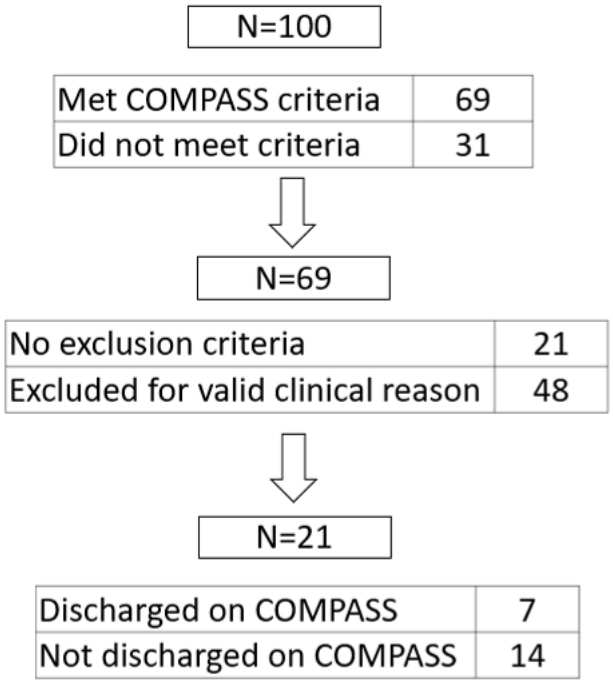


Fig 1. Breakdown of patients that met eligibility criteria for COMPASS and were subsequently discharged given no valid reason for exclusion

VSO10

Machine learning based classification of arterial spectral waveforms for the diagnosis of peripheral arterial disease in the context of diabetes: A proof of concept study

Mr Pasha Normahani[1], Mr Viknesh Sounderajah, Prof Danilo Mandic, Mr Usman Jaffer
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Background
Point-of-care duplex ultrasound (DUS) has emerged as a promising test for the diagnosis of peripheral arterial disease (PAD) in the context of diabetes. We aimed to evaluate the utility of machine learning techniques for the diagnosis of PAD from ankle Doppler waveforms in patients with diabetes.

Methods
In 2 centres, 590 ankle Doppler waveform images were prospectively collected from 305 patients. Doppler signals were reconstructed. Blinded full lower limb reference DUS results were used to label waveforms according to PAD status. Statistical metrics and multiscale wavelet variance were extracted as discriminatory features. A long short-term memory (LSTM) network was used for the classification of raw signals, and logistic regression (LR) and support vector machines (SVM) were used for classification of extracted features. Signals and feature vectors were randomly divided into training (80%) and testing (20%) sets.

Results
The highest overall accuracy was achieved using a LR model with a combination of statistical and multiscale wavelet variance features, with 88% accuracy, 92% sensitivity and 82% specificity. The area under receiver operating characteristics curve was 0.93.

Conclusion
We have constructed a machine learning algorithm with high discriminatory ability for the diagnosis of PAD using Doppler waveforms sampled at the ankle vessels.

VSO11

Vascular Hot Clinics for Cold Legs

Miss Emily Kirkham[1], Miss Sophie Harris[1], Mr Sharath Paravastu[1], Mr Sachin Kulkarni[1]
[1]*Gloucester Hospitals Nhs Foundation Trust, ,*

Introduction
Peripheral Arterial Disease – Quality Improvement Framework (PAD-QIF) has recommended 'time-to-treat' targets for Critical Limb Ischaemia (CLI). A new Vascular one-stop Hot Clinic service was established to achieve these targets; avoid unnecessary admissions and reduce burden on ED.

Methods
Data were collected prospectively (January - June 2021). Clinics were run thrice-weekly with dedicated scanning slots to enable a 'one-stop' service. Data were collected on presenting complaints and time-to-interventions. The outcomes were audited against PAD-QIF recommendations (5-days for admitted and 14-days for non-admitted patients).

Results
Overall 177 patients were seen within two days of referral (median, range 0-12). Of the 88 presented with suspected CLI; 27 (31%) were admitted directly from the clinic and 13 (15%) had elective interventions. Of those admitted, 16 had interventions within 3 days (median, range 1-13) of admission. The rest of the admitted patients were managed conservatively. Median time-to-intervention for patients managed more electively was 6-days (median, range 1-31). Of the remaining patients with suspected CLI (n=48); 39 were managed conservatively and 9 were discharged directly from the clinic.

Conclusion
Creation of this new vascular hot clinic enabled timely review and management of patients presenting with CLI in line with PAD-QIF recommendations.

VSO12

How can we better prepare medical students for a placement in vascular surgery?

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[1]University Of Exeter Medical School, Exeter, United Kingdom , [2]Royal Devon and Exeter Hospital , Exeter, United Kingdom

Introduction
Medical students have limited teaching in vascular surgery leading to apprehension prior to placements. Our aim was to identify the best learning materials to prepare students for placement and assess impact of introduction.

Method
In 2019, an online quantitative questionnaire was sent to all 3rd year medical students undertaking vascular surgery placements at a single university. Students were asked to rate quality of placement and preparedness on Likert scales (1-5), and to identify what learning materials would best support placement. In 2021, a second questionnaire was circulated after introduction of recommendations to assess impact.

Result
First and second questionnaires were completed by 54% (39/72) and 48% (25/52) respectively. Initial questionnaire recommended a workbook (64%) as the preferred format to support learning.

Following workbook introduction, rating of the vascular placement improved from 2.8/5 to 4.5/5. Students' preparedness also improved from 2.1/5 to 3.4/5. Feedback was to increase information on vascular operations and increase depth of information.

Conclusion
Identifying preferred learning methods and subsequent introduction has improved the vascular placement for 3rd year medical students. Collating appropriate feedback is a viable way of introducing new learning materials to support confidence and experience in vascular surgery placements.

VSO13

Investigating the relationship between trust volume and best practice outcomes for vascular procedures in the United Kingdom

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[1]*South East Wales Vascular Network, , UK*

Introduction
The relationship between unit volume and patient outcomes (e.g. in AAA) has been well documented. However, the relationship between unit volume and patient process measures is not well reported.

Methods
Publicly available data from the National Vascular Registry 2020 report were utilised. Regression analyses assessing unit volume against process measures (e.g. time to surgery) for CEA, AAA repair, lower limb amputation, and revascularisation procedures were conducted.

Results
Larger unit volume was associated with fewer CEA procedures within 14 days of symptoms (OR=0.997, p=0.002) and higher median delay to procedure (Beta=0.009, p<0.001).

Larger unit volume was associated with fewer AAA procedures within 8 weeks of referral (OR=0.992, p<0.001) and higher median delay to procedure (Beta=0.238, p<0.001).

Larger unit volume was associated with higher median delay to amputation (Beta=0.006, p<0.001), fewer procedures with consultant present (OR=0.994, p<0.001), and fewer patients receiving prophylactic antibiotics (OR=0.998, p<0.001).

Conversely, larger unit volume was associated with lower median delay to revascularisation (Beta=-0.002, p<0.001) and more treated within 5-days (OR=1.001, p=0.004).

Conclusion
Process measures for CEA, AAA, and amputation surgery worse with increasing unit volume, whilst process measures for revascularisation was better in larger units. Patient level NVR data has been applied for.

VSO14

Is surgery for neurogenic thoracic outlet syndrome worthwhile?

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[1]*South Mersey Arterial Unit at the Countess of Chester NHS Foundation Trust, Chester, United Kingdom*

Neurogenic thoracic outlet syndrome (nTOS) is a debilitating condition that can potentially be treated surgically. Apprehension about diagnosis and lack of outcome data may influence treatment options.

Aim
Is surgery for nTOS worthwhile?

Methods
Prospective data of patients operated between 2017-2021 who fulfilled the Society of Vascular Surgery Reporting Standards 2016 with a minimum of 6 months follow-up were analysed in relation to complete patient-reported outcome measures using the Disability of the Arm, Shoulder & Hand (DASH) scores, improvement in primary neurogenic symptoms and patients' overall perception.

Results
39 patients (mean age 37.9 years, range: 16-55) fulfilled the criteria for inclusion. Surgical approaches were supraclavicular (20), paraclavicular (8), and combined high-definition video-assisted transaxillary + supraclavicular (11). There was an 18.9 point reduction in mean (□ standard error) DASH score after surgery [preop 50.2 (□ 3.7), postop 31.8 (□4.2), paired t-test, $P<0.05$]. 32 patients (82%) improved in primary neurogenic symptoms with 4 patients (10%) declaring no improvement and 3 patients (8%) equivocal. 31 patients (79%) felt the operation was worth it, with an equal number (4 patients respectively) stating "Not worth it", or "Maybe".

Conclusion
Operations for nTOS can yield worthwhile results in 4 out of 5 patients.

VSO15

TOS UK (Thoracic outlet syndrome, United Kingdom)
service evaluation project.

Mr Ahmed Shalan[1], Mr Ahmed Elbasty[2], Mr Louis Fligelstone[3], Professor Frank CT. Smith[4], Mr Arun Pherwani[5], Mr Andrew Garnham[6]

[1]University Hospitals Birmingham, Birmingham, United Kingdom, [2]Brighton and Sussex university hospital, Brighton, United Kingdom, [3]Swansea Bay University Health Board, Morriston Hospital, Swansea, United Kingdom, [4]University of Bristol, Bristol, United Kingdom, [5]University Hospitals North Midlands NHS Foundation Trust, Stoke-on-Trent, United Kingdom, [6]The Royal Wolverhampton NHS Trust, Black Country Vascular network, Black country, United Kingdom

Introduction
Thoracic Outlet Syndrome (TOS) is a rare disease where diagnosis and management are challenging. There is lack of evidence regarding treatment options. The aims of this study are to describe the practice of this condition around the UK.

Methods
Retrospective multicentre cohort study. Cases that have been operated on during 2019 with one year follow up. The primary outcome aimed to describe the activity of vascular units regarding TOS diagnosis, management, and surgical approaches. Secondary outcomes are rate of complications and symptoms relief.

Results
24 centres are participating in this project. This is a preliminary analysis for 13 centres data. 133 patients have been identified, mean age is 36 years, 60% of patients are female. 23% had arterial TOS, 33% had venous TOS and 43% had neurogenic TOS. Only 15% of cases had Pre-op scalene block. 33% of cases had Pre-op Physiotherapy. 51% of cases had pre-op MRI, 24% had pre-op CT and 11% had both imaging. This variability is regardless of patient presentation. Mean Out-patient follow up is 13 weeks (SD17.7, range 2 to 108 weeks).

Conclusion
There is variability in TOS practice across UK. This data supports the need to collect standardised data on a national registry.

VSO16

Early results following the introduction of a Proactive care of Older People undergoing Surgery (POPS) service in Vascular Surgery

Mrs Lee-Ellen Fawcett, Dr Rebecca Anthony, Mrs Rosie Darwood[1]
[1]*Leeds Teaching Hospitals Nhs Trust, Leeds, UK*

Introduction
A POPS service was introduced for vascular surgery inpatients, delivered by a consultant geriatrician and advanced nurse practitioner. Patients >65yrs were screened on admission; selected patients underwent comprehensive geriatric assessment and follow-up. Joint vascular surgery-POPS ward rounds were conducted twice weekly, with joint daily board rounds and a weekly MDT. The aim of this study was to assess the impact of the POPS service.

Method
All patients >65yrs were included for a 3 month period (December-February 2018-2019 and 2019-2020) before and after introduction of the service. Baseline data included age, gender, co-morbidity, reason for admission and intervention. Outcome measures included length of stay (LoS), morbidity, mortality and readmission.

Results
Of 300 patients (70% male, median age 75yrs, 70% admitted non-electively); 68% underwent POPS assessment. There was a reduction in median LoS (7.5 to 6.5 days) and 30 day mortality (4% to 2.5%) but an increase in readmission rate (12.9 to 15%) although these did not reach statistical significance. There was an increase in diagnosis of delerium (4 to 13%) with a trend towards reduction in other morbiditiy.

Conclusion
This demonstrates promising initial results for the POPS service although quantitative data have not show a statistically significant improvement in outcomes.

VSO17

Development of an endovascular training programme for vascular training – a pilot study.

Miss Marta Madurska[1], Dr John Reicher[1], Dr Georgia Priona[1], Mr Matthew Thomas[1], Mr Sandip Nandhra[1], Miss Lucy Wales[1]
[1]*Newcastle Hospitals Nhs Foundation Trust, ,*

Introduction
Vascular trainees require adequate endovascular training to meet the competencies outlined by the curriculum. Training issues include limited opportunities, competing with radiology trainees and balancing service provision with training. This study presents pilot data following implementation of a collaborative endovascular training programme.

Methods
A monthly fellowship was developed with each trainee rotating through a 4-week programme of protected training sessions delivered by vascular and interventional radiology (IR) departments. Training was tailored to everyone's needs. Procedure data has been collected between April and May 2021.

Results
Over one month, each trainee participated in 19 sessions, 8 IR, 6 vascular, and 5 in the hybrid suite. Each trainee participated in 28 cases, 61% IR, 28% vascular, and 11% in the hybrid suite. 71% were peripheral arterial, and 4% aortic cases. 60% of cases were performed by the trainee with supervision. Trainees performed arterial access in 46%, crossed the lesion in 32%, delivered treatment and used a closure device in 29% of the cases.

Conclusion
Vascular trainees and trainers have welcomed the initiative and early feedback has been positive. Data collection will continue as the programme progresses, to assess how the program will meet the endovascular competencies required for completion of training.

VVO2

Risk factors for occlusion of veins within 1cm of the sapheno-femoral and sapheno-popliteal junction following endovenous laser treatment

Dr Ketino Pasenidou[1], Mr Maciej Juszczak[1], Mr Alok Tiwari[1]
[1]*University Hospitals Birmingham, ,*

Introduction
It is recommended that distance between the tip of the catheter from the sapheno-femoral (SFJ) or sapheno-popliteal junction (SPJ) during Endovenous (EVLT) procedure should be at least 2cm to minimise thrombus formation in deep veins. We investigated risk factors for occlusion(stump) of the great saphenous (GSV) or short saphenous (SSV) veins to within 1cm of the deep vein post procedure.

Method
All patient undergoing EVLT between 2012-2018 were identified. The primary outcome was the length of residual stump on follow up. We studied the association between numerous factors including BMI, laterality, anatomical distribution and junction length. Analysis was performed using R Statistical Environment.

Results
825 consecutive patients: mean age 52.5 years (17-88); 430 (52.1%) females; GSV 726 (88%) were analysed. 561(61.2%) had pre-procedure junction >2cm. The mean stump at follow up was 1.6cm (0, 10); 22.4% of patients had stump <1cm. The incidence of flush occlusion was 8.4%. Multivariable analysis showed that risk factors for stump length <1cm was the length of pre-operative junction, BMI, SSV treatment and right leg.

Conclusion
EVLT of the SSV, pre-operative junction length <2cm and BMI are associated with stump length <1cm. Consideration should be given to increasing the pre-operative junction in this group.

VVO3

Covid-19; the push our unit needed to revolutionise the provision of varicose vein treatment

Dr Rebecca Walsh[1], Mrs Lauren Shelmerdine[1], Mr Sandip Nandhra[1,2], Miss Rachel Bell[1], Mr James McCaslin[1]

[1]Northern Vascular Centre, Freeman Hospital, Newcastle upon Tyne, United Kingdom , [2]Institute of health and Society Newcastle University, Newcastle upon Tyne, United Kingdom

Background

Waiting lists are the longest they have been since 2007, with just under 5 million people awaiting surgery. Superficial venous intervention (SVI) was deferred during the COVID-19 pandemic, resulting in unprecedented pressure on theatre-based radiofrequency ablation (RFA) services during the post pandemic period.

In response to this, a pilot COVID-19 safe local anaesthesia (LA) RFA service was developed and trialled on Saturdays over a 6-week period.

Objective

To investigate the patient experience and acceptability of a Saturday LA RFA day-case list.

Methods

Participants involved in the pilot service completed a structured questionnaire post treatment.

Results

Over six Saturdays, 120 interventions were completed. Average visit duration was 101 minutes. From the questionnaire 100% of patients would recommend the service and all patients found the process convenient and “better than imagined”.

Conclusion

Patient feedback for this service was overwhelmingly positive. As well as being time efficient, approximately double the number of interventions per list were preformed compared to the general anesthesia theatre-based service. The service was COVID-19 safe, by minimizing person contact and mixing.

Most importantly though this clinic exemplifies a patient centred and well accepted approach to SVI, providing a good solution to the increased waiting lists, exacerbated by COVID-19.

VVO4

Developing a core outcome set for chronic deep venous insufficiency of the lower limb: a systematic review of reported outcomes VVO4

Miss Eleanor McNally[1], Mr Baris Ozdemir[1,2], Professor Robert Hinchliffe[1,2]
[1]University of Bristol, Bristol, United Kingdom , [2]North Bristol NHS Trust, Bristol, United Kingdom

Introduction
Deep venous disease is increasing and presents a significant burden to patients and the NHS. In response, novel interventions have been developed. A core outcome set (COS) is required to standardise outcome reporting and improve stakeholder representation in trials evaluating these interventions.

Methods
Following Core Outcome Measures in Effectiveness Trials (COMET) methodology, a systematic review was conducted to PRISMA guidance (CRD42021236795). Databases were searched Jan-2018 to Jan-2021 capturing outcomes. Clinical trials and observational studies involving >20 participants, reporting outcomes for patients with chronic deep venous insufficiency were eligible. Outcomes were extracted verbatim, condensed into agreed outcome terms and coded using COMET taxonomy.

Results
Some 103 studies were eligible. 1183 verbatim outcomes were extracted, spanning 22 domains. No outcome was reported unanimously, with the most widely reported 'primary patency' featuring in 51 (<50%) papers. There was a predominant focus on clinical outcomes (963), with 'treatment durability' (278) and 'clinical severity' (108) reported frequently. Only 60 (5%) outcomes related to life impact.

Conclusion
Outcome reporting in studies of patients with deep venous insufficiency is heterogeneous and lacks patient representation. This is hindering evidence synthesis and clinical decision-making. These data will inform stakeholder consultation in subsequent COS development.

VVO5

Histopathological analysis of vascular malformations

Dr Calver Pang[1,2], Dr Jeries Abu-Hanna[2], Mr Chung Sim Lim[1,2], Dr Jocelyn Brookes[1,3], Professor Janice Tsui[1,2], Professor George Hamilton[1,2], Dr Louisa Onuba[4], Dr Florence Deroide[4]

[1]Department of Vascular Surgery, Royal Free London NHS Foundation Trust, London, United Kingdom, [2]Department of Surgical Biotechnology, Division of Surgery & Interventional Science, Faculty of Medical Sciences, University College London, London, United Kingdom, [3]Department of Interventional Radiology, Royal Free London NHS Foundation Trust, London, United Kingdom, [4]Department of Cellular Pathology, Royal Free London NHS Foundation Trust, London, United Kingdom

Objective

To develop and assess a set of histopathological criteria that would improve the diagnostic accuracy of vascular anomalies.

Methods

We conducted a retrospective histopathological evaluation in a tertiary referral vascular anomaly centre between 01 August 2018 – 28 February 2020. A set of criteria with ten parameters were developed and a revision of histopathological diagnoses was performed by two specialist dermatopathologists (FD and LO) who were blinded for both the clinical and the historical histopathologic diagnosis.

Results

A total of twenty-four cases were retrieved with a discrepancy of 21 cases (87.5%) between the clinical diagnosis and the historical histopathological diagnosis. A discrepancy between the historical and revised histopathological diagnosis were shown in 17 cases (71%), but only 14 cases (58.3%) between clinical and revised histopathological diagnosis. Finally, there was a discrepancy in 12 cases (50%) between the intra-observer (1st time) and inter-observer. However, this reduced to 11 cases (46%) from comparing with intra-observer (2nd time).

Conclusion

This study highlighted the requirement of an agreed criteria for histopathologists to help formulate their diagnosis. The proposed histopathological criteria may be used as a guide in addressing this and consequently guide treatment and improve clinical practice.

VVO6

Initial reduction in ulcer size as a prognostic indicator for complete wound healing: a review of diabetic foot and venous leg ulcers

Mr Brenig Gwilym[1], Gurudutt Naik[2], Eshan Mazumdar[1], Tom Tolley[1], Keith Harding[2], David Bosanquet[1]
[1]South East Wales Vascular Network, , UK, [2]Welsh Wound Innovation Centre (WWIC), , UK

Introduction
Venous and diabetic ulcer healing trials are time consuming and expensive, as such, percent area reduction (PAR) is a common surrogate-outcome. Wounds reducing in size by a certain percentage within a certain time (e.g. 50% by 4-weeks) are predicted to heal by the end-point (e.g. 12-weeks). It is unclear how well PAR predicts complete wound healing.

Methods
A search was conducted for studies reporting PAR's predictive ability. Outcomes included timing of PAR and outcome measurement, PAR cut-off value, and predictive performance of PAR.

Results
Ten studies (9 RCTs, 31,138 patients) were included. Wound chronicity ranged from 2 to 48 weeks. PAR timing ranged from 2 to 8 weeks, and cut-off ranged from 3 to 90%. Discrimination was acceptable to outstanding (C-statistic 0.800-0.910) in studies including diabetic ulcers (n=4); poor to excellent (C-statistic 0.680-0.830) in studies including venous ulcers (n=5). No study reported calibration. All studies had a high risk of bias.

Conclusion
PAR's discriminatory performance was promising. However, most data were obtained in control arms of RCTs, with varied PAR timing and cut-off, in heterogeneous studies at high risk of bias. PAR may be applicable in highly controlled specific research environments, but clinical utility is limited.

VVO7

MechanOChemical ablation versus CyanoAcrylate Adhesive for the treatment of primary truncal saphenous veins incompetence (MOCCA study)

Mr Amjad Belramman[1], Mr Roshan Bootun[1], Mr Tristan R A Lane[1], Mr Tjun Yip Tang[3], Professor Alun H Davies[1]

[1]Imperial College London, London, United Kingdom, [2]Omar Al-Mukhtar University, Derna, Libya, [3]Singapore General Hospital and Sengkang General Hospital, , Singapore

Background

We aimed to assess the difference in pain score using mechanochemical ablation (MOCA) and cyanoacrylate adhesive injection (CAE) with 12 months' follow-up

Methods

Patients with primary saphenous vein incompetence were randomised to receive MOCA or CAE. Pain score using Visual Analogue Scale (VAS) and number scale immediately after completing the truncal ablation was recorded. Adjunctive procedures were completed when necessary. Pain scores post adjunctive procedures;10 days postoperative; ecchymosis; return to normal activities or work; wearing compression; occlusion rates, clinical and QoL scores were recorded

Results

167 patients were randomised; mean age was 56 years; 60% were female. 47.1% had simultaneous adjunctive procedures. Both groups experienced similar median maximum pain score by VAS (MOCA 24mm (IQR: 24–44.7mm) vs CAE 20 mm (IQR: 9–42mm), p = .230) and number scale (MOCA 4 (IQR: 2–5), vs CAE 3 (IQR: 2–4), p = .179). The median average pain score was also similar. Pain scores post adjunctive procedures;10 days postoperative; ecchymosis; return to normal activities or work; wearing compression; occlusion rates, clinical and QoL scores were similar between groups

Conclusions

The MOCCA study demonstrated that there was no difference in pain score following MOCA or CAE, with similar improvement in clinical and QoL scores.

VVO8

Elevated platelet-derived sGPVI is a biomarker of venous in-stent stenosis in patients with post-thrombotic syndrome

Mr Adam Gwozdz[1], Prof Stephen Black[1], Dr Rachael Morris[1], Dr Sophie Messiha[1], Dr Mohammed Ikram[1], Dr Alexander Bye[2], Prof Jonathan Gibbins[2], Mr Ashish Patel[1], Prof Bijan Modarai[1], Prof Alberto Smith[1], Mr Prakash Saha[1]

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Background

In-stent stenosis following intervention for post-thrombotic syndrome occurs in ~30% of cases, despite anticoagulation. Here, we investigate whether platelets have a role.

Methods

Blood was taken before and after venous stenting. Platelet activation (P-selectin and phosphatidylserine) and reactivity were determined by flow cytometry and plate-based aggregation. Soluble glycoprotein VI (sGPVI) was measured in plasma. Patients with in-stent stenosis requiring reintervention were compared with those who did not.

Results

Forty-five patients were recruited (median age: 43yrs, range: 33-55yrs; 65% female). Re-intervention occurred in 19 patients (42%; median time: 3wks). There was no difference in platelet activation or reactivity after stenting, but P-selectin exposure pre-stent was higher in patients who developed in-stent stenosis (2.7%±0.4 vs 1.7%±0.2; $P<0.05$). sGPVI levels pre-stent were increased in patients who developed in-stent stenosis (18.9±3.6ng/mL vs. 7.4±0.9ng/mL; $P<0.01$). Platelet reactivity to collagen-related peptide, a GPVI-specific platelet agonist, was also reduced in patients with in-stent stenosis (logEC50 = -6.5M±0.3 vs -7.2M±0.2; $P<0.05$; n=33).

Conclusions

Patients who develop in-stent stenosis exhibit greater levels of pre-stent platelet activation, greater loss of platelet surface GPVI and a reduction in reactivity to GPVI activation. sGPVI may have potential to risk-stratify patients undergoing venous stenting and predict who requires closer surveillance.

VVO9

Development of standardised assessment criteria for patients presenting with Klippel-Trenaunay Syndrome: a prospective single specialist centre twelve-month case series.

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This preliminary study aimed to develop a standardised duplex ultrasound (DUS) assessment criteria to ascertain the importance of anatomical variations of patients with Klippel-Trenaunay Syndrome (KTS) and their impact on quality-of-life (QoL) in a single specialist centre.

Due to the varied clinical and anatomical presentations of patients with KTS, direct comparisons between cases are often difficult and the resulting heterogeneity of published work on the syndrome is problematic. We developed standardised measurements, which can be easily obtained from DUS using the asymptomatic limb as a control. We prospectively analysed the clinical characteristics, standardised DUS protocol findings, and RAND 36-Item Short Form Survey (SF36) in 19 patients with KTS over 12 months; fourteen females and five males, an average age of 38.3 years (range; 20-61 years).

DUS demonstrated deep venous anomalies in 74% of patients; 90% had veins distributed on the lateral leg of which 47% were lateral marginal veins (LMV), 16% were persistent sciatic veins (PSV), and 26% had both LMV and PSV. In conclusion, when combined with the routine use of QoL questionnaires, this standardised approach to imaging has proved to be a valuable tool in patient management and treatment planning.

VVO10

Venous Leg Ulceration: an assessment of associated lifestyle, sociodemographic and clinical factors using UK Biobank.

Dr Safa Salim[1], Mr Alberto Vidal-Diez[2], Mr Matthew Machin[1], Mr Benjamin O Patterson[3], Miss Sarah Onida[1], Professor Alun H Davies[1]

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Introduction

Several factors are thought to be associated with venous leg ulceration (VLU). UK Biobank (UKB) is an electronic dataset with in-depth sociodemographic and clinical data on its participants. UKB data was analysed to explore factors associated with VLU.

Methods

Participants diagnosed with VLU were identified alongside an age, sex and comorbidity matched control group. Multivariate logistic regression identified factors associated with VLU; significant factors ($p<0.05$) were expressed through odds ratios (OR). Survival in VLU and control participants were compared using a Kaplan Meier and log-rank test. Data analysis was preformed using R Studio and Python.

Results

2,437 VLU participants were identified; they were significantly older with proportionally more males ($X^2= 279.22$, $p<0.001$) than the overall UKB cohort. Factors associated with VLU included: deprivation (OR:1.27), obesity (OR:1.40), smoking (OR:1.21), immoderate alcohol intake (OR:1.32), previous deep vein thrombosis (OR:3.07) and loneliness (OR:1.21). Associated biochemical factors included low haemoglobin (OR:1.50), low circulating lymphocyte (OR:1.57), raised glycated heamoglobin (OR:2.92), raised c-reactive protein (OR:1.41), raised cystatin C (OR:1.11) and low Vitamin D (OR:1.52). At 11.5 years median follow up, the mortality in VLU participants was 28%; significantly higher than controls ($p<0.001$).

Conclusion

VLU participants are comorbid with poorer physical, social and psychological wellbeing.

VVO11

The primary and secondary care management of venous leg ulceration using UK Biobank.

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Introduction

Evidence has guided the management of venous leg ulceration (VLU), however, patient received care is variable. UK Biobank (UKB) is an electronic dataset with linkage to primary and secondary care healthcare records of its participants. UKB was explored to understand the management of VLU.

Methods

This retrospective observational study identified participants with diagnostic codes for active VLU in primary or secondary healthcare records. Descriptive statistics, including median and interquartile ranges (IQR), were used to explore the presentation and management of VLU. Data extraction was performed using SQL and analysis performed using R.

Results

662 VLU participants were identified. 138 participants (20.85%) had multiple distinct episodes of VLU; median between episodes 3.26 years (IQR:1.34-7.32years).

251 participants (37.92%) had a diagnostic code for varicose veins prior to their first VLU diagnosis; median progression time to VLU 7.01 years (IQR:2.24-15.83years).

Management of VLU: 350 participants (52.87%) were prescribed compression. 310 participants (46.83%) underwent a surgical/endovenous procedure for superficial venous disease; median time to first intervention 1.4 years (IQR:0.7-5.3years). 162 participants (24.47%) had multiple interventions at a median of 5.37 years between each course (IQR:1.58-14.63years).

Conclusion

VLU participants do not receive optimal care. Improving VLU services is a challenge for clinicians and commissioners.

VVO12

The impact of the COVID-19 pandemic on patients awaiting surgery for varicose veins

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Introduction

Varicose veins (VV) negatively impact quality of life (QoL) and have risks of major complications including bleeding, ulceration and phlebitis. The VSGBI and GIRFT classified VVs as lowest priority for intervention. This prospective study aims to determine the impact of the COVID-19 pandemic on VV patients.

Methods

Patients with VVs awaiting intervention for >1 year were sent QoL questionnaires and underwent telephone consultation to assess harm. Both generic (EQ-VAS and EQ-5D) and disease-specific (AVVQ and CIVIQ-14) instruments were used.

Results

275 patients were identified (37.1% male), median time since review 60 weeks (IQR 56-65). 19 patients (6.9%) came to major harm, including phlebitis (3.6%), bleeding (1.8%) and ulceration (1.8%). 53 patients had minor harm, including worsening pain (12.7%) and swelling (6.2%). 6.9% reported psychological harm. Only 8.7% stated they would decline surgery during the pandemic.

106 QoL responses were received. Median EQ-VAS and EQ-5D was 75 (IQR: 60-85) and 0.685 (0.566-0.761), respectively. Median AVVQ score was 23.2 (14.9-31.0) and CIVIQ-14 score was 33 (21-44).

Conclusion

This study highlights that delays to venous surgery cause a significant rate of both major and minor as well as psychological harm, and demonstrates that VVs have a significant detriment to quality of life.

VVO13

Venous Stent Migration: A Single Centre Review

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Venous stenting has become common practice for treatment of symptomatic venous outflow obstruction and stenosis/ compression. Recent safety concerns have been raised regarding venous stent migration, with some devices subsequently recalled.

Aims
To assess the incidence of venous stent migration within a single tertiary vascular centre.

Methods
Retrospective analysis of a prospectively maintained database of all cases of venous stenting in a single UK vascular unit was performed. All cases were assessed for evidence of stent migration on surveillance venous duplex and/or venography if undergoing reintervention. Details of stent manufacturer, diameter and length were recorded.

Results
Between January 2015 - June 2021 211 venous stents were implanted in 97 patients. 56% of cases were female (median age 46 years). Indication was for thrombotic disease in 98% of cases. Multiple devices were implanted with majority being Boston Scientific Vici Venous stent 146/211 (14 x 120mm device in 109/146 stents). No cases of stent migration were identified on duplex surveillance or venography.

Conclusions
Within this large cohort of cases no incidences of venous stent migration were identified. It is likely the risk of stent migration is minimal when performed for symptomatic venous outflow obstruction, or significant stenosis, with suitably sized stents.

VVO14

Circulating proteins as diagnostic biomarkers in chronic venous disease (CVD): a systematic review

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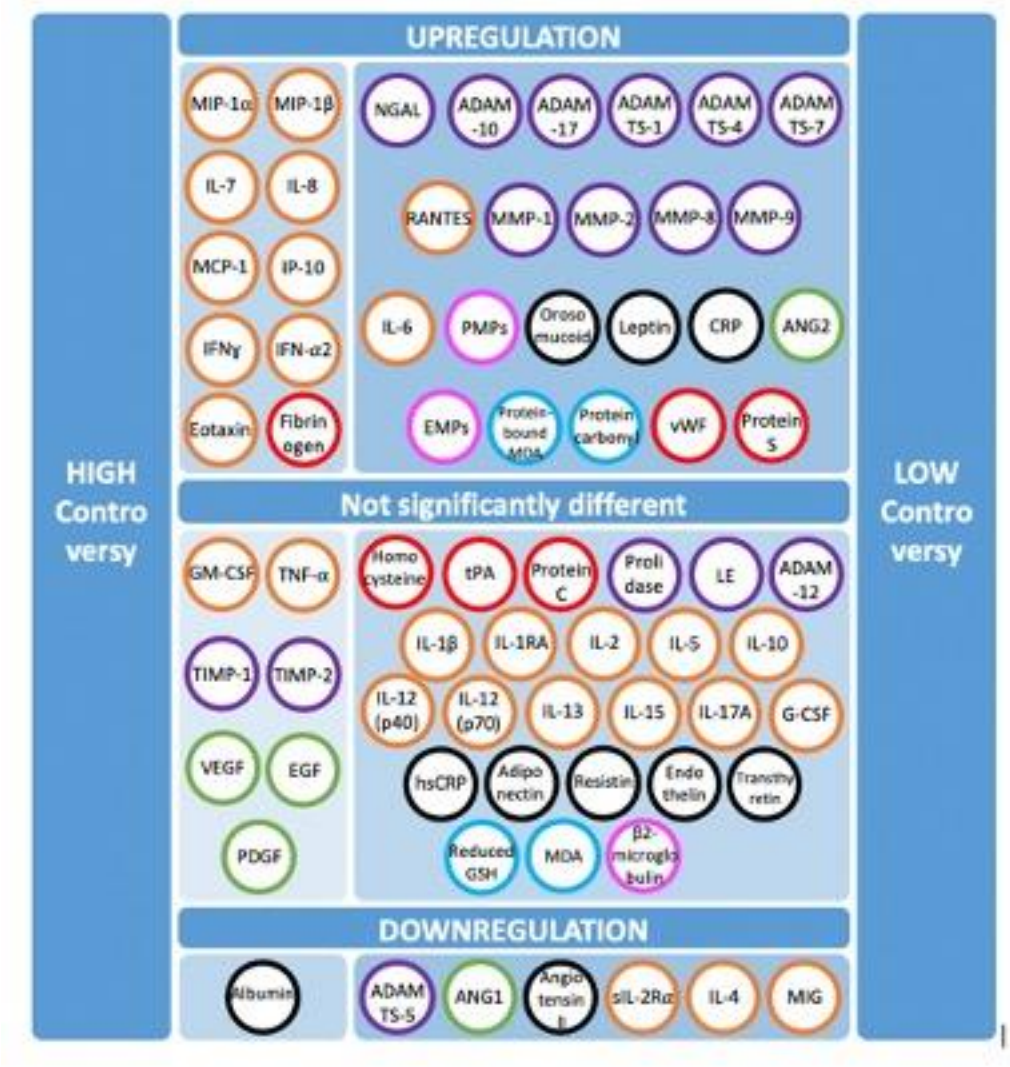
Aims
This systematic review aimed to characterise the circulating proteomics in primary CVD to explore their role as diagnostic biomarkers, scope future potential in proteomics and integrate updated knowledge with other 'omic' disciplines to further elucidate the pathophysiology.

Methodology
EMBASE and MEDLINE were searched for comparative and non-comparative primary study data for circulating proteins in primary CVD participants. Comparative studies were qualitatively synthesised to determine prominent upregulated and downregulated biomarkers, and both study types were synthesised to map a CEAP-stratified proteomic phenotype to gauge signs of progression and biomarker specificity.

Results
Screening identified 25 comparative and 18 non-comparative studies totalling 43 article inclusions. 70 unique proteomic biomarkers among cytokines, chemokines, growth factors, coagulation proteins, oxidative stress markers, and leukocyte adhesion markers, all showing varying evidence of upregulation were identified., Extracellular matrix (ECM) remodelling proteins, matrix metalloproteinases (MMPs)-2, MMP-9 as well as a disintegrin and metalloproteinase with thrombospondin motifs (ADAMTS)-1 and ADAMTS-7 showed the strongest evidence of upregulation in CVD and in increasing CEAP.

Conclusion
Clinical biomarker research in CVD would benefit from the application of novel longitudinal studies with biochemical characterisation of participants and follow-up. ECM remodelling proteins were identified as potential starting point with many more proteomics worth exploring.

Figure.1: Array of proteomic markers reported from (n=25) comparative studies



The left-hand side groups represent those with high controversy where study findings are conflicting and the right-hand side groups represent those with low controversy where study findings are supported or unopposed.

Abstract Posters

P1

P1 - Functional and pain outcomes following amputation or limb salvage for major lower limb trauma: A systematic review and meta-analysis

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Background
In recent decades there has been significant advancement in limb salvage techniques following lower limb trauma. The aim of this systematic review was to establish whether there is a functional and pain benefit from limb salvage over amputation in the management of the mangled lower limb.

Methods
A search of MEDLINE and EMBASE was performed of studies comparing successful limb salvage versus amputation following major lower limb trauma. A narrative synthesis was undertaken for functional outcomes and meta-analysis for pain outcomes.

Results
13 observational cohort studies were analysed. 3 studies reported statistically significant better functional outcomes in amputees, 2 reported in favour of limb salvage, and 6 reported no difference between the groups. On meta-analysis limb salvage was associated with a reduced likelihood of minimal/no pain compared with amputation (OR:0.53, 95% CI:0.35-0.78).

Conclusions
Functional outcome after major lower limb trauma is broadly equivalent between amputation and limb salvage, although amputees experience less chronic pain. This can support the shared decision-making process. Research regarding QoL and patient decisional regret are needed to further inform those managing patients with lower limb trauma.

P2

P2 - Innovative personalised smart stents: design and in vitro validation

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Personalised design is the agenda of developing next-generation stents, which, however, has not been well explored yet. This study focuses on design of personalised nitinol stents for femoropopliteal arteries based on actual patients' data and finite-element (FE) simulations.

Two types of diseased arteries were modelled: one with a focal plaque and another with two opposite focal plaques. The models were developed with Mimics from DICOM images of a patient's femoropopliteal plaque obtained using CT. Personalised self-expandable nitinol stents were designed for the two diseased arteries. The personalised stents were designed with circumferentially varying width and thickness, and had an oval shape. FE simulations of stent deployment were carried out with Abaqus/Explicit solver to evaluate the performance.

For both arteries, the lumen gains achieved with the personalised design almost doubled those achieved with a commercial nitinol stent. The lumen shapes were also improved and more circular for the personalised design.

The performances of the personalized nitinol stent designs are currently undergoing in vitro evaluations in artificial artery-plaque models reconstructed using additive manufacturing technology.

P4

P4 - The impact of symptomatic chronic venous insufficiency (CVI) on health-related Quality of Life (HR QoL) in Malaysia's multi-ethnics society

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Materials and methods
This was a multi-centre, cross sectional study conducted among symptomatic patients with chronic venous insufficiency who presented to International Islamic University of Malaysia (IIUM) teaching hospitals between Feb 2018 to February 2019. We studied its clinical presentation and effect on the HR QoL using CEAP classification system and SF 36 validated Malay version respectively.

Results
A total of 110 patients were studied, majority were Malay with a slight male preponderance. Commonest symptom was pain, followed by ulceration. Commonest clinical staging was C2 (34%). Interestingly, 25% of our patient presented with C5 and another 9% with C6. As expected, the patient-reported quality of life was significantly worsened with a more advance clinical stage of chronic venous insufficiency except social function.

Conclusion
Our symptomatic CVI patients presented at an advance clinical stage of their disease due to the fact that it has significantly affected their quality of life.

P5

P5 - An endovascular-first approach is safe and effective in the treatment of screen-detected abdominal aortic aneurysms

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An endovascular-first approach is safe and effective in the treatment of screen-detected abdominal aortic aneurysms

Aims
Ruptured abdominal aortic aneurysm (AAA) accounts for 4000 deaths in the United Kingdom (UK) annually. Screening programmes are effective at reducing rupture rates and aneurysm-related mortality. Outcomes of intervention for screen-detected AAA (SDAAA) are superior to those for incidentally-detected AAA. Although relatively young, patients with SDAAA are often physiologically unfit; this study assesses the safety and efficacy of an endovascular-first approach.

Methods
A retrospective analysis of prospectively-collected data on consecutive patients. The outcomes for all men treated for a SDAAA between November 2009 and January 2019 are reported.

Results
119 men (median age 67 years, IQR 65.7 – 69.7 years) were treated for a SDAAA; of these, 2 underwent open repair and 117 endovascular. 110/117 endovascular repairs were elective. Endovascular repairs were undertaken for 87 infrarenal aneurysms and 30 non-infrarenal. Median aneurysm diameter was 59 mm (57 – 62 mm). Median follow-up is 4.11 years (2.88 – 6.97 years). Outcomes are shown in the table.

Conclusions
These outcomes suggest EVAR to be a good intervention for SDAAA, with comparatively low incidence of complications and favourable survival.

	All endovascular	Elective infrarenal	Non-elective infrarenal	Non-infrarenal
n	117	80	7	30
Type 1a endoleak	6 (5.1%)	4 (5.0%)	0	2 (6.7%)
Type 1b endoleak	2 (1.7%)	0	0	2 (6.7%)
Type 3 endoleak	2 (1.7%)	1 (1.3%)	1 (14.3%)	0
Type 2 endoleak	24 (20.5%)	14 (17.5%)	2 (28.6%)	8 (26.7%)
Migration > 5 mm	3 (2.6%)	1 (1.3%)	0	2 (6.7%)
Sac expansion > 5 mm	10 (8.5%)	7 (8.8%)	0	3 (10.0%)
Secondary rupture	3 (2.6%)	1 (1.3%)	0	2 (6.7%)
Limb occlusion	5 (4.3%)	3 (3.8%)	0	2 (6.7%)
Reintervention	25 (21.4%)	15 (18.8%)	1 (14.3%)	9 (30.0%)
All-cause mortality	24 (20.5%)	15 (18.8%)	4 (57.1%)	5 (16.7%)
Aneurysm-related mortality	5 (4.3%)	1 (1.3%)	1 (14.3%)	3 (10.0%)

P6

P6 - The use of secondary preventative medications in patients with severe peripheral arterial disease: a four-week prospective study

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Introduction
Recent studies have suggested improved cardiovascular outcomes in patients prescribed rivaroxaban with aspirin. We aimed to assess our adherence to National Institute for Health and Care Excellence (NICE) guidelines that recommend prescribing rivaroxaban and aspirin in patients with peripheral arterial disease.

Methods
A prospective analysis of secondary preventative medications was performed in all patients admitted to our vascular unit with critical limb ischaemia between January and February 2021 (inclusive). Data relating to demographics, presenting symptoms, medications prescribed, interventions performed and complications were collected.

Results
Overall, 27 patients (median age: 72 years) were included, with a male preponderance (n=17; 63%). No (0%) patients were prescribed rivaroxaban and aspirin but all (100%) patients were prescribed an anti-platelet. Patients were prescribed both dual (n=4; 15%) and single anti-platelet agents (n=23; 85%). Aspirin (n=15) was the commonest anti-platelet agent used. Most patients (n=21; 78%) were prescribed a statin but less than half (n=13) were prescribed anti-hypertensives. The commonest procedural complications were transfusion (n=5) and re-intervention (n=4).

Conclusion
No patients were prescribed rivaroxaban in addition to aspirin in accordance with NICE guidelines. Whilst prescription of anti-platelets was ubiquitous, further optimisation of medical therapy is required to improve outcomes in this high-risk cohort of patients.

P7

P7 - Safety and durability of uni-body bifurcated endograft in aortoiliac occlusive disease management

Mr Mohamed Elsharkawi[1], Mr Baker Ghoneim[1], Ms Miriam O'Sullivan[1], Mr Wael Tawfick[1], Professor Sherif Sultan[1]
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Purpose
The aim of this study is to investigate the durability and clinical efficacy of endovascular solution using unibody endograft to treat patients with symptomatic Aortoiliac-occlusive disease (AIOD).

Materials and Methods
Retrospective analysis of data from procedures performed to treat symptomatic patients with AIOD using the Endologix AFX unibody graft. Main endpoints were amputation-free survival and re-intervention rates.

Results
20 included in the study. Nine patients were classified as TASC-II C and 11 patients were TASC-II D. Technical success was achieved in all cases with no recorded device-related complications. Mean length of ICU stay was 0.75 day while mean hospital post-operative stay was 7.8 days. There were no recorded 30-day mortality cases.

One patient developed acute kidney injury which was managed conservatively requiring no dialysis. Immediate improvement in ABPI by at least 0.15 was achieved in 90% of patients. At three-years, freedom from recurrence of ischemic symptoms was 95%. Only 12% experienced binary restenosis during follow up with freedom from re-interventions of 90% at three-years. Amputation-free survival was 95% at three-years.

Conclusion
Unibody endograft is a safe durable option in treating AIOD with shorter hospital and ICU stay. It also preserves the aortic bifurcation allowing easy access for future interventions.

P8

P8 - Effect of COVID-19 Pandemic on AAA Surveillance Programme in West London

Ms Sophia Lewis[1]
[1]*Northwick Park Hospital, ,*

Aim
AAA screening and surveillance programmes are vital in monitoring patients. During the COVID pandemic (starting March 2020) non-emergency treatment of patients was greatly disrupted. We aimed to investigate how the pandemic affected planned surveillance of AAA patients.

Method
The database of patients under AAA and post-EVAR surveillance from our trust starts August 2015. All patients in this database were found on the online health records, and their scans reviewed. The patients' scan was counted as delayed if it occurred over one month after their recommended follow-up.

Results
111 patients are currently under our AAA surveillance programme. 32 patients' scans were not delayed by more than one month. 79 patients had their scan delayed, 18 of these still awaiting their scan. The mean time for a scan to be delayed was 3.95 months (range 2-11 months), with the majority delayed for two months (25 patients).

Conclusions
Although the majority of patients under AAA surveillance had scans delayed by the COVID pandemic, 29% were not delayed. Even if patients did have scans postponed, the majority had their scans performed in a timely fashion. This demonstrates the logistical efforts made to ensure patients have the best possible care, even during a pandemic.

P9

P9 - Comparison of patient mortality in a DGH AAA surveillance programme in COVID and non-COVID years

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[1]*Northwick Park Hospital, WELViC, , United Kingdom*

Aim
Abdominal Aortic Aneurysm (AAA) is an asymptomatic condition that can be fatal. The UK has a AAA screening programme and this recruits patients to surveillance. This study aims to investigate cause of death in patients under AAA surveillance during and preceding the COVID pandemic.

Method
There is a database of patients under AAA surveillance from our trust starting August 2015. All patients on this database were found on the online health records, and if deceased, their formal cause of death was elicited.

Results
Our surveillance programme has 228 patients in AAA surveillance, and 59 patients died in the years preceding 2020, six during 2019. Six patients died during 2020: one due to ruptured AAA, one due to COVID. Of the patients who died in 2019, two did not have a recorded cause of death, two died of AAA-related causes, and two died of other causes.

Conclusions
There are similar numbers of deaths in AAA patients in a COVID year to a non-COVID year, however their causes of death appear to be different. Only one patient died due to COVID in 2020. Few patients in the AAA surveillance programme died from AAA rupture: one in 2020 and two in 2019.

P11

P11 - An investigation of microstructure, mechanical properties and functionality of 316L SS stents manufactured through selective laser melting

Mr Enzoh Langi[1], Dr Rebecca Garrard[2], Prof Moataz Attallah[2], Prof Vadim V Silberschmidt[1], Dr Helen Willcock[3], Prof Liguo Zhao[1], Associate Professor Felix Vogt[4]

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Additive manufacturing (AM) via selective laser melting (SLM) offers the most promising approach to produce patient-specific stents. However, the full potential of AM of metallic stents is yet to be discovered. This study focuses on the microstructure characterisation, mechanical properties, and functional testing of AM 316L stainless steel (SS) stents. Microstructures were investigated through optical microscopy, scanning electron microscopy, and electron backscattered diffraction, while mechanical properties were evaluated by nanoindentation tests. The functionality of the printed stent was assessed by crimping and expanding the stent with a crimper and balloon, respectively, with measurement of diameter change as a function of inflation pressure. Microstructure characterisation revealed the presence of hierarchical macro-, micro, nanostructures, and columnar grains in the as-built stent that are totally different from those of a commercial 316L SS stent. Furthermore, the correlation between the microstructure and the measured mechanical properties was investigated, which justified the high elastic modulus, hardness, and yield strength for the as-built stent. Finally, results from the crimping and expansion tests confirmed that SLMed 316L SS stents could be successfully crimped and expanded without failure of the stent structure. The work is an important step towards AM of load-bearing cardiovascular medical implants.

P12

P12 - The similarities and differences of living with through-knee or above-knee amputation

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Background
Through-knee amputation (TKA) offers a longer residuum and, unlike above-knee amputation (AKA), offers the potential to end weight-bear and self-suspend the prosthesis. However, a commonly held belief is that the prosthetic cosmesis is worse with TKA. How these factors impact the lived experience post TKA or AKA from the patient's perspective is unknown. This study aims to compare the experience of living with TKA or AKA, specifically prosthetic satisfaction, perceived body image and overall quality of life.

Method
Cross-sectional qualitative study using semi-structured interviews. A sampling frame was used to find 19 community-dwelling participants with TKA or AKA, from two UK artificial limb centres, sampled by gender and mobility. Inductive thematic analysis was used to draw conclusions.

Results
Perceived experience was expressed in three key themes. The TKA group expressed cosmetic and practical issues caused by uneven knee centres, however, also outlined the advantages the end weight-bearing residuum gave them in everyday life, making them thankful, overall, to have had a TKA rather than AKA.

Conclusion
The functional advantages of a TKA are more important to the patient than any cosmetic concern.

P14

P14 - Open Surgery for Abdominal Aortic Aneurysm: 994 consecutive patient outcomes.

Mr Robert Blair[1], Mr Denis Harkin[2], Mr Adrian Lim[1], Ms Dorothy Johnston[1], Ms Lisa McFetridge[3], Ms Hannah Mitchell[3]

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Introduction

Controversy persists regarding the optimal treatment for large abdominal aortic aneurysm (AAA). We report our experience over the last 15 years in treating consecutive AAA by open surgery.

Methods

A retrospective review of a prospectively collected database of all patients undergoing open AAA repair from 2004 to 2019. OR for elective and emergency (ruptured and symptomatic) outcomes considered included early morbidity and 30-day mortality, and survival at 1, 5 and 10 years.

Results

There were 1017 patients who underwent OR between 2004-2009, of application of our inclusion-criteria 994 patients formed our cohort for analysis (81.2% male) with a mean age 73.6±7.8 years treated by OR for AAA. 672 elective and 308 emergency (ruptured or symptomatic), and 14 explants. Overall, 30-day mortality was 11.3%, elective 30-day mortality was 2.5%, and emergency 30-day mortality was 29.9%. The overall rate of complications was 45.7% (elective 35.7%, emergency 66.8%), these included: cardiac (elective 10.2%, emergency 18.8%); respiratory (elective 18%, emergency 35.4%); renal failure (elective 7.6%, emergency 25.3%). 30-day re-intervention rate was 9.5%, (elective 7.0%, emergency 15.9%).

Conclusion

Our data confirm that open surgery for AAA can be performed in large volume centres quite safely, with results comparable to the major Randomised Clinical Trials.

P15

P15 - Return to theatre after index procedure - preventable or inevitable?

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Unplanned reoperation within a 30-day period following Vascular surgery is an important quality indication of the patients' care. Return to theatre after an index procedure adds to the morbidity and mortality risk, besides being very disconcerting to the patient and disheartening to the surgical team. It is also a financial burden. Can due diligence prevent some such returns or are they inevitable?

We collected retrospective operation data for cases over a 12 month period for patients admitted for both elective and emergency vascular intervention. 44% of these patients had an unexpected return to theatre. Re-operation may be inevitable for limb salvage or may represent an additional procedure in a complex vascular case. Some cases of graft thrombosis in the perioperative period could be attributed to ineffective blood pressure control in the immediate post-operative period, and could have been prevented.

The vascular patient population inherently have more complex co-morbidities and return to theatre will increase morbidity and may lead to excess mortality.

P16

P16 - Measuring carotid plaque content with grey-scale median by 3D ultrasound

Miss Alison Phair[1,2], Mr Jonathan Ghosh[1,2], Dr Fiona Wilkinson[3], Dr Ria Weston[3], Professor Frank Bowling[1,2], Professor Craig Smith[4], Dr Steven Rogers[1,2]

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Introduction

Lipid/thrombus-laden Carotid plaques are more vulnerable to rupture and cause stroke. Determining plaque composition, prior to considering surgery, may identify asymptomatic patients at risk. Ultrasound evaluation of Grey-scale median (GSM) gives an objective measure of plaque content. We tested the reproducibility and accuracy of GSM measured by 3D ultrasound.

Methods

3D-ultrasound GSM (3D-GSM) was performed in 49 symptomatic and 11 asymptomatic carotid disease patients, prior to surgery. Two blinded observers repeated measurements for inter and intra-rater agreement. Wilcoxon rank sum test compared the means between groups and Bland Altman agreement and Interclass correlations were performed for reliability assessment.

Results

Mean (sd) 3D-GSM in the symptomatic group was 57(13) and in the asymptomatic group was 64(7), Wilcoxon rank sum test p=0.056. Intra-observer mean difference (±sd)[95%CI] was -1.1 (6.69)[-14.22-12.00] with excellent ICC=0.93(0.88-0.96) and narrow confidence intervals. Inter-observer mean difference (±sd)[95%CI] was 4(9.29) [-14.2-22.2] with good correlation ICC=0.89 (95%CI 0.58-0.97).

Conclusion

GSM can be measured by 3D ultrasound with good reproducibility between observers. Its role in assessment of asymptomatic disease can now be tested.

P17

P17 - Long-term Outcomes of the 'Primary Extension Technique' for the prevention of Dialysis Access Steal Syndrome (DASS)

Mr Ahmed Elmetwally[1], Mr Amr Abdelhaliem[1], Mr Hazem Elsantawy[1], Mr Ravi Goel[1], Mr Taher Fayedi[1], Mr Mohamed Ahmed[1], Mr Haytham Al-Khaffaf[1]
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Aims and Objectives
To report long-term results of our experience with the 'Primary Extension Technique' (PET) fistula formation to prevent dialysis-associated steal syndrome (DASS).

Methods
All diabetic patients undergoing upper arm autogenous elbow fistula formation just distal to the brachial bifurcation using the PET between September 2001 and January 2021 at a single centre. At follow-up, all patients were evaluated for patency, adequacy of needling, and the presence or absence of steal symptoms.

Results
73 fistulas in 73 patients. Follow-up 23- 84 months. Nine patients (12.3%) developed cephalic vein thrombosis. In all these cases, the basilic vein was successfully transposed to the existing fistula. In 8 patients (10.9%), the cephalic vein was too deep to needle and required superficialisation. One patient developed DASS since the fistula was inadvertently formed proximal to the bifurcation of the brachial artery instead of PET. Symptoms improved with revision of the fistula.
Out of the 73 patients, 29 died (39.7%) during follow-up due to other causes.

Conclusion
Our experience demonstrates that the PET is a safe and effective procedure for fistula formation with patency rates comparable to brachio-cephalic and brachio-basilic fistulas and effective prevention of DASS in a high-risk group with a high mortality rate.

P18

P18 - Long-term Outcomes of the 'Secondary Extension Technique' for the Treatment of Dialysis Access Steal Syndrome (DASS)

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Background: Dialysis-associated steal syndrome (DASS) remains a difficult clinical scenario for vascular access surgeons. The study describes an innovative technique used in clinical practice over a 19 year period for DASS treatment.

Methods
29 patients with DASS were recruited over 19 years and treated with the extension technique. All patients were evaluated for resolution of symptoms, patency and adequacy of needling.

Results
Complete symptomatic resolution was seen in 28 of the 29 patients (96.5%), with improvements in pain, sensori-motor disturbance and temperature. It was impossible to perform the procedure in one patient due to heavy calcification of the brachial artery and bifurcation. All 28 patients had a patent fistula at six-months follow up. 3 of 28 (10.7%) developed fistula thrombosis which could not be salvaged, and 2 of 28 (7.1%) developed thrombosis successfully salvaged by fistulaplasty at 12-months follow up.

Conclusion
The secondary Extension Technique is an effective treatment for Dialysis Access Associated Steal Syndrome and results have demonstrated a high level of fistula patency and a low rate of complications. It has several advantages compared to other established treatment methods and has the versatility to be used as a method for DASS prevention and treatment.

P19

P19 - Fibromuscular dysplasia (FMD) of the carotid & cerebrovascular vessels – a retrospective cohort study in 86 patients.

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Introduction
FMD is a rare, non-atherosclerotic, non-inflammatory vasculopathy predominantly affecting renal and carotid arteries. Limited data are available on the clinical characteristics of carotid FMD particularly from the UK/Europe.

Methods
Retrospective cohort study of all cases of carotid/cerebrovascular FMD (n=86) presenting to our regional vascular service between 1998-2020, by case-note review.

Results
The cohort was predominantly female, 78(90%) patients, middle-aged (mean age 64y) and Caucasian 45(75%). The predominant presentation was Stroke/TIA in 54(63%) patients, with 11(13%) presenting incidentally. 14(16%) were familial or had a hereditary connective tissue disorder.
The extracranial carotid artery was the predominantly affected vessel in 73(85%) patients, 58(67%) bilaterally. Of 22 patients who had extracranial imaging, 14(60%) had FMD affecting other sites. 67(80%) patients had multi-site FMD. Co-existent other vascular complications including aneurysm and dissection of cerebral and extracranial vessels was common, affecting 46(54%) patients.
19(22%) patients required carotid/cerebrovascular intervention and 9(10%) required vascular intervention at other sites. Recurrent cerebrovascular events (stroke/TIAssymptomatic Berry aneurysm) were seen in 20(23%) patients. Overall mortality was 7% over a median follow-up period of 47 months.

Conclusion
Carotid FMD patients have a high rate of multisite involvement, extracerebral vascular complications and evidence of hereditary vasculopathy, requiring careful screening and surveillance.

	No of patients (%)
FMD Pattern	
Cerebrovascular Total	**86 *(100)***
Extracranial carotid	73 *(85)*
Vertebral	19 *(22)*
Intracranial	*8 (9)*
Multisite FMD (2 or more vascular beds)	67 (80)
Other Vascular Complications	
Cerebrovascular	
Carotid Dissection or aneurysm	19 *(22)*
Carotid occlusive disease	8 *(9)*
Intra cranial aneurysm / SAH	11 *(14)*
Vertebral aneurysm / dissection	2 *(2)*
Extracerebral	
Aortic aneurysm / dissection	3 *(4)*
Visceral aneurysm / dissection	3 *(4)*
Interventions	
Carotid endarterectomy or stenting	2 (3)
Intracranial aneurysm interventions	17 (19)
Other Vascular Interventions	*9 (10)*

P20

P20 - Single centre experience with cyanoacrylate glue treatment of the first 250 truncal varicose veins

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Introduction
The aim of this prospective single-centre study is to assess the effectiveness of the VenaSeal™ Closure System, which uses cyanoacrylate glue to occlude the refluxing truncal superficial veins to treat varicose veins.

Methods
Retrospective collection of data of patients who underwent Venaseal treatment for truncal veins from 03/2017 to 11/2020. All procedures were done under local anaesthesia as day case. Patients followed up with duplex scan at 6-8 weeks. Patients who did not attend clinic follow up or did not have follow up scan were excluded.

Results
250 truncal veins treated with VenaSeal™ Closure System ablation in 235 limbs. Immediate technical success was achieved in 99.6%. Mean pain score of 2 out of 10 (0-5). Follow up scan shows total occlusion in 236 veins (94%). Partial occlusion in 9 veins (4%) while 5 veins (2%) were patent. 129 patients reported improvement in their clinical symptoms. Five Patients underwent planned adjunctive procedures. Five patients underwent further unplanned procedures. Transient superficial phlebitis was the most common complication (13 patients).

Conclusion
Cyanoacrylate glue is a safe and effective modality to ablate truncal varicose veins in the short term. Early results are promising. Further evaluation and longer term follow-up are required.

P21

P21 - Can the British National Vascular Registry identify problems with novel surgical techniques, a study on the Nellix® EndoVascular Aneurysm Sealing System (EVAS)?

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Introduction
The Nellix® EndoVascular Aneurysm Sealing System (EVAS), is no longer commercially available following high rates of long-term graft failure. The British National Vascular Registry (NVR) was established to measure quality and outcomes of patients undergoing major vascular procedures. The aim of this study was to assess if the NVR can identify safety concerns with novel technologies.

Methods
Data was collected from the NVR, on endovascular aortic aneurysm repair (EVAR) and sealing (EVAS) procedures performed between January 2016 till December 2017. Univariate analyses were performed to compare treatment modalities.

Results
A total of 6763 EVAR and 205 EVAS procedures were identified. Regarding aortic morphology, EVAS had significantly shorter aortic necks. Procedural results identified significantly higher rates of type 1 and type 2 endoleaks in the EVAR group, yet peri-procedural complications were higher in the EVAS group including limb and bowel ischaemia. Thirty-day mortality rates were higher for EVAS. No follow-up data was available beyond 30 days.

Conclusion
Initial peri-procedural and 30-day results are conflicting, with a higher type 1 and type 2 endoleak for EVAR, yet a higher mortality rate for EVAS. Long-term follow-up data is unavailable. Quality assurance of novel techniques cannot be guaranteed in the NVR's current form.

P22

P22 - Investigating mortality following major lower limb amputation

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Introduction

The morbidity and mortality associated with major lower limb amputation (MLLA) is significant yet there is a paucity of validated models to predict adverse outcomes following this procedure.

Methods

In the context of an RCT, a prospective cohort study was conducted to establish 3-year survival, develop an outcome prediction model, and quantify post-operative adverse outcomes in patients undergoing MLLA.

Results

151 patients underwent MLLA (56% Below knee, 25% Above knee) for ischaemia (36%), combined ischaemia/infection (36%) and infection (6%). The 3-year mortality rate was 39.7%. Overall, the multivariable Cox proportional hazards model was a statistically significant predictor of survival over 3 years ($p<0.0001$). When controlling for other factors age (per year, HR 1.028; 95% CI: 1.006-1.051; $p=0.014$) and the requirement for ipsilateral revisional surgery (HR 2.788; 95% CI: 1.264-6.152; $p=0.011$) were the only variables significantly associated with 3-year mortality. The mean time to ipsilateral revisional surgery was 29 months (95% CI 26-31). 6.6% (10/151 patients) experienced postoperative major adverse cardiovascular events.

Conclusions

3-year mortality following MLLA is high. Age and a requirement for ipsilateral revisional surgery are predictors of mortality over this timeframe. Further studies with large datasets would improve the quality of predictive models and allow validation.

P23

P23 - Does an endovascular first approach compromise salvage in patients presenting with mesenteric ischaemia?

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Aim

The European guidelines on management of chronic mesenteric ischaemia (CMI) advocate an endovascular first approach, based on a large meta-analysis, which described reduced peri-operative morbidity; mortality and hospital stay with this strategy. Previous randomised controlled trials have questioned the durability of endovascular procedures. We have explored whether endovascular treatment influenced salvage options if primary treatment failed.

Methods

Retrospective review of endovascular procedures performed for CMI (2010 to 2021). Cases were identified from a prospectively maintained radiology database and CHI numbers identified for case-linkage. Where there had been treatment failure without re-intervention, cross-sectional imaging was reviewed to define whether there was a target for salvage, and the reasons for turndown identified.

Results

There were 84 procedures performed, the majority of patients were female and smoking was common. During the follow-up there was failure of primary treatment in 30 cases. Revascularization was performed in 24 (surgery n=15; endovascular n=9). Of the 6 remaining cases, 5 had severe medical co-morbidity and 1 had evidence of extensive GI tract infarction. Five of these patients had arterial targets for surgical revascularization.

Conclusion

Endovascular treatment can offer a durable outcome. If the treatment fails this does not prejudice further attempts at salvage.

P24

P24 - The Influence of Body Mass Index on Outcome Following Intervention for Abdominal Aortic Aneurysm

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Aim
The effect of Body Mass Index (BMI) on surgical outcomes is procedure specific but an increased BMI increases operative times in both vascular and non-vascular surgical operations. Obese patients are more likely to experience post-operative complications. We have explored the effect of BMI on outcome after elective and unscheduled repair of abdominal aortic aneurysm (AAA).

Methods
This was a retrospective review of patients who had intervention for AAA (September 2017 to January 2021). BMI at the time of presentation was defined and patients stratified into groups based on this and procedure urgency. The primary outcome variable of interest was death on index admission.

Results
There were 333 returns to the National Vascular Registry. There were 227 procedures performed on an elective basis and 106 procedures performed on an urgent basis. Patient demographics were comparable. For a BMI of 19-24 (n=37), 25-30 (n=124) and >30 (n=65) death on the index admission was recorded in 1% (in each sub-group of elective patients). For unscheduled repair BMI of 19-24 (n=29), 25-30 (n=37) and >30 (n=22) death on the index admission was 24%, 30% and 59% respectively.

Conclusion
In unscheduled presentations a BMI > 30 seemed to be associated with increased in-hospital mortality.

P25

P25 - Improving local data capture and entry for the National Vascular Registry

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In Scotland, data entry into the NVR is not obligatory, with marked variation of data entry across the units, with concerns highlighted regarding appropriateness of self entered data. Following recognition of our units' poor data entry at the Scottish Vascular Audit Group meeting, we established a system of data entry, with outcomes entered independent of the operating consultant surgeon.

All demographic and operative details were entered onto a paper format NVR form by the operating surgeons, with all outcome data recorded by the middle grade staff and vascular nurse specialists (after a period of training and ongoing support). Any concerns were discussed with an independent consultant, and all data were entered into the electronic NVR by the vascular nurse specialists. This process commenced 1st April 2021. We compared three periods of data entry (Period 1: 1/4/19-21/7/19; Period 2 1/4/20-21/7/20; Period 3 1/4/21-21/7/21), with operative data verified via our in house audit system.

The introduction of the new system has led to improved number of cases entered into the NVR. There is still room for improvement, with exploration of barriers to data capture.

	NVR			Local Data
Time Period	Elective	Non Elective	Total	Total Performed
Period 1	18	16	34	88
Period 2	2	7	9	98
Period 3	34	24	58	91
Total	54	47	101	277

	AAA		Amputations		CEA		Lower Limb Bypass	
Time Period	NVR	Local	NVR	Local	NVR	Local	NVR	Local
Period 1	9	15	5	21	12	15	8	37
Period 2	0	8	4	36	0	17	5	29
Period 3	14	21	20	33	8	9	16	28

P26

P26 - Plantar Shear Stress in the Diabetic Foot: A Systematic review and Meta-analysis

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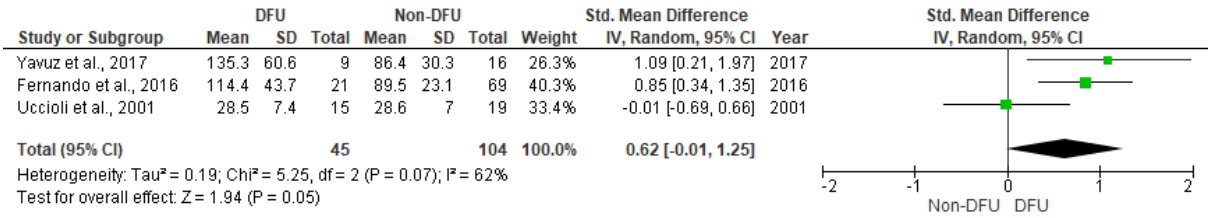
Plantar shear stress (PSS) forms a major part of plantar load. The aim of this review is to determine whether elevated PSS is associated with ulceration in patients with diabetes.

A systematic review of online library databases was performed. Studies involving patients with diabetes who underwent PSS assessment were included. The primary outcome was PSS magnitude in patients with diabetes who had a current/previous diabetic foot ulcer (DFU) compared with those with no prior DFU. Meta-analysis was performed comparing PSS between those with a current/previous DFU and those without, and those with diabetes and healthy controls.

Sixteen studies (597 patients) met the inclusion criteria. Comparing PSS between the current/previous DFU group and those without: Standardised mean difference (SMD) 0.62 (95% CI -0.01 – 1.25), in favour of greater PSS within the DFU group, p = 0.05. Comparing PSS between patients with diabetes and healthy controls: SMD 0.36 (95% CI -0.31 – 1.03), in favour of greater PSS within the diabetes group, p = 0.29.

This review suggests that that patients with diabetes and a history of ulceration exhibit greater shear stress than their ulcer free counterparts and patients with diabetes exhibit greater shear stress than healthy controls.



Plantar shear stress in those with a current or history of ulceration (DFU) compared with patients with diabetes without a history of ulceration (Non-DFU)

P27

P27 - Accuracy of mortality prediction following infrarenal abdominal aortic aneurysm surgery may be enhanced through the application of modern machine learning techniques

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Introduction
NICE guidance does not recommend tools to predict mortality following AAA surgery as their discriminatory power is inadequate (1). The British Aneurysm Repair score was the best assessed tool, implementing a logistic regression (LR) model (2). There exist alternate machine learning techniques to solve classification problems.

Methods
Data on patients undergoing infrarenal AAA repair (open and endovascular) between 2015-2019 were collected (age, weight, height, CPET, aortic diameter, comorbidity, blood tests, smoking, procedure). Data were split randomly into training and validation sets (70:30 ratio). We trained LR, artificial neural network (ANN), and random forest (RF) classifiers to predict death in the first year following surgery. Models were assessed by receiver operating characteristic area under curve.

Results
462 patient data were included for analysis. Neither the LR or ANN models provided accurate classification (AUC 0.49, 0.38-0.62). The RF model performed better (AUC 0.65), although is still inadequate for real-world use.

Conclusions
The above models were trained on a small dataset whilst predicting an uncommon event and therefore underfit due to an inadequate volume of training data. We have shown that RFs can outperform the established best technique of LR models and believe performance should scale up with access to more data.

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P28

P28 - The effect of obesity on the cardiopulmonary exercise test (CPET) in patients undergoing endovascular aneurysm repair (EVAR)?

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Various studies have examined the relationship between BMI and cardiopulmonary exercise test (CPET) performance. However, results have been conflicting and mostly focusing on patients younger than 65 years. It is widely believed that obese individuals show much lower values, which may underestimate fitness.

A retrospective review of regional vascular centre database was carried out for the period between August 2013 and March 2019. Data collected included patient demographics, BMI, survival (months) and CPET parameters. Patients were divided into normal, overweight, and obese groups and values of the ventilatory equivalent for Oxygen (VE/VO2) and Carbon Dioxide (VE/VCO2) and anaerobic threshold (AT) were compared in each group. Simple averages and non-parametric tests were used to identify any significant differences between groups.

A total of 182 cases were included. 53 patients (29%) had a normal BMI, 74 (41%) were overweight and 55 (30%) were obese. There was a significant difference between the normal and obese groups in VE/VO2 ($p=0.015$), VE/VCO2 ($p=0.003$) and AT ($p=0.009$). However, there was no significant difference on overall survival.

Despite a significant difference in AT, VE/VO2 and VE/VCO2 between normal and obese patients, this had no significant impact on overall survival in patients undergoing endovascular aneurysm repair (EVAR).

P29

P29 - Improving investigation and treatment of anaemia in acute vascular admissions

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Background
Anaemia is common among vascular patients, and is a risk factor for major amputation and mortality[1,2]. We assessed our rates of pickup, treatment and referral for anaemia.

Materials and Methods
Emergency vascular admissions were identified over a 2 month period. Anaemic patients were identified, and further investigations or treatment for iron, B12 or folate deficiency were noted. Investigation of anaemia was encouraged with a departmental educational presentation, and posters were displayed. A further audit then took place.

Results
Most patients were anaemic (23/(79%) Cycle1 (C1), 16/23 (70%) Cycle 2(C2)). In C1, 5 anaemic patients (22%) had further blood tests, which improved to 9 patients (56%) in C2. 6 patients in C1 and 3 in C2 had enough evidence of iron deficiency anaemia to justify a 2-week-wait referral for suspected malignancy; 1 patient in each cycle was referred (17% vs 33%). In both cycles, most patients in which an iron, B12 or folate deficiency was identified received replacement(Table 1).

Conclusions
Anaemia is common in acute vascular admissions; it was poorly investigated in our centre. Once investigated it was usually adequately treated. Prompts for junior doctors to investigate anaemia had partial effect.

	Iron deficiency	Iron replacement prescribed	B12/folate deficiency	B12/folate replacement prescribed
Cycle 1 (n=29)	6	5	4	3
Cycle 2 (n=23)	3	3	5	4

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P30

P30 - Necrotising Soft Tissue Infections Related to Intravenous Drug Use – Time to surgical debridement

Miss Hannah O'Neill[1], Miss Caitlin MacLeod[1], Mr Ramy Shaalan[1], Mr John Nagy[1], Mr Murray Flett[1], Mr Graeme Guthrie[1], Professor Graeme McLeod[1], Mr Stuart Suttie[1]
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Necrotising Soft Tissue Infection (NSTI) is a significant cause of morbidity in Intra Venous Drug Users (IVDU). Time to debridement is paramount for the treatment of NSTI, but diagnosis requires a high index of suspicion. Our aim was to identify if admitting specialty influenced time to surgical debridement.

A retrospective study of intravenous drug use related admissions involving the lower limbs between December 2011- December 2020, with follow up inclusive to 28/01/2021 or death. Data collected: Demographics, admitting specialty, in hospital referral, time to imaging/debridement.

There were 124 admissions secondary to NSTI (Median age 39yrs (24-58), 78 male (63%)). 69/124 admissions were direct to Vascular Surgery (56%), with 47/52 onward referrals from other specialties to Vascular, who performed 94% (n=117) of the initial debridements. There was significant variation in mean time from admission to theatre dependent on admitting specialty, p=0.001: Vascular 17hr, General Surgery 37hr, Plastics 44hrs, Orthopaedics 35hrs, Infectious Diseases 108hrs and Other Medical 50hr.

There is a wide variation in time to debridement, with referrals to medicine resulting in longer delays, reflecting the need for a high index of suspicion for NSTI. Improving awareness regarding necrotising infection is required.

P31

P31 - Infra-renal aortic diameter and cardiovascular risk: making better use of abdominal aortic aneurysm screening outcomes.

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Background
Aortic diameter (AD), used traditionally for aneurysm (AAA) screening may have a role in assessing cardiovascular risk. Unfortunately, are underutilised, whilst cardiovascular risk is sub-optimally . We examine the association between AD measurements and future cardiovascular risk.

Methods
Imaging and clinical data were obtained from three independent sources: 1) the Multi-centre Aneurysm Screening Study (MASS) trial; 2) the 2013/14 cohort of the English NHS AAA Screening Programme (NAAASP) and 3) the Framingham Heart Study (FHS) offspring cohort.Associations between maximal aortic diameter and cardiovascular outcomes were examined.

Results
Cardiovascular mortality in the MASS trial, was higher in men with AAA at 13 years of follow up, compared to those without [Hazard Ratio (HR) 2.22, 95%CI 1.97-2.50, P≤0.0001]. Contemporary risk of major adverse cardiovascular events in the NAAASP was highest in those with an AAA (HR 2.91, 95%CI 2.00-4.25), whilst, extremes of aortic diameter were associated with increased risk for cardiovascular events.

Conclusions
Irrespective of the diagnosis of AAA, men attending for AAA screening who are found to have an abnormal aortic diameter are at high risk of future cardiovascular events. This currently unutilised data from AAA screening programmes has the potential to improve preventative management of cardiovascular risk.

P32 - Necrotising Soft Tissue Infection Related to Intravenous Drug Abuse – Can Biochemical Markers Aid Diagnosis?

Miss Caitlin MacLeod[1], Miss Hannah O'Neill[1], Mr Ramy Shaalan[2], Mr John Nagy[1], Mr Murray Flett[1], Mr Graeme Guthrie[1], Professor Graeme McLeod[2], Mr Stuart Suttie[1]
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Necrotising soft tissue infections (NSTI) are a significant cause of morbidity in Intra Venous Drug Users (IVDU). Scoring systems such as Laboratory Risk Indicator for Necrotising Fasciitis (LRINEC) have never been validated in such populations. We sought to identify if biochemical markers can distinguish NSTI from non NSTI in this population using the LRINEC scoring system.

A retrospective study of intravenous drug use, limb related admissions generated 580 inpatient admission episodes (December 2011-December 2020, mean age 38yrs (21-61); 348/580 males) with 124 admissions related to NSTI. Data collected: demographics; biochemistry; hospital/critical care stay. LRINEC score cutoff of ≥6 had a sensitivity of 73% (Positive Predictive Value=31%) for predicting NSTI. A LRINEC score of <6 had a specificity of 62% (Negative Predictive Value=91%) in predicting non NSTI.

	NSTI	No NSTI
LRINEC Score ≥6	33	73
LRINEC Score <6	12	119

The LRINEC scoring system has a poor positive predictive value in identifying NSTI in this group of patients. This patient population is not the standard general population on which the LRINEC system was developed. Further modelling should be conducted to develop a predictive tool for identifying NSTI in this specific population, in which the diagnosis can be challenging.

	NSTI	No NSTI
LRINEC Score ≥6	33	73
LRINEC Score <6	12	119

P33

P33 - Prevalence of pre-operative anaemia and its association with socioeconomic status and short-term post-operative outcome in Carotid Endarterectomy (CEA).

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Introduction
Pre-operative anaemia and low socio-economic status (SES) are associated with worse outcomes in surgical procedures, including CEA. Further, low SES is associated with anaemia. This study aims to describe the prevalence of pre-operative anaemia and investigate its association with SES and outcome following CEA.

Method
Patients undergoing CEA between January 2016 - December 2020 in a single unit were included. Pre-operative anaemia, SES, and 30 day outcome was recorded. Data was analysed using STATA IC/15. Haemoglobin level of <130g/dL in men and <120g/dL in women were defined as anaemia.

Results
Of 171 patients, 17.0% (n=29) were anaemic. 10.3% (n=3) of anaemic patients were in the most deprived SES quintile. A non-linear association was found between anaemia and SES quintile. Anaemia was associated with increased risk of stroke within 30days (OR 5.48; 95%CI 0.95 – 6.67; p-value 0.057), but not Major Adverse Cardiovascular Events (MACE), (OR 0.65; 95%CI 0.06 – 2.27; p-value 0.71). Patients in most deprived SES quintile were noted to have 10 times the odds of MACE in 30-days (OR 10.62; 95%CI 1.97 – 57.2; p-value 0.006).

Conclusion
Pre-operative anaemia may increase risk of stroke within 30 days of CEA while socioeconomic deprivation clearly influences MACE following CEA.

P34

P34 - VSGBI guidelines during COVID-19 pandemic failed renal access patients

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Introduction
The COVID-19 pandemic caused major disruptions to surgical activity across the UK. According to the VSGBI and Federation of Surgical Specialty Association guidelines, vascular access (VA) surgery was classed as priority 3, with a recommendation for the primary creation of AVF to be postponed.

Methods
Data of VA activity in 2020 was collected using Electronic patient records (EPR) and Renal database. Previous VA audits were used to provide comparative data and outcomes were assessed against latest KDOQI and GIRFT guidelines.

Results
In 2020, 214 vascular access procedures were performed, down 27% from 2019. The total number of Interventional radiology procedures performed was however the same as in 2019 (300).
The percentage of incident dialysis population which started dialysis through fistula or graft was only 20%, compared to national target of 60%. The conversion rate of those who started on lines to permanent access at 90 days was merely 4%.

Conclusions
Renal access patients were hit worse by changes to surgery guidelines during the COVID-19 pandemic. Access is life-line for these patients and the American guidelines gave them priority 2a. We need to re-evaluate the priority system for future pandemics.

P35

P35 - The mysterious risk of arterial thrombosis with COVID-19: 12-month experience from a tertiary vascular unit.

Miss Isabelle Sanders[1], Miss Pavithira Sivagangan[1], Mr Philip Stather[1], Mr Wissam Al-Jundi[1]
[1]*Norfolk And Norwich University Hospital, Norwich, United Kingdom*

Introduction
COVID-19 generates a cytokine storm that predisposes patients to systemic complications including arterial thrombosis (AT) and acute limb ischaemia (ALI). This study reviews our understanding of the incidence and outcomes of patients with COVID-19 who develop AT.

Method
The case notes of all emergency patients with COVID-19 referred to the vascular services between March 2020-21 were retrospectively reviewed. The study was undertaken to measure 30-day outcomes.

Results
During March 2020-21, 60,000 people tested positive for COVID-19 in Norfolk. 33 patients were referred to the vascular service of which 15 had AT (estimated incidence 0.03%). 93% AT patients had ALI, with 40% having other risk factors for AT (Table). Fourteen locations of AT were identified in 9 patients. 36% of ATs were infrainguinal, with the majority affecting chest, abdominal and pelvic vessels. 30-day mortality was 60%. Three patients underwent surgery: 2 embolectomies (1 requiring subsequent BKA and 1 mortality); 1 primary BKA requiring subsequent AKA. 30-day amputation free survival (AFS) rate was 29%.

Conclusion
The incidence of AT within the vascular surgery territory in COVID-19 patients is low, however, it is associated with poor 30-day AFS. A CTA protocol including the entire major vessels may be indicated in COVID-19 patients.

Demographics	Mean (range) or No. (%)
Age	72 (49-92)
Females	8 (53%)
DM	4 (27%)
AF/AVR	6 (40%)
COPD/Asthma	4 (27%)
IHD	2 (13%)
HT	2 (13%)
CKD	2 (13%)
No comorbidities	1 (7%)
Hospitalised with COVID	11 (73%)
Primary admission under Vascular	4 (27%)

Table 1: Demographics of patients admitted with AT and positive COVID-19.

P36

P36 - The modified Glasgow Prognostic Score as a predictor of survival following major limb amputation in patients with arterial disease/diabetes.

Mr Manoj Nair[1], Mr Maaz Syed[1], Mr Alan Meldrum[1], Mr Keith Hussey[1]
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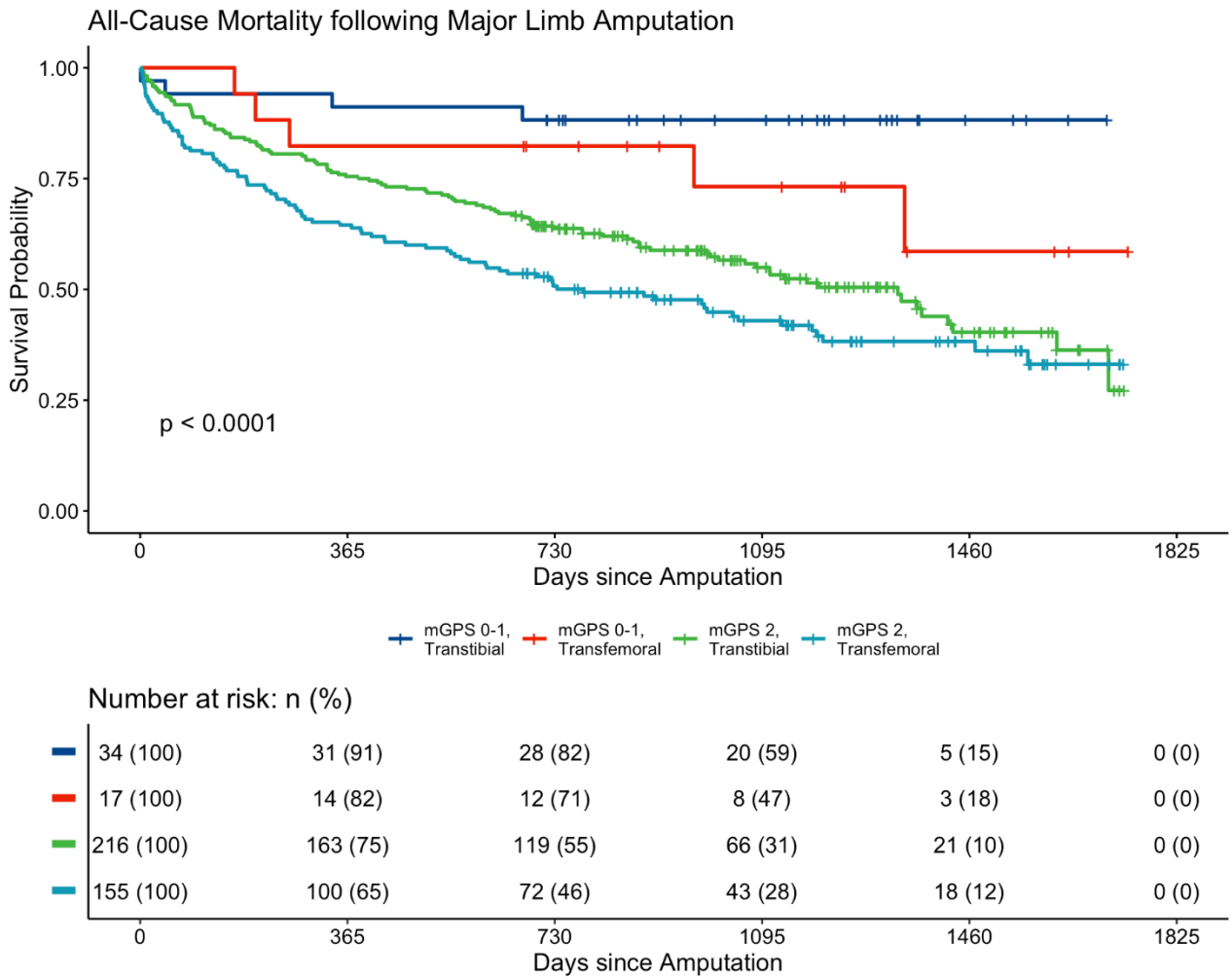
Aim
The modified Glasgow Prognostic Score (mGPS) describes systemic inflammatory response and nutritional status by combining serum albumin and C-reactive protein (CRP). mGPS can be used as a predictive tool for survival in patients with different cancer diagnoses. We have applied mGPS to a group of patients following major limb amputation as a consequence of arterial disease/diabetes.

Method
This was a retrospective review of patients undergoing major limb amputation in a single Scottish Health Board (2016 to 2018) with follow-up to 2020. The Community Health Index number and case-linkage were used. Serum albumin and CRP were recorded. The primary outcome measure was survival.

Results
There were 422 major limb amputations performed with 204 deaths in the follow-up period. Patients with a modified Glasgow Prognostic Score of 2 had a 3.85 (95% CI 1.97 to 7.52) times increased likelihood of all-cause mortality compared to patients with a low modified Glasgow Prognostic Score. Adjusted multivariate analysis suggests that the principle effect is from serum albumin ($p<0.003$) rather than CRP ($p>0.9$).

Conclusion
An mGPS of 2 is associated with an increased likelihood of all-cause mortality. This is primarily related to serum albumin, which is both a marker of acute phase response and nutrition.


All-Cause Mortality following Major Limb Amputation
Survival Probability
1.00
0.75
0.50
0.25
0.00
p < 0.0001
0
365
730
1095
1460
1825
Days since Amputation
mGPS 0-1, Transtibial
mGPS 0-1, Transfemoral
mGPS 2, Transtibial
mGPS 2, Transfemoral
Number at risk: n (%)
34 (100) 31 (91) 28 (82) 20 (59) 5 (15) 0 (0)
17 (100) 14 (82) 12 (71) 8 (47) 3 (18) 0 (0)
216 (100) 163 (75) 119 (55) 66 (31) 21 (10) 0 (0)
155 (100) 100 (65) 72 (46) 43 (28) 18 (12) 0 (0)
0
365
730
1095
1460
1825
Days since Amputation

P37

P37 - Royal Derby experience in Aortic Graft Infection management over the last decade and local protocol modification

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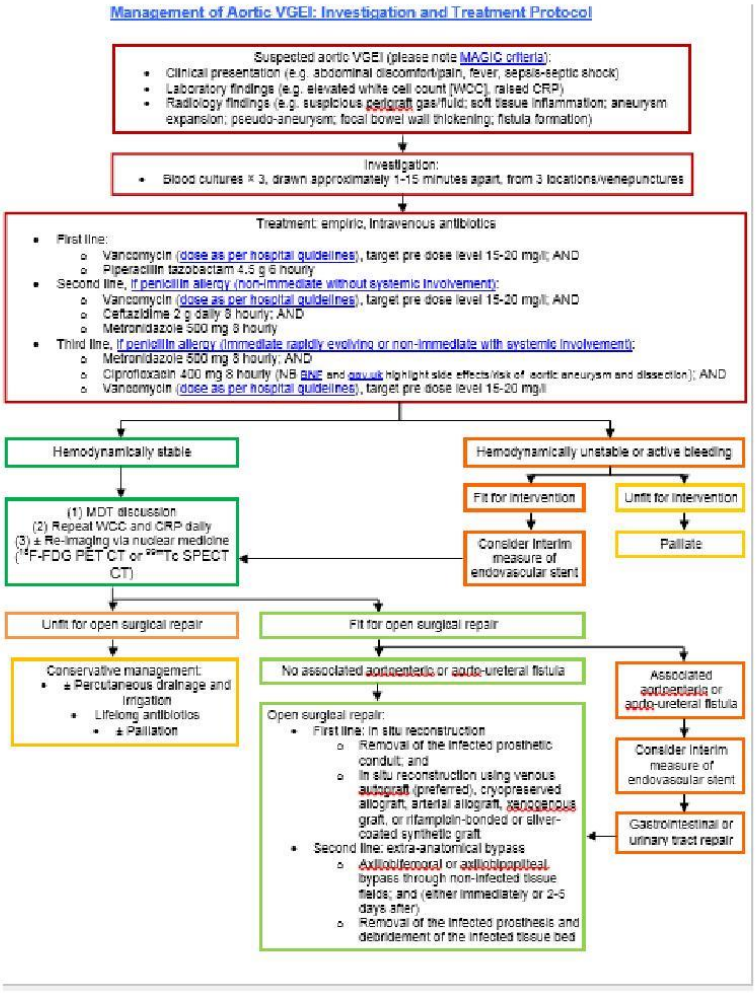
Introduction
Aortic graft infection (AGI) is rare(0.6%-3%), yet serious(30-60% mortality and 40-60% morbidity). The main stay is conservative or explantation. The aim of this study is to look into the role of percutaneous drainage in the management of AGI and modify the existing local protocol accordingly.

Method
This is a retrospective study, which included all AGI cases over the last decade. Short and long term outcome was recorded (30-day and 5 year). AGI treatment was stratified depending on the MDT outcome into either management via IV antibiotics only, percutaneous drainage (PCD), re-operation, or a combination of the interventions along with antibiotics.

Results
The study included 17 patients, 59%(n=10) had Endovascular repair, 41%(n=7) had a collection on CT scan, all patients received IV antibiotics, whereas 29% (n=5) had an additional percutaneous drainage. Only one patient had explantation. 30-day Mortality was 0%, 5 year all-cause mortality rate was 35% across all groups(n=6), where it was 20%(n=1) in the PCD group.

Conclusion
Percutaneous drainage of AGI, where anatomically possible, could be considered an additional approach to improve AGI mortality when combined with IV antibiotics. PCD has been incorporated into the local protocol for management of AGI especially in patients unfit for open surgery.


Management of Aortic VGEI: Investigation and Treatment Protocol
Suspected aortic VGEI (please note MAGIC criteria):
Clinical presentation (e.g. abdominal discomfort/pain, fever, sepsis-septic shock)
Laboratory findings (e.g. elevated white cell count [WCC], raised CRP)
Radiology findings (e.g. suspicious perigraft gas/fluid; soft tissue inflammation; aneurysm expansion; pseudo-aneurysm; focal bowel wall thickening; fistula formation)
Investigation:
Blood cultures × 3, drawn approximately 1-15 minutes apart, from 3 locations/venepunctures
Treatment: empiric, intravenous antibiotics
First line:
Vancomycin (dose as per hospital guidelines), target pre dose level 15-20 mg/l; AND
Piperacillin tazobactam 4.5 g 6 hourly
Second line, if penicillin allergy (non-immediate without systemic involvement):
Vancomycin (dose as per hospital guidelines), target pre dose level 15-20 mg/l; AND
Ceftazidime 2 g daily 8 hourly; AND
Metronidazole 500 mg 8 hourly
Third line, if penicillin allergy (immediate rapidly evolving or non-immediate with systemic involvement):
Metronidazole 500 mg 8 hourly; AND
Ciprofloxacin 400 mg 8 hourly (NB BNF and gov.uk highlight side effects/risk of aortic aneurysm and dissection); AND
Vancomycin (dose as per hospital guidelines), target pre dose level 15-20 mg/l
Haemodynamically stable
Haemodynamically unstable or active bleeding
Fit for intervention
Unfit for intervention
(1) MDT discussion
(2) Repeat WCC and CRP daily
(3) ± Re-imaging via nuclear medicine (18F-FDG PET CT or 99mTc SPECT CT)
Consider interim measure of endovascular stent
Palliate
Unfit for open surgical repair
Fit for open surgical repair
Conservative management:
± Percutaneous drainage and irrigation
Lifelong antibiotics
± Palliation
No associated aortoenteric or aorto-ureteral fistula
Associated aortoenteric or aorto-ureteral fistula
Open surgical repair:
First line: in situ reconstruction
Removal of the infected prosthetic conduit; and
In situ reconstruction using venous autograft (preferred), cryopreserved allograft, arterial allograft, xenogenous graft, or rifampicin-bonded or silver-coated synthetic graft
Second line: extra-anatomical bypass
Axillofemoral or axillobipopliteal bypass through non-infected tissue fields; and (either immediately or 2-5 days after)
Removal of the infected prosthesis and debridement of the infected tissue bed
Consider interim measure of endovascular stent
Gastrointestinal or urinary tract repair

P38

P38 - Challenges in delivering good quality vascular research in developing countries - a narrative review

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[1]University of Leicester , Leicester, United Kingdom, [2]Al-Azhar University Gaza, Gaza, Palestine

Introduction
The aim of this article is to highlight challenges and concerns related to vascular research delivery in developing countries.

Methods
Literature search was conducted using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow using MESH keywords

Results
5105 articles were initially identified. Upon subsequent screening by title and abstract, 756 articles were published either discussing research challenges or quality of research in developing countries. Articles were distributed according to the continent they were published from [Asia 34.6% (n=262), Africa 33.6% (n=254), South America 16.5% (n=125), developing Europe 15.2% (n=115)]. Major challenges highlighted included: gaps in research training, lack of research facilities and/or infrastructure, inadequate mentorship, insufficient funding,or unstable geopolitical environment.

Conclusions
This study emphasises on the need for a more sustainable collaborative research initiative especially in developing countries, where the focus would be on producing high quality meaningful research via enhancing undergraduate research exchange oriented medical education, collaborating with various international vascular centres of excellence ,improving physical or virtual mentorship programs and developing strategies to overcome lack of funding through the governments, charity or collaborative work, in view of improving the quality of vascular basic research and clinical service provided in developing countries.

P39

P39 - Severe infra-inguinal disease and tissue loss, but not the loss of graft patency are associated with amputation-free survival in patients with TASC C and D Aorto-Iliac Occlusive Disease treated with covered stents

Mr Amro Elboushi[1], Ms Wafaa Mohammed[1], Mr Matthew Popplewell[1], Mr Maciej Juszczak[1,2], Mr Hosaam Nasr[1], Mr Donald Adam[1], Mr Martin Claridge[1,2]

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Background

Covered stent (CS) patency is often considered the primary end-point in endovascular management of aorto-iliac occlusive disease (AIOD) driving development of new techniques. We investigated the association of CS patency with amputation rate and survival in patients with TASC C and D AIOD.

Methods

All patients with TASC C & D AIOD treated with CSs between 2008 and 2020 were identified. The primary outcome was amputation-free survival (AFS). Secondary outcome was amputation rate.

Results

One hundred twenty-five patients [86 men, mean age 69.2 (range 46.8-95.4), 86% TASC D lesions] were treated for critical limb-threatening ischaemia (72%) or short-distance claudication with 99% technical success. Eleven (8.8%) patients had major limb amputation. AFS at 1 and 3 years was 83.2% [95%CI 75.4-88.7] and 72.3% [95%CI 63.2-79.5] (median follow-up 37.3 months [IQR 16.9,70.0]). CS patency was not associated with amputation rate (OR 0.3 [0.1;1.7], p=0.20) or AFS (HR=0.74 [0.29;1.86], p=0.52). Age, severe infra-inguinal disease, tissue loss and delayed emergency presentation were independently associated with AFS (Table 1).

Conclusions

Covered stent patency is not associated with meaningful patient outcomes and may not be an appropriate metric to assess efficacy of endovascular management of advanced AIOD.

Table 1. Multivariable analysis of factors associated with amputation-free survival. HR - Hazard Ratio; ASA - American Society of Anesthesiologists Physical Status Classification System.

VARIABLE	UNITS	HAZARD RATIO	95% C.I.	P-VALUE
AGE		1.09	1.04;1.13	<0.001
EMERGENCY STATUS	Stable	Ref		
	Emergency	2.26	0.91;5.58	0.077
	Delayed presentation	3.85	1.56;9.49	0.003
ASA	II	Ref		
	III	1.35	0.37;4.95	0.647
	IV	3.54	0.88;14.30	0.076
EGFR		0.99	0.98;1.00	0.111
INFRA-INGUINAL DISEASE	Not present	Ref		
	Mild	1.31	0.35;4.86	0.685
	Severe	3.35	1.15;9.69	0.026
TISSUE LOSS	No	Ref		
	Yes	2.42	1.22;4.82	0.012

P40

P40 - Open surgical replacement of the descending thoracic and thoracoabdominal aorta in patients with confirmed Marfan and Loeys-Dietz syndormes: a 20-year single centre experience

Mr Donald Adam[1], Dr Mauro Iafrancesco[1], **Mr Maciej Juszczak[1]**, Mr Martin Claridge[1], Mr David Quinn[1], Mr Eshan Senanayake[1], Dr Paul Clift[1], Mr Jorge Mascaro[1]
[1]University Hospitals Birmingham NHS Foundation Trust, ,

Introduction
Open replacement (OR) of the descending thoracic (DTA) or thoracoabdominal aorta (TAA) in patients with connective tissue disorders (CTD) is a relatively uncommon procedure in the UK.

Methods
Single-centre retrospective study of consecutive patients with Marfan (MS) and Loeys-Dietz (LD) syndromes treated between October 1999 to December 2019. Primary endpoint was 30-day mortality. Secondary end points were mid-term survival and freedom-from-distal re-intervention. Data are presented as median (IQR).

Results
58 patients [33 men; median age 41 years (35-48); median aneurysm diameter 60mm (55-74); 51MS, 7 LDS] underwent OR (37 elective) of the DTA (n=21) or TAA (n=37). 30-day mortality was 5.2% (n=3; including 2 patients > 60 years) and permanent spinal cord ischaemia occurred in 3.8% (n=2). Median follow-up was 81 months (48-127). Estimated (±SE) 5-year survival was 85% ±5%. Seven patients had distal aortic re-intervention with no mortality or SCI: estimated 5-year freedom from distal re-intervention was 94% ±3%. There was no significant difference in outcome comparing acuity or extent of repair.

Conclusions
Open DTA and TAA replacement in patients with MS and LDS can be performed with low peri-operative morbidity and mortality and satisfactory long-term survival with a low requirement for distal aortic re-intervention.

P41

P41 - Deprivation and supervised exercise for intermittent claudication

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[1]South East Wales Vascular Network, , UK, [2]Aneurin Bevan University Health Board, , UK

Introduction
Socioeconomic deprivation is associated with unhealthy lifestyle habits including lack of exercise; however, it is not known whether socioeconomic deprivation is associated with engagement with supervised exercise for intermittent claudication.

Methods
Consecutive patients referred to a supervised exercise programme from a vascular department in South-East Wales from January 2017 to December 2018 were eligible for inclusion. Demographic data were linked with exercise referral scheme data on the Secure Anonymised Information Linkage platform. The Welsh Index of Multiple Deprivation was used to represent small-area socioeconomic deprivation based on patient postcodes. Outcomes were the numbers attending the exercise programme, completing the programme, quality of life questionnaire (EQ-5D-5L). Regression analyses were used to identify predictors of attending and completing the programme.

Results
164 patients were included in analysis. 28 (17.1%) attended the first appointment, 12 (7.3%) completed the exercise programme. Increasing deprivation was not associated with attending the first appointment (OR=0.999, p=0.144) nor completing the programme (OR=0.999, p=0.156). Mean EQ-5D-5L scores did not significantly improve for those completing the programme.

Conclusion
The uptake and completion rate in this cohort was very low. Improving engagement should focus on other known barriers regardless of small-area deprivation based on these findings.

P42

P42 - Outcomes of single vessel infrapopliteal angioplasty stratified by Global Limb Anatomical Staging System (GLASS) for Critical Limb Threatening Ischaemia (CLTI)

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[1]*Department of Vascular Surgery, Ninewells Hospital, Dundee, United Kingdom*

Introduction
To investigate whether outcomes (amputation (AFS) and reintervention free survival (RFS)) in patients undergoing infrapopliteal percutaneous angioplasty for Critical Limb Threatening Ischaemia (CLTI) was related to Global Limb Anatomical Staging System (GLASS) severity.

Methods
Patients who underwent single vessel infrapopliteal angioplasty for CLTI between March 2015-Feb 2018 were retrospectively identified. Data collected: demographics, co-morbidities, GLASS Score and outcomes. Patients were followed up for one year. GLASS score was performed independently by two vascular consultant surgeons. Data was analysed using IBM® SPSS® statistical package.

Results
A total of 50 patients were identified, mean age of 70.2 years (range 44-91 years). Patients were assigned GLASS stage 1 (n=20) 2 (n=15) and 3 (n=15) (Cohen's kappa=0.82). No significant difference in age or comorbidities between each group. AFS at 1 year was 34% (n=17), with a non-significant trend to improved AFS in lower GLASS stages (p=0.164). RFS at 1 year was 80% (n=10) with no significant difference between the groups.

Conclusion
GLASS did not predict amputation free survival. However, GLASS is a reproducible anatomic classification tool. The presence of anatomically complex infrapopliteal disease should not exclude patients from an attempted angioplasty.

P43

P43 - How did the COVID-19 pandemic affect UK Tertiary Vascular Surgery Centre interventions?

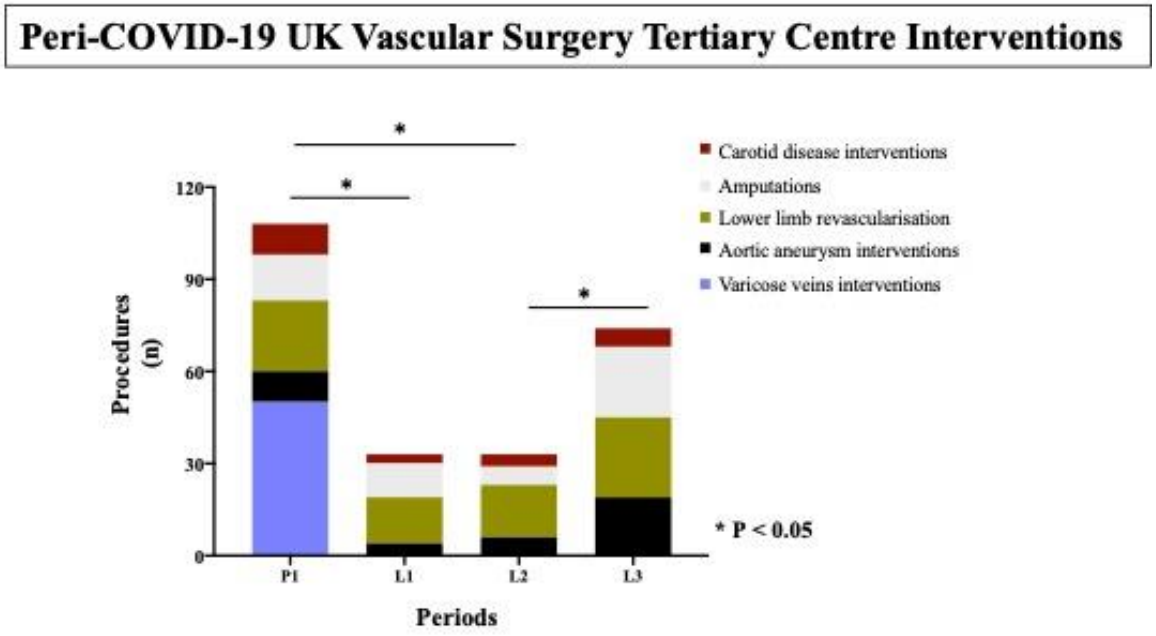
Mr Tamer El-Sayed[1], Miss Katherine France[1], Mr Albagir Altahir[1], Mr Peng Wong[1]
[1]*The James Cook University Hospitals, ,*

Introduction
COVID-19 disrupted global vascular surgery care. This study evaluates a UK Vascular Surgery tertiary service during COVID-19

Methods
Retrospective comparison of vascular interventions in the James Cook Tertiary Centre during Pre-Covid [P1, (23/03/2019-31/05/2019)], UK first lockdown [L1, (23/03/2020-31/05/2020)], second lockdown [L2, (05/11/2020-02/12/2020)], and third lockdown [L3, (06/01/2021-08/03/2021)].

Results
118 operations in P1 dropped to 33 in L1 and 33 in L2(P<0.03, both), recovering to 74 in L3. 14 vascular patients suffered COVID-19, mainly in L1 with 70% thrombosis. Ten aortic aneurysm repairs in P1 dropped to 4 (>7cm) in L1, 6 in L2, and rose to 19 (>5.5cm) in L3 (P<0.0001, all). Thrombo-embolectomy doubled from 3 in P1 to 6 in L1, 5 in L2, and 6 in L3(P<0.05, all). Emergency bypasses increased from 6 in P1 to 10 in L3, while elective bypasses were halved by L3. Major amputations dropped in L1 and L2 but rose in L3 (P<0.0001). Carotid interventions dropped from 10 in P1 to 3 in L1, recovering to 6 in L3. Varicose veins interventions stopped during COVID-19 (P<0.0001). All-cause mortality was comparable in all periods.

Conclusion
COVID-19 has impacted vascular services; however, a better understanding is required for improved readiness for further pandemic waves.



P44

P44 - An ambulatory pathway for catheter directed thrombolysis to treat acute iliofemoral DVT is feasible and effective.

Dr Ashwin Sivaharan[1], Tomos Williams[1], Reece Nixon[1], Rachael Morris[1], Meryl Green[1], Shaunagh Prouse[1], Siobhan O'Shea[1], Chloe Lakin[1], Narayan Karunanithy[1], Narayan Thulasidasan[1], Athanasios Diamantopoulos[1], Alvin Credo[1], Marcos Bango-Garcia[1], Vanessa Livingstone[1], Hayley Moore[1], Stephen Black[1], Becky Sandford[1]
[1]Guy's & St Thomas' NHS Foundation Trust, London, United Kingdom

Introduction
Inter-hospital transfer for catheter directed thrombolysis (CDT) following acute iliofemoral deep venous thrombosis (IF-DVT) can result in lengthy hospital stay. This study assessed the feasibility of an ambulatory care pathway for patients with IF-DVT.

Methods
Patients presenting with IF-DVT considered suitable for an ambulatory pathway were assessed through a one-stop Emergency Vascular Clinic (EVC). Catheter-directed thrombolysis was started within 5 days of review, with a standardised thrombolysis protocol. Data were analysed retrospectively from a prospectively maintained database.

Results
Fifty-eight patients with a first presentation of acute IF-DVT were managed via this pathway between 13/9/2017 and 1/3/2021. Median age was 51 years (18-73 years). Lysis was commenced on the same day in 15 patients (26%) and within 24 hours in a further 30 patients (52%). Median time from symptom onset to treatment was 12 days (3-55 days) and from referral to treatment was 5 days (0-11 days).
Median length of hospital stay was 5 days (2-13 days). Technical success with a patent target vein on discharge was achieved in 42 patients (72%).

Conclusion
Acute iliofemoral DVT can be managed effectively via an ambulatory pathway within a rapid timeframe to allow successful CDT treatment.

P45

P45 - The Mental Health of Patients' undergoing Open vs Endovascular Revascularisation

Mr Ahmed Abdel Rahim[1], Dr Lu Yau[1], Mrs Debra Chong[1], Mr Devender Mittapalli[1]
[1]*Derriford Hospitals, University Hospitals Plymouth NHS Trust, Plymouth, United Kingdom*

Introduction
Recent clinical trials have compared outcomes between open and endovascular revascularization strategies. However, there is little information and attention focused on patients' mental health undergoing these procedures, which will be the aim of this study.

Material and Methods
A prospective study was conducted on patients undergoing either infra-inguinal angioplasties or open bypass surgeries between January 2021 and June 2021. They were given the Hospital anxiety and depression score (HADS) questionnaire one-week pre- and 6-8 weeks post-procedure.
We collected information on their demographics, co-morbidities, and hospital stay length.

Results
A total of 73 patients were included in the study (endovascular (n=35) vs open (n= 38) revascularization. 57.5% were diabetics, 41.1% had hypertension, and 32.9% had ischaemic heart disease. 11% had previous psychological problems under medical treatment. The median score and interquartile range of the pre-and post-operative HADS-D for both groups are 5(2-8) vs. 6(2-9) and 3(1-8) vs. 4(2-7), (p=0.37 and 0.39), respectively. And for HADS-A in both groups is 5(2-7) vs 7(2-11) and 3(2-8) vs 5.5(3-9), (p=0.52 and 0.14) respectively.

Conclusion
Despite the minimally invasive nature of endovascular interventions, there is no added advantage of endovascular over open revascularisation on patient mental health.

P46

P46 - A comparison of outcomes in patients undergoing revascularisation for chronic limb threatening ischaemia before and during the COVID-19 pandemic.

Mr Paul Zaki[1], Dr Mohammad Iqbal[1], Dr Syed Akhter[1], Mr Matthew Popplewell[2], Mr Tim Sykes[2], Mr Steven Jones[2]

[1]Keele Medical School, Staffordshire, UK, [2]Royal Shrewsbury Hospital, Shropshire, UK

Introduction

We aim to quantify the impact of the COVID-19 pandemic on important quality performance indicators and outcomes in patients with chronic limb threatening ischaemia (CLTI).

Methods

We compared patient outcomes pre-COVID-19 (6-months prior) and during the pandemic 6-months after the 17th March 2020 in patients undergoing revascularisation for CLTI at a single UK vascular unit. The primary outcome of the study was limb salvage (LS) with secondary outcomes of time to imaging, time to revascularisation, length of hospital stay (LOS) and overall survival (OS).

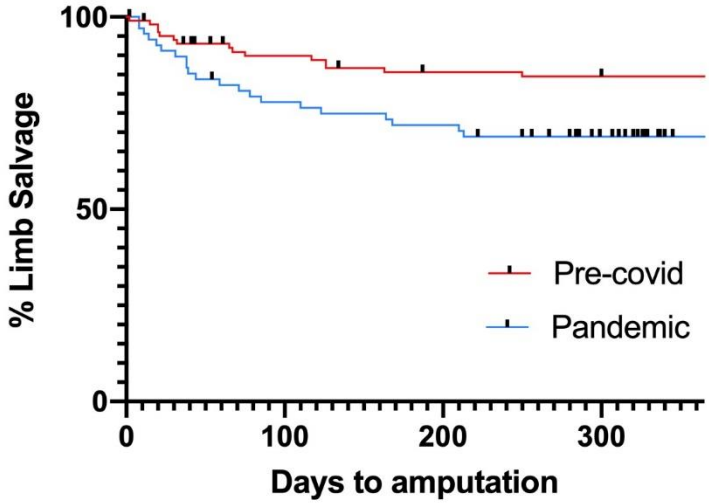
Results

We performed 62 endovascular and 39 open surgical revascularisations in the pre-COVID group. In the first wave we completed 46 endovascular and 23 open surgical revascularisations. There was no difference in time to imaging from presentation, time to revascularisation and length of hospital stay. There was a higher proportion of patients with tissue loss extending past the forefoot in the pandemic group (p=0.004). LS was significantly worse in those presenting during the pandemic (HR 0.5, 95%CI: 0.3-0.9, p=0.02). There were no differences in OS (HR 1.1, 95%CI: 0.4-2.7, p=0.9).

Conclusions

Despite timely assessment and treatment, patients undergoing revascularisation during the pandemic had worse LS, likely due to more extensive tissue loss.

A Comparison of Limb Salvage in Patients Undergoing Revascularisation for CLTI Pre-COVID and During the First Wave of the Pandemic



At risk				
Pre-COVID	101	86	80	79
Pandemic	69	53	49	35

Log-rank HR 0.5, 95%CI: 0.3-0.9, p=0.02

P47

P47 - Effect of amputation level on patient mental and psychological health

Mr Ahmed Abdel Rahim[1], Dr Wei shen Cheok[1], Mrs Debra Chong[1], Mr Devender Mittapalli[1]
[1]1Derriford Hospital, University Hospitals Plymouth NHS Trust, United Kingdom, Plymouth, United Kingdom

Introduction
Amputation is a very stressful event for patients, and the psychological reaction to it is complex and variable. Our study aims to compare the effect of above and below-knee amputations on the patient's mental health.

Methods
A prospective study of patients undergoing Surgical Amputations between January 2021 and June 2021 was conducted. They have given the Hospital anxiety and depression score (HADS) 1-week pre- and 6-8 weeks postoperatively. Patient demographics and co-morbidities, Pre- and postoperative hospital stay length, and Patient discharge destination were identified.

Results
A total of 49 patients (22 AKA vs. 27 BKA) were included in statistical analysis; of them, 57.1% had diabetes, 46.9% had hypertension, and 28.6% had ischaemic heart disease. Comparing the postoperative HADS-A and -D in
AKA vs BKA groups revealed (11(7-12) vs 8(5-11)) and (10.5(8-13) vs 8(7-13)),p value = 0.07and 0.19 respectively. However, comparing the pre- and post-operative HADS-A and -D in each group revealed p-value of 0.095 and 0.07 in AKA and 0.03 and 0.08 in BKA.

Conclusion
Both AKA and BKA have similar effects on patient mental health despite increased anxiety postoperatively in the BKA group.

P48

P48 - The mechanistic effects of shockwave therapy on an ex-vivo human wounded skin model

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Introduction
Chronic non-healing wounds are a significant health concern. They have a considerable impact on physical, psychological, and social domains of quality of life. Lower limb wounds are predominately linked with vascular disease and alone cost £8.3billion per year to treat (more than cancer). There is an urgent need to develop novel treatments to accelerate wound healing and the aim of this study was to explore the mechanistic effects of shockwave therapy on processes related to human cutaneous healing.

Methods
Varying dosages of shockwave therapy were applied to human cells isolated from donors with and without diabetes; in an ex vivo wounded skin model to identify potential beneficial effects.

Results
Shockwave treatment was associated with a significant improvement in wound closure. Histological analysis revealed a shockwave mediated increase in both proliferation and markers of neo-epidermal formation. Gene expression profiling analysis is currently ongoing. In relation to wound bacteria, there was little effect on microbial viability, however treatment did significantly increase bacterial sensitivity to antimicrobial therapy.

Discussion
Collectively, these findings are beginning to shed light on the mechanisms responsible for improved wound healing with shockwave therapy. This novel treatment has clear potential to impact chronic wound management in the near future.

P49

P49 - Temporal factors affecting functional outcome in surgery for neurogenic thoracic outlet syndrome (nTOS)?

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Neurogenic thoracic outlet syndrome (nTOS) is a debilitating but potentially treatable condition. Identifying temporal factors affecting outcome may improve patient selection in this complex group of patients.

Aim
To identify temporal factors that may influence surgical outcome.

Methods
Prospective data of patients operated with complete datasets between 2017-2021 were analysed in relation to duration of symptoms, onset of symptoms and age at surgery, using patient-reported outcome measures [Disability of the Arm, Shoulder and Hand (DASH) scores], as well as clinical assessment of primary neurogenic symptoms.

Results
35 patients (mean age 37.9 years, range 16-55) were included in the study.
96% (23/24) of patients with symptoms less than 5 years had improved DASH scores compared to 64% (7/11) greater than 5 years. Neither onset of symptoms nor age at surgery was associated with better DASH scores nor neurogenic symptom improvement.

Table (attached)

Conclusion
Duration of neurogenic symptoms < 5 years is associated with improved functional scores following surgery for nTOS.

P50

P50 - Frailty, cognitive impairment and delirium in chronic limb-threatening ischaemia: a prospective cohort study

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Introduction
Frailty and cognitive impairment are common in patients with chronic limb-threatening ischaemia (CLTI), however their inter-relatedness and association with post-operative delirium are not well described.

Methods
Single-centre, prospective cohort study including patients aged ≥50 presenting with CLTI, planned intervention and consenting to participate (study registration: NCT04027244). Frailty was assessed using the Edmonton Frail Scale (EFS), cognition by the Montreal Cognitive Assessment (MoCA) and delirium by the 4 'A's test. Associations of frailty, cognitive impairment and multi-morbidity with post-operative delirium were assessed using multivariable binary logistic regression and reported as odds ratios (OR) with 95% confidence intervals (CI).

Results
Ninety-nine patients underwent baseline assessments. Forty-five (45%) had frailty (EFS ≥8) and 31 (33%) had cognitive impairment (MoCA ≤23). Frailty was associated with multi-morbidity, anaemia, and worse cognition, disability and quality of life scores (Table 1).

Eighty-nine patients underwent a procedure. Ten patients (11%) developed post-operative delirium, none of whom had undergone angioplasty. Cognitive impairment (OR 6.94; 95%CI 1.16, 41.48) but not frailty (OR 4.96; 95%CI 0.51, 47.99) or Charlson comorbidity index (OR 1.69; 95%CI 0.99, 2.87) were associated with post-operative delirium.

Conclusion
Frailty and cognitive impairment are co-related in CLTI, however cognitive impairment is a better predictor of post-operative delirium.

Table 1: Association of frailty with baseline variables and assessments

	No frailty (EFS <8)	Frailty (EFS ≥8)	p-value
Demographics and Comorbidities			
Age[1]	72.1 (9.9)	72.6 (10.9)	.844
Female	8 (15%)	14 (31%)	.052
CCI score[2]	1 (0 – 2)	2 (1 – 4)	<.001
Haemoglobin (g/L)[1]	137.3 (17.0)	124.4 (19.8)	<.001
No. Medications[1]	7.2 (3.1)	9.2 (3.1)	.002
Frailty-related and Quality of Life Assessments			
MoCA score[1]	25.8 (3.1)	21.6 (6.0)	<.001
Grip strength (kg)[1]	31.9 (10.4)	23.6 (11.2)	<.001
SPPB[1]	6.8 (3.6)	2.9 (2.3)	<.001
VascuQoL[1]	77.3 (25.3)	63.4 (25.3)	.011
Anxiety (HADS)[2]	4 (2 – 6)	9.5 (5 – 13)	<.001
Depression (HADS)[2]	4 (2 – 6)	8 (4 – 11)	<.001
Barthel Index[2]	20 (19 – 20)	17 (15 – 19)	<.001

[1]Data presented as means (standard deviation) and compared using t-tests
[2]Data presented as medians (interquartile range) and compared using the Kruskal-Wallis test

CCI, Charlson comorbidity index; EFS, Edmonton frail scale; HADS, Hospital anxiety and depression score; MoCA, Montreal cognitive assessment; No., Number of; SPPB, Short physical performance battery; VascuQoL, Vascular quality of life.

P51

P51 - Contemporaneous long-term outcomes following carotid endarterectomy as the treatment for symptomatic carotid artery disease, from a single vascular centre, in the era of best medical therapy.

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Current 30-day stroke/death outcomes following carotid endarterectomy (CEA) are significantly better than the historical randomised trials. Patients have benefitted from complementary developments in surgical practice as well as evidence based best medical therapies (BMT) lacking in the original trials. Some speculate symptomatic carotid patients may be treated by BMT alone without surgery. The risk reduction benefit of CEA extends well beyond 30-days. The long-term benefit to patients while prescribed BMT, post CEA, is unclear.

Methods
All patients treated with CEA for symptomatic disease between 2014 & 2015, in a high-volume centre, were followed up for five years. Medical records were retrospectively accessed to determine prescription of anti-thrombotics, anti-hypertensives and statins. All strokes and deaths were recorded. Local results were compared with trial data using fisher's exact test.

Results
276 patients were included in the analysis. All patients were prescribed anti-thrombotics, 96% a statin and 97% at least one anti-hypertensive.
Only 1.8% (n=5) had an ipsilateral stroke between 30 days and five years (or death by another cause). Long-term strokes are better than NASCET, but the patients treated were much older (Table 1).

Conclusion
Prescription of BMT is high. Present short and long-term stroke outcomes following CEA are enhanced with BMT.

	CEA Patients	Average Age	Early Stroke/Death	Long Term Strokes	Deaths
Local Results 2021	N = 276	71	2.5% (at 30 days) for all strokes and deaths	9.8% (at 5 years)	25% (5-years)
NASCET 1998	N = 1415	<65 = 40% 65-74 = 46% >75 = 14%	6.5% (up to 30-days post op) p=0.0075	12.6% 2 years Local = 17/276 p=0.0078	3.2% (2 years)
ECST 1998	N = 1807	62.5	7.0% stroke/death P=0.003 3.8% (for fatal stroke or death up to 30-days) Local = 3/276 p=0.0197	Major stroke/death 14.9% at 3 years (for >80% stenosis) p=0.09	27.6% (6-year f/up)

P52

P52 - Decompression of thoracic outlet syndrome (TOS) improves symptoms and reduce the disability

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Aim
To review outcomes and compare pre- and post-operative Disabilities of Arm, Hand and Shoulder (DASH) scores at a tertiary referral centre.

Methods
A retrospective case note review, plus pre- and post-operative DASH questionnaires were used to assess complication risk, and objective and subjective outcomes for patients undergoing surgery for TOS between 2010 and 2021.

Result
Out of 88 identified procedures, 81 (representing 69 patients) had received follow-up, and were used towards analysis. The majority were venous (57; 50 arterial; 10 neuro).
Eight cases (9.9%) required 9 unplanned interventions, including 5 chest drain insertions, 2 venoplasties, 1 evacuation of haematoma and 1 drainage of seroma. 5(6.2%) had simple wound infections, 3(3.7%) pulmonary emboli, and 2(2.5%) required further surgical intervention on the treated limb for ongoing TOS. 8(9.9%) suffered suspected nerve injury with 4(4.9%) having significant disability at follow-up.
61.5% had resolution of disability, 7.7% had ongoing severe disability (37.5% pre-operatively). 82.8% were able to work post-operatively (55.4% pre-operatively). DASH questionnaires revealed improved scores (mean 18.7 point reduction), with patients noting improved confidence and capability following intervention.

Conclusion
Decompression for TOS improves both patient's subjective symptoms and objective outcomes, as well as reducing disability, however does come with risk of complication.

P53

P53 - Outcomes after Deep Venous Stenting – a Single Centre Experience

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Introduction
Endovascular deep venous stenting is an established method for treating ileo-femoral stenoses and occlusions causing chronic venous disease, as well as an adjunct in treating acute ileo-femoro-caval DVT. We reviewed outcomes at our tertiary referral centre.

Methods
We retrospectively analysed patients undergoing deep venous stenting for any indication from January 2016 - July 2020. All patients had venographically confirmed ileo-femoro-caval disease and intravascular ultrasound perioperatively; duplex ultrasound and/or CT was used to assess stent patency during follow-up.

Results
55 patients identified (36 females; mean age 56; follow-up unavailable for 17 patients) with 60 stents placed (45 left-sided, 5 bilateral); median follow-up 23.6 months (max 59; min <1; excluding lost to follow-up). Indications were: acute DVT without May-Thurner Syndrome (MTS) (6); acute DVT with MTS (8); acute DVT with Post Thrombotic Syndrome (PTS) (3); symptomatic MTS (31); and PTS (7). One-year primary, primary assisted and secondary patency was 82%, 96% and 96%, respectively; thrombosis rate was 10%. Stents patent at 1 year remained patent throughout follow-up.

Conclusion
Despite suspected low case ascertainment, we found patients treated for symptomatic MTS had better outcomes than patients treated for DVT/PTS, as previously described. Attempts to achieve secondary patency were unsuccessful in our cohort.

P54

P54 - The impact of the COVID-19 pandemic on training opportunities in vascular surgery

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The COVID-19 pandemic has disrupted surgical services with reduced elective activity and increased pressure on unscheduled activity. We hypothesise that the pandemic has increased unscheduled activity in vascular surgery; this shift in activity may impact opportunities for surgical training.

We aimed to assess elective and unscheduled activity in a tertiary vascular regional centre before and during the pandemic. Data was collected retrospectively from a prospectively maintained departmental database between March-September 2019(Pre-COVID-19) and March-September 2020(COVID-19). Procedures were categorised as elective vs emergency(unscheduled), type of operation, number of consultants and trainees present.

Pre-COVID-19 had 332 operations performed by the vascular service (elective n=117 vs emergency n=207; open aortic repair(OAR) n=10 vs n=8, EVAR n=12 vs n=2, carotid n=28, bypass n=24 vs n=19, major amputation n=2 vs n=49),with 63.9%(n=212) as single trainee. During COVID-19, there were 309 operations (elective n=127 vs emergency n=176; OAR n=5 vs n=6, EVAR n=2 vs n=3, carotid n=25, bypass n=11 vs n=25, major amputation n=11 vs n=45) and 80.2%(n=243) with
single trainee present.

The COVID-19 pandemic has resulted in 75% of vascular surgical activity being performed as an emergency with more individual opportunity for trainees. We suggest there is still ample learning opportunities for trainees in vascular surgery.

P55

P55 - A pilot trial of a short stay endovascular aneurysm repair pathway.

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Objectives
Short Stay (SS) Endovascular Aneurysm Repair (EVAR) pathways offer the potential to improve service efficiency and patient satisfaction by reducing length of stay. This study aims to assess previously retrospectively validated SS-EVAR criteria in a prospective population.

Methods
Validated SS-EVAR criteria based on patient comorbidities (see table 1), was applied prospectively to all EVAR cases between 1st January 2021 – 1st July 2021 at a tertiary centre. Post-operative complications, length of stay and readmissions were recorded.

Results
Twenty-two patients were assessed with nineteen included (95% male, median age 74 +/- 6.41), three were excluded for symptomatic aneurysms and age. Median length of stay was 35 +/- 21.5 hours. Six (26.3%) patients had in-patient complications, four within 8-hours (Two groin haematoma's, one respiratory infection, and one urinary retention). One occurred post 24-hours (pseudo-aneurysm). There were two readmissions within 30 days, one requiring renal artery stenting and one cholecystitis. There was no in-patient or 30-day deaths in the studied population.

Conclusions
The pathway used allows for the safe inclusion and adequate uptake of patients with limited co-morbidity for SS-EVAR. Without greater than national average rates of readmission. Wider adoption of this pathway could improve EVAR resource efficiency, whilst maintaining patient safety.

Table 1: patient selection criteria for SS-EVAR

	criteria
Social	Transport available Adult observer available for 24 h post-discharge Absence of significant immobility
Distance	< 100km
Age	<90 years
Body mass index (kg/m2)	<35
ASA grade	<=3
Advanced liver disease	Absent
Cognitive impairment	Absent
eGFR (mL/min/1.73m2)	>= 45
Ischemic heart disease	No myocardial infarction in past 6 months
Cerebrovascular disease	No stroke in past 1 year
Heart failure	No severe heart failure (ejection fraction <40%)
Chronic lung disease	No severe COPD (FEV1 <50%) or other severe respiratory disease
Diabetes	No insulin-dependent diabetes

SS-EVAR: short-stay endovascular aneurysm repair; ASA: American Society of Anaesthesiologists; eGFR: estimated glomerular filtration rate; COPD: chronic obstructive pulmonary disease; FEV1: forced expiratory volume in 1 s.

P56

P56 - A Systematic Review of the Safety and Efficacy of Stenting of the Inferior Vena Cava

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Background
Stenting of the inferior cava has become a more commonly performed procedure in recent years, yet there are no devices licensed for use in the IVC and systematic reviews on the topic are lacking.

Methods
The Medline and Embase databases were searched for studies reporting outcomes for safety and effectiveness of IVC stenting for any indication in series of 10 or more patients.

Results
Twenty -three studies were included with a total of 1,177 patients. Indications for stenting were malignant IVC syndrome (208 patients), thrombotic disease (575 patients), Budd-Chiari syndrome (364 patients) and IVC stenosis post liver transplantation (30 patients). The male: female ratio was 2.2:1 and the median age ranged from 30-61. The studies were too heterogenous for a formal metanalysis. Technical success ranged from 85%-100%, primary patency from 38-87% and cumulative patency from 77-97% . Major complications were rare with pulmonary embolism, stent migration and major bleeding reported in 0.02%, 0.1% and 0.07% patients respectively. Symptomatic improvement was inconsistently reported.

Conclusion
Stenting of the IVC has a high rate of technical success with low incidence of complications. Primary patency is variable however cumulative patency is reasonable regardless of the indication for stenting.

P57

P57 - Can Procalcitonin levels predict ICU mortality following open AAA repair for rupture?

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Intro
Post-operative mortality for ruptured AAA (rAAA) remains high. Determination of modifiable aspects of perioperative care is essential to improve outcomes. Procalcitonin (PCT) is a specific biomarker for bacterial infection. We hypothesised that PCT allowed us to predict ICU mortality.

Methods
A retrospective review of all patients directly admitted to ICU following open repair for ruptured AAA, between November 2013-December 2019. Data collected: demographics, serial PCT levels, White Cell Count, C-Reactive Protein, aortic cross clamp time and ICU survival.

Results
Peak PCT was significantly higher in the non ICU survivor group vs those surviving to ICU discharge median 1.81 ng/ml (IQR 0.94-6.52 ng/ml) vs 25.51 ng/ml (IQR 7.97-54.15 ng/ml) respectively, $p<0.05$. Peak PCT level positively correlated with clamp time $R=0.54$ $p< 0.001$ and in the non- survivors, clamp time was significantly longer. White Cell Count (WCC) and C-Reactive Protein (CRP) levels were not significantly different between ICU survivors and non ICU survivors.

Conclusion
PCT levels were significantly higher in the non-survivor group, with a positive correlation between clamp time and peak PCT levels. This would suggest a significant bacterial driver to poor outcome and may allow for the more targeted use of antibiotics or more aggressive post-operative imaging.

P58

P58 - Endoleak following Endovascular Aneurysm Repair: Incidence and management outcomes in a Single Centre: A 10 Year Follow-Up Study.

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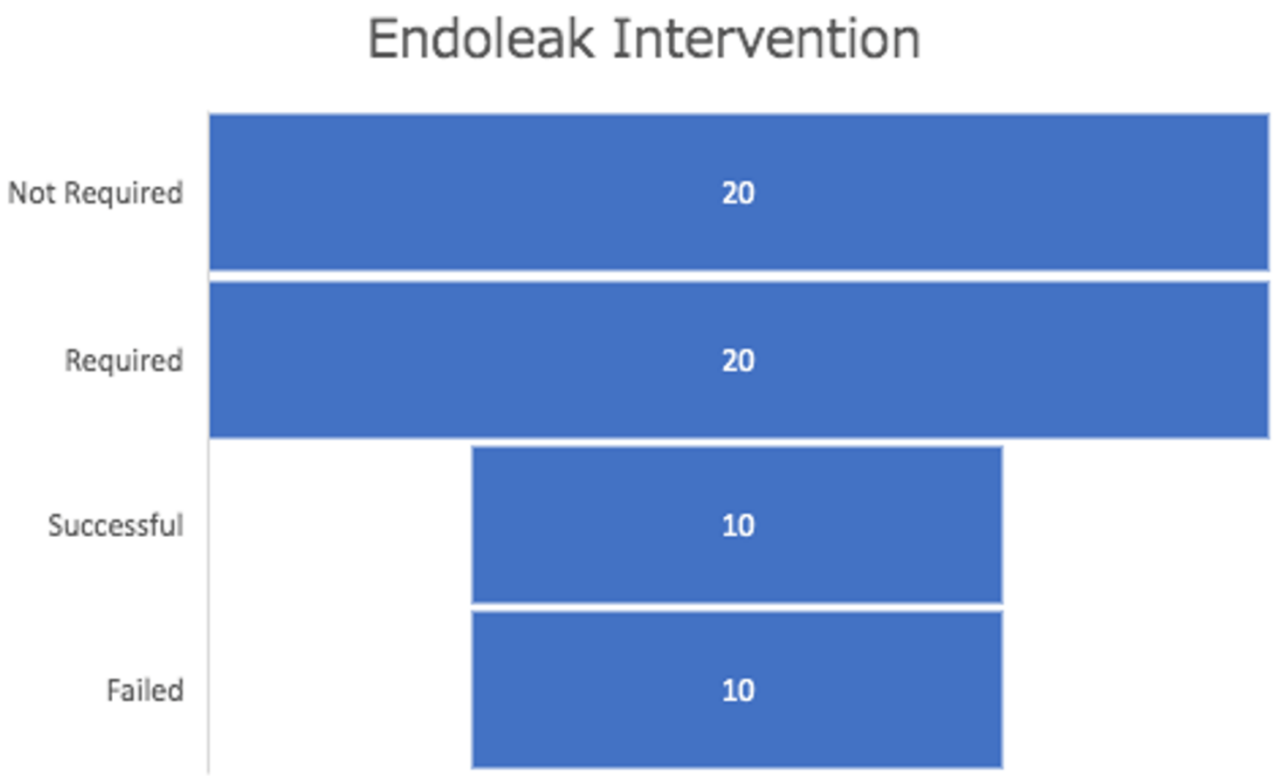
Introduction
Endoleak is a common complication of EVAR which occurs in 25% of patients.
Aims: To review all EVARs performed between 2011-2020, and identify endoleaks as a complication along with their management &outcome.

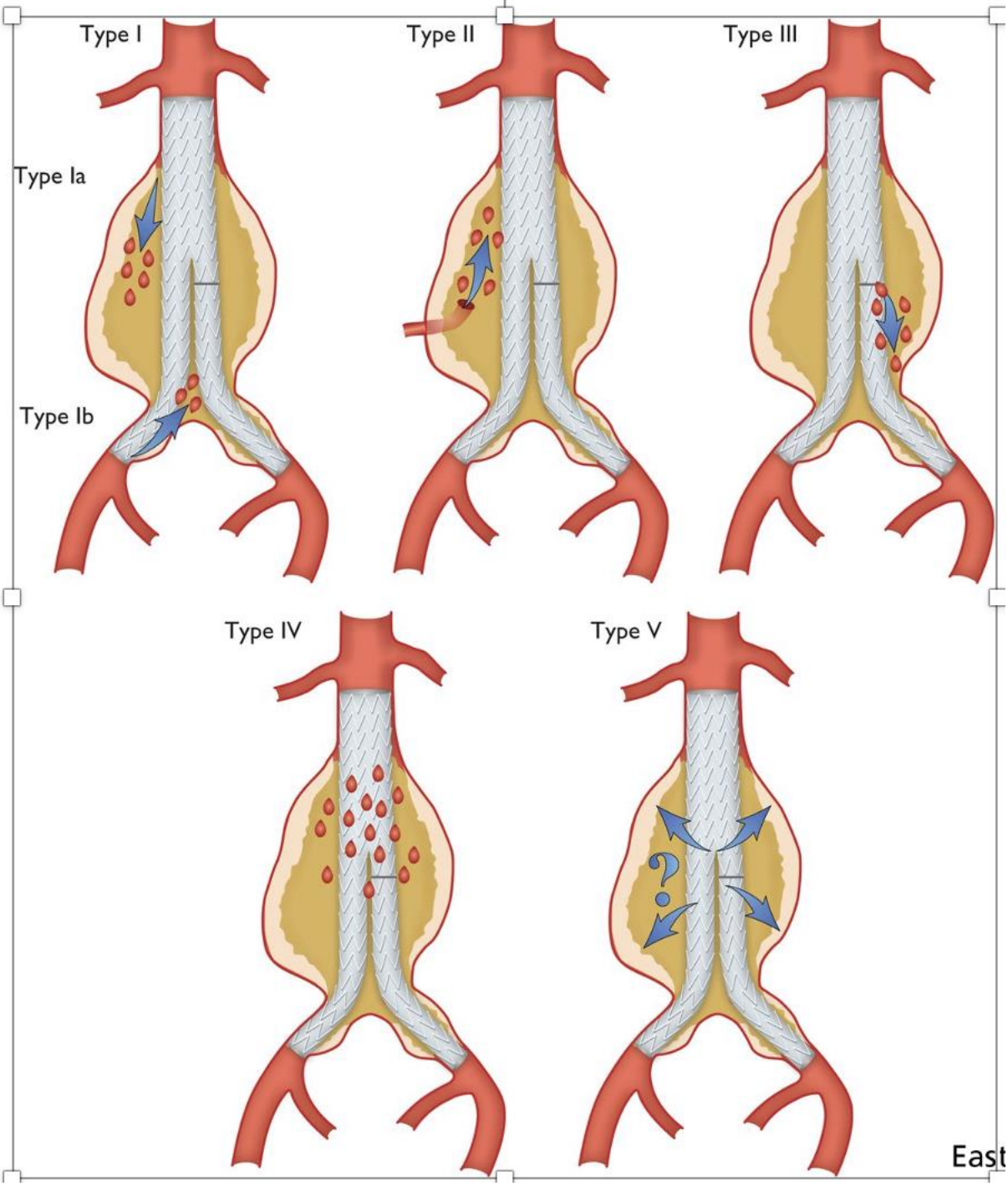
Method:
A retrospective review of the case notes, radiology and discharge summaries was performed.

Results
272 patients had an EVAR between 2011-2020. 229 (84.2%) patients of these had no endoleak following EVAR. 40 patients (14.7%) had confirmed endoleak. 37 were male and 3 were female. The mean age was 76 years (60-88 years). 21(52.5%) of patients who had an endoleak are now deceased - no documentation to suggest that deaths were related to a ruptured aneurysm or endoleak. Out of the 19 patients,9(47%) patients had Endoleak type2. Out of these 9 patients 2 were treated with Onyx embolization,1 was offered balloon moulding while 6 patients resolved under surveillance without treatment. Endoleak 1 was seen in 6 (31.5%) patients, two were offered balloon moulding and onyx embolization, while 4 resolved without any treatment.2 (10.5 %) patients had type 3 Endoleak who were treated with stent extension and balloon moulding.1 (5.2%) patient had no type labelled but had redo EVAR.

Conclusion
Common endoleaks worldwide following EVAR are type 2.


Endoleak Intervention
Not Required
20
Required
20
Successful
10
Failed
10

Classification of endoleaks[2, 3]



P62

P62 - Outcomes of common femoral artery endarterectomy with or without adjunctive iliac angioplasty-Single centre experience

Ms Rana Khalil[1], Mr Mohamed A H Taha[1], Mr Amiya Ahsan[1], Miss Anja Imsirovic, Mr Sergejs Magers[1], Mr Khaled AbdelMagid[1], Mr Mohamed Balbola[1], Professor Syed Waquar YUSUF[1]
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Introduction
Common Femoral Endarterectomy (CFEA) remains the preferred option for common femoral atherosclerotic disease despite advances in endovascular management.

Methods
Retrospective review of patients who underwent CFEA between 2010-2019 and divided into Group A (CFEA alone) and Group B (CFEA with iliac stenting). Thirty-day mortality and morbidity, long-term patency, limb-salvage and overall survival were statistically analysed.

Results
Hundred-twenty-five limbs in 111 symptomatic patients underwent CFEA. Indications were superficial ischemic ulcers and gangrene (52.8 %), rest pain (20 %), claudication (24.8%) and acute ischemia (2.4%). Iliac angioplasty+/- stenting performed in 18 patients while two required extensive major iliac reconstruction. Technical success achieved in all patients with restoration of inline flow in 40 % and into PFA in 60 % of limbs where better ABPI (P= 0.000) & limb salvage reported in inline flow group. Clinical success with limb-salvage was achieved in 98.1% of limbs with rates of 100 %, 88 % and 82.6% depending on Rutherford classes 3, 4,5&6 respectively. Mean postoperative increase in ABPI was 0.34 (P = .000) with statistical significance towards the hybrid group.

Conclusion
This is one of the largest series of CFEA which confirms it is relatively safe procedure and effective in selected group of patients.

Groups	Number of limbs (%)	Mean Pre op ABPI (SD)	Mean Post op ABPI (SD)	Proximal Iliac revascularization (%)	Amputation (%)
Rutherford class					
Class 3	31	0.39 (0.13)	0.71 (0.11)	6 (19.4%)	0 (0%)
Class 4	25	0.32 (0.13)	0.7 (0.12)	6 (24%)	2 (8%)
Class 5/6	69	0.32 (0.12)	0.68 (0.14)	12 (17.4)	13 (18.8%)
Level of Blood flow restoration					
Inline flow restored Group	49	0.40 (0.14)	0.74 (0.12)	15 (30.6%)	7 (14.2%)
PFA restored Group	76	0.31 (0.09)	0.65 (0.12)	10 (13.1%)	8 (10.5%)
Total					
Total	125	0.34 (0.13)	0.69 (0.13)	24 (19.2%)	15 (12%)

P63

P63 - CT Angiography of the Lower Extremities: Are we getting the complete picture?

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Introduction
CT angiography (CTA) is used in to assess peripheral vascular disease, but carries risks of radiation and nephrotoxicity. Efforts should be made to maximize image quality, including adequate anatomical coverage. We aimed to determine our extent of anatomical coverage.

Methods
A retrospective, consecutive, closed-loop audit was performed. All lower-limb CTAs performed over two three-month periods were collected (July-October 19, March-June 21). CTAs were assessed for visibility of; crus of diaphragm, coeliac trunk, superior mesenteric artery (SMA), renal arteries, bifurcation of aorta. Initial work suggested anatomical coverage was sub-standard; a new Trust policy stating coverage should extend from the crus of diaphragm to toes was introduced and disseminated, prior to re-audit.

Results
82 and 131 CTAs were performed per cycle. Anatomical coverage improved on re-audit; crus of diaphragm included in 80% vs. 54%, coeliac trunk 86% vs. 59%, SMA 91% vs. 67%, renal arteries 94% vs. 76%, aortic bifurcation 100% vs. 99%.

Discussion
Clear national guidance does not exist regarding anatomical coverage of CTA of the lower extremities; most recommend coverage from the coeliac trunk to toes. Since introduction of a new Trust standard and dissemination of this knowledge, far greater compliance with anatomical coverage in CTAs has been achieved.

P64

P64 - Treating to Target LDL-cholesterol confers enhanced LDL-C reductions compared to a Fire and Forget Approach in Peripheral Arterial Disease

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Background
Reduction in low density lipoprotein cholesterol (LDL-C) is directly linked to reduced major adverse cardiovascular events in patients with peripheral arterial disease (PAD). Treat to Target (T2T) and Fire and Forget (F&F) approaches to lipid management have been described. T2T: attaining a target LDL-C of <1.8mmol/L. F&F: prescribing statins alone. We compare how these two approaches compare for LDL-C reduction at one-year following first vascular clinic appointment.

Methods
This single-centre non-randomized retrospective study in 376 new PAD referrals, compares F&F (n=224) to T2T (n=152). Electronic patient records were examined, with one-year follow-up.

Results
High-intensity statin prescription at baseline was F&F 40.5% and T2T 48.3%, p=0.2. At one-year this reached F&F 56.0% versus T2T 68.8% T2T, p=0.02. Median baseline LDL-C was 2.2mmol/L and 2.3 mmol/L in F&F and T2T respectively, p= 0.7. At one-year, the median LDL-C reduced to 2.0 mmol/L in F&F (p=0.09 vs baseline) and 1.8mmol/L in the T2T group, p=0.0004 vs. baseline. T2T had significant reductions in Non-HDL-C (2.9 to 2.6mmol/L) and LDL-C percentage reduction (15.3%) p<0.05 vs. F&F (2.95 to 2.8mmol/L) and 0% median LDL-C percentage reduction p>0.05.

Conclusion
A T2T approach conferred superior LDL-C reduction at one year compared to F&F in this non-randomized study.

Characteristics no. (%)	F&F n=224	T2T n=152	p value	adj. p
Age yrs mean (SD)	67.9 (±10.0)	68.9 (±10.7)	0.37	0.85
Female	67 (29.9)	53 (34.9)	0.31	0.84
White ethnicity (of given)	193 (96.0)	114 (96.6)	1.00	1.00
BMI kg/m² mean (SD)	26.6 (±5.2)	27.2 (±5.1)	0.37	0.61
Fontaine Staging no. (%)				
I	5 (2.2)	1 (0.66)	0.41	0.56
II a/b	167 (74.6)	108 (71.1)	0.48	0.74
III	39 (17.4)	25 (16.4)	0.89	1.00
IV	13 (5.8)	18 (11.8)	**0.05**	0.17
Comorbidities no. (%)				
Diabetes T1/2	77 (34.4)	53 (34.9)	1.00	1.00
IHD	71 (31.7)	47 (30.9)	0.91	1.00
COPD	58 (25.9)	23 (15.1)	**0.02**	0.24
Hypertension	126 (56.3)	102 (67.1)	**0.04**	0.22
CKD	129 (57.6)	102 (67.1)	**0.04**	0.17
Cerebrovascular Hx	29 (12.9)	34 (22.4)	**0.02**	0.19
Mono PAD	134 (60.0)	87 (57.2)	0.67	0.97
Poly PAD	90 (40.2)	65 (42.8)	0.67	0.89

Table 1. Baseline characteristics of the overall population and across Fire and Forget (F&F) and Treat to Target (T2T). I/II/III/IV = Fontaine staging. Adj.p = Benjamini-Hochberg correction

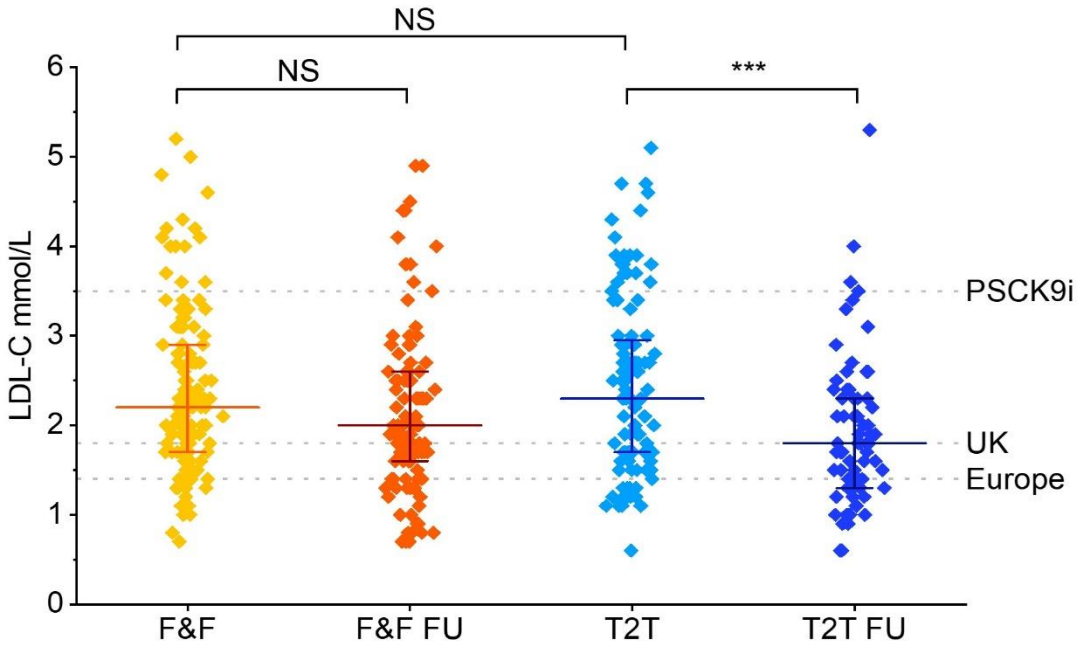

*Figure 1. LDL-C mmol/L at baseline and one year follow up (FU) across Fire and Forget (F&F) and Treat to Target (T2T). Mann-Whitney significant testing. Middle line = median. Whiskers = IQR. NS= not significant. ***= p<0.001. PSCK9i= UK NICE referral threshold. UK= NICE 1.8mmol/L LDL-C target. Europe= ECS/ESVS 1.4mmol/L target.*

P65

P65 - How does the anti-thrombotic management of PAD in the clinic differ from the proposed UK guidelines?

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Introduction
Since the CAPRIE trial, clopidogrel has been preferred over aspirin in peripheral arterial disease (PAD) management in the UK and is recommended as first line by UK NICE PAD guidelines. This study aims to evaluate contemporary anti-thrombotic prescribing habits in PAD patients and assess for differences in approach between mono and poly-vascular PAD.

Method
This retrospective single-centre study of 376 patients collated patient information for new PAD referrals, between 1-Jan-17 to 1-Mar-20, on demographics, co-morbidities, mortality and anti-thrombotic prescriptions. Patients had a one year follow-up (FU).

Results
58.8% had mono-vascular PAD and 41.2% had poly-vascular PAD (PAD +/- CVD/IHD). Significantly fewer poly-PAD patients were referred on no anti-thrombotic therapy than mono-PAD (7% vs 41%, $p<0.001$). No significant differences between clopidogrel, aspirin and DAPT between the two groups at baseline; at FU a significant trend towards increased use of clopidogrel was seen in mono-PAD ($p<0.001$) and aspirin in poly-PAD ($p<0.05$). Aspirin made up 38% of anti-thrombotic prescriptions, in both mono and poly-PAD, followed by clopidogrel, 29%.

Conclusion
Prescription of anti-thrombotic therapy to mono-PAD patients prior to referral was poor. Our study reveals clinician preference for aspirin over clopidogrel in mono-PAD the reasons for which require further investigation.

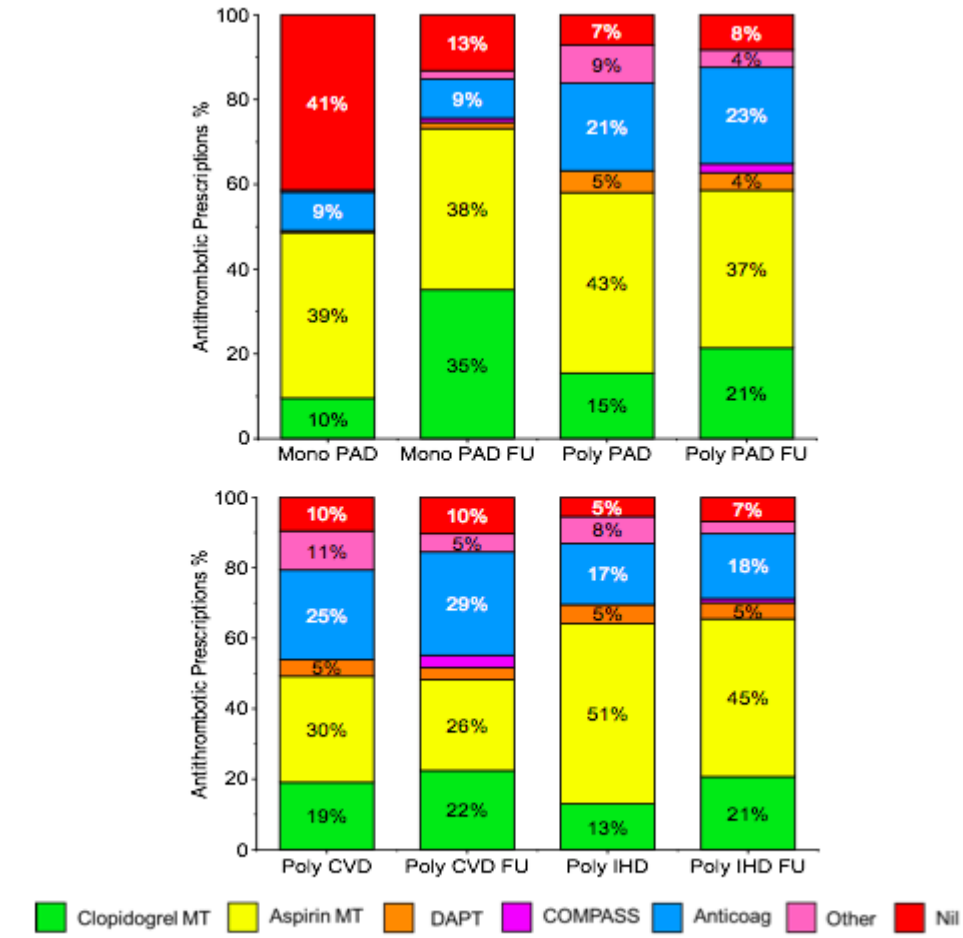

Figure 1AB Antithrombotic prescriptions at clinic and at one year follow up (FU). A) MonoPAD verses PolyPAD. B) PolyPAD cerebrovascular disease (CVD) verses PolyPAD ischaemic heart disease.

P66

P66 - Mycotic extracranial carotid artery aneurysms: a systematic literature review

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Introduction
Mycotic extracranial carotid artery aneurysms are rare, and their management is variable.

Methods
A systematic literature review following PRIMSA guidelines identified 193 such aneurysm cases between January 1970 and March 2021 from 154 sources.

Results
Patients were predominantly male (71.4%) and aged 0.5 to 89 years. The commonest presentations were neck mass and fever (122,85%), local neck symptoms (53,27%), haemorrhage (17,23%) and neurological symptoms (13,10%). Most aneurysms arose from the internal carotid artery (47.4%). Staphylococcus (23.4%) was the commonest causative pathogen, followed by Mycobacterium tuberculosis (21.1%). 101 cases underwent open surgery with 50% having interposition graft placement. 30% underwent ligation alone. Of the 42 endovascular interventions, coil occlusion was the commonest (25, 60%) followed by covered stent deployment (13, 31%). Only 4 cases involved a hybrid intervention. The complication rate was higher in the open surgery than the endovascular treated group (21%v13.2%). Follow-up was generally short. Seven of 126 patients where outcome were reported, died within 30 days of intervention.

Conclusion
As endovascular management is associated with fewer complications it could be recommended as initial intervention. However, despite a large number of mycotic extracranial carotid artery aneurysms being identified, outcome data is too sparse for clearer management recommendations.

P67

P67 - Effect of the COVID-19 pandemic on major amputations in diabetic foot patients

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Introduction

A multidisciplinary diabetic foot service (MDFT) has been operational at our hospital since August 2017, following success in the National Diabetes Treatment and Care – Transformation Funding. This grant of £184, 000 helped us set up the MDFT and we have successfully reduced major amputations in the following 2 years. This audit was completed to study the impact of COVID-19 on major amputations in diabetic foot patients in 2020-21.

Results

In spite of a full diabetic foot MDFT and comprehensive vascular services being operational at our hospital throughout the pandemic, there has been a marked increase in major amputations in 2020-21 (see table).

Discussion

Community foot protection for diabetic patients was non-existent during the pandemic. Patients were reluctant to seek medical advice for foot problems. Primary care consultations were conducted virtually. This may have led to a delayed referral of diabetic foot patients last year. Patients often presented late, had poor diabetic control and were frailer and more septic than in previous years. This could be some reasons for the increase in major amputations in 2020-21.

Conclusion

COVID-19 has had a significant adverse impact on major amputations in diabetic foot patients at our hospital.

	Prior 2017	2018-19	2019-20	2020-21
Major amputations in diabetic foot patients	average 20 / year	7	4	11

P68

P68 - The PReliMinAry (Pain Relief in Major Amputation) Survey: A multi-national, multi-disciplinary survey to evaluate existing analgesia strategies for patients undergoing major lower limb amputation (MLLA).

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Background

MLLA is associated with significant peri- and post-operative pain and has been identified as a research priority by patient and healthcare groups.

Methods

A SurveyMonkey® survey was circulated via social media and society email lists(5/10/2020-03/11/2020). 10-questions explored 'pain-team' services, pre-operative neuroleptic medication, pre-incision peripheral nerve blocks/catheters, surgically-placed nerve catheters, post-operative adjunctive regimens and areas of equipoise for future research.

Results

76 responses(60 hospitals) worldwide. Twelve hospitals(20%) had a dedicated MLLA pain team, seven(12%) had none. Most pain teams(n=52; 87%) assessed pain with a 0-10 numerical rating scale. 55% respondents "never" preloaded patients with oral neuroleptic agents (n= 42/76).

Forty-seven hospitals(78%) utilised patient controlled opioid analgesia. Most hospitals can provide pre-incision peripheral nerve blocks and catheters and surgical nerve catheters (95%, 77%, and 90% respectively), but use was variable. Ultrasound guided peripheral nerve catheters were "infrequently" or "never" used in 57% of hospitals, whilst 23% "infrequently" or "never" utilise surgically placed nerve catheters.

Conclusion

The full survey results have been accepted for publication but not yet published (Annals of Vascular Surgery). They revealed a preference towards 'single-shot' nerve blocks and surgical catheters. Most respondents felt there was equipoise surrounding future trials evaluating nerve blocks/catheters, but less so for surgical catheters.

P69

P69 - Pain Relief in Major Amputation (PRIMA): A single centre randomised clinical trial (RCT) comparing pre-incision 'single-shot' nerve block and patient controlled analgesia (PCA) to pre-incision continuous peri-neural catheter (PNC), in patients undergoing a major lower limb amputation (MLLA)

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Background
10,022 MLLA were performed in UK NHS hospitals, between 2017-2019. Despite this high number, there is no universally accepted peri-operative analgesia regime. The Vascular Society and Vascular Anaesthesia Society of Great Britain and Ireland have identified this topic as a key research priority, in partnership with patients. This Royal College of Surgeons(Edinburgh) funded, NIHR portfolio adopted RCT, aims to provide robust evidence as to which method is the most effective.

Methods
A prospective, single-blind, RCT (1:1), comparing pre-incision ultrasound sited PNC (7-day duration) or pre-incision 'single-shot' nerve block and PCA, for those undergoing MLLA (REC reference:21/SS/0013, Trial ID:ISRCTN64207537). The sample size is 34 patients, powered to detect a primary outcome of 2.5cm(2cmSD) difference on a visual analogue scale(VAS) at day 3.
Secondary outcomes include daily pain scores, analgesia use, post-operative nausea and vomiting, Pasero opioid-induced sedation scale and physiotherapy progress. Patient-reported neuropathic pain and quality of life tools (SF36 and EQ5D) are recorded at baseline, day-7, 6-weeks and one-year.

Results
Recruitment is underway and is on track to complete prior to the VSASM in December 2021.

Conclusion
This NIHR-portfolio, RCS(Ed) funded RCT will provide a robust evidence-based platform for pre-incision pain control for this patient and clinician priority area.

P70

P70 - Percutaneous EVAR reduces hospital length of stay

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Introduction
Percutaneous ultrasound-guided access has evolved in endovascular aneurysm repair (pEVAR). Open access (oEVAR) can be associated with wound-related complications and longer length-of-stay (LOS). We aimed to determine patient-related outcomes of pEVAR.

Methods
Prospective data collection of consecutive pEVARs (Proglide®-Abbot Vascular, USA), October-2018 to January-2021. Intraoperative details (successful punctures, number of devices used), post-operative pain (assessed using the 'Numerical Rating Pain Scale' at day 1 and follow-up), LOS, readmissions and wound-related complications were recorded. Comparative data were collected on consecutive oEVARs performed immediately prior to the study period.

Results
52 pEVARs and 52 oEVARs were included. Patient demographics were comparable. Percutaneous access was successful in 99% (one groin converted to open access). Median two Proglides used per groin (range 2-6).
Median pain scores for pEVARs were 0 at day-1 and follow-up. Median LOS was 1 day (range:0-10) and 4 days (range:1-14) respectively for pEVAR and oEVAR ($p<0.001$). Wound-related complications were 3.8% and 9.6% respectively for pEVAR and oEVAR ($p=0.24$). There were no pEVAR readmissions, but one oEVAR readmission.

Conclusion
pEVAR, whist being highly successful with minimal pain, was associated with significantly shorter LOS and fewer wound complications; providing the potential for day-case EVARs, especially important during the COVID-19 pandemic.

P71

P71 - Duplex Ultrasound Surveillance (DUS) After Carotid Artery Endarterectomy (CEA) and it's Real World Impact

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Introduction
The association between restenosis after CEA and recurrent ipsilateral symptoms is unproven. European Society of Vascular Surgery guidelines suggest DUS can be used to monitor disease progression, the data as to its benefit is conflicting. It is routine practice to scan 4-6 weeks post CEA in our institution. This is to monitor surgical outcomes and direct medical therapy. The aim of this study is to define the clinical utility of DUS.

Methods
Retrospective casenote review of patients who underwent CEAs between Jan 2019-May 2021. Descriptive statistics used to define central tendency and sample distribution.

Results
In total, 90 CEAs were performed: 60 patients were male and the average age was 70 years.
22% (N=17) had some degree of stenosis, of which 5% (N=4) were significant (>50%). No adverse events, further surgical intervention or change in medical management occurred in patients with significant stenosis.
5 patients had transient neurological symptoms in the follow-up period, 3 ipsilateral to their surgery. All had sub-significant or normal findings at 4 weeks.

Conclusion
Abnormal scan is not predictive of further strokes and has not resulted in tailored intervention Whilst important for quality assurance, post-operative DUS is of questionable clinical use.

P72

P72 - A single-centre qualitative experience of closed incision negative-pressure wound therapy (ciNPWT) following major lower limb amputation (MLLA)

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Background

ciNPWT has been shown to improve healing. We report a single centre experience of ciNPWT (Prevena) in MLLA.

Method

A single-centre audit of ciNPWT use in MLLA (Feb'21 to June'21). Qualitative data was collected through local survey of vascular staff to assess wound care, application, experience and perceived impact. Patient feedback centred around tolerance, interference with activity and recovery.

Results

ciNPWT was applied to 13 MLLA patients. Healthcare professionals (10 surgeons and 8 nurses) reported agreement regarding ciNPWT appearing well-tolerated by patients(n=18), acting as appropriate barrier to contamination(n=18), not adding to wound-care workload(n=17), not impacting discharge(n=15) or physiotherapy/rehabilitation(n=14). Some 14(77.8%) respondents felt ciNPWT encourages wound healing but only 10(55.6%) thought it reduced wound complications. All surgeons felt ciNPWT was easy to apply but 27%(n=3) felt uncomfortable with delaying wound review until 5-7 days. 61%(n=11) thought the additional cost of ciNPWT was justified and 78%(n=14) would favour using ciNPWT over standard dressings for amputation stumps. Patient feedback was received from 6 patients; all reported no perceived additional discomfort, 2 reported interference with washing. There was no reported interference with sleep.

Conclusion

ciNPWT is acceptable to nurses, surgeons and patients providing the foundation for clinical evidence before generalisation.

P73

P73 - Implementation of the COMPASS trial recommendations following symptomatic carotid endarterectomy (CEA)

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Introduction
The COMPASS trial demonstrated that low-dose Rivaroxaban and Aspirin had a greater protective effect on cardiovascular events than antiplatelets alone. This included CEA patients. We assessed our success at implementing COMPASS in our symptomatic CEA patients

Methods
At the four-week virtual post-CEA review, in suitable patients the general practitioner was advised to change from single antiplatelet to COMPASS. At 6-month follow-up, the success and safety of the conversion was assessed.

Results
For 18 months up to February 2021, 47 patients underwent successful CEA. 29 were recommended for COMPASS, 3 were lost to follow up and 15 were not suitable (6 on DOAC for AF/VTE, 9 complex drug regimen). At 6 months, 18 of 29 patients were on the COMPASS regimen (9 not started; 2 withdrawn due to bruising). All patients reported compliance. There were no reported haemorrhagic or gastrointestinal events. 1 patient (not in the COMPASS group) had further multi-territory cerebrovascular events.

Conclusions
COMPASS is well tolerated in this cohort. Conversion from established drug regimens has yet to gain traction. The benefits on future cardiovascular events post-CEA is yet to be demonstrated.

P74

P74 - Understanding the impact and associations of Health Literacy with outcomes for Chronic Limb-threatening Ischaemia (CLTI); The HeaLTHI study

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Introduction
Health literacy (HL) is the ability to obtain, process and understand health information needed to make health-related decisions. Some healthcare settings have established that inadequate HL is associated with adverse health outcomes. Research suggests that 76.7% of vascular patients have inadequate health literacy. This is concerning given that chronic limb threatening ischaemia (CLTI) can lead to limb-loss. The HeaLTHI study aims to assess the effect of health literacy on CLTI post-intervention outcomes.

Methods
HeaLTHI is a HRA approved (REC:21/NI/0092) retrospective cross-sectional study evaluating the Health Literacy (by a validated 12-item HLS-EU-Q12 Questionnaire) of 100 participants at 1-year post-surgical intervention for CLTI. Associations with baseline demographics, socio-economic status (using indices of multiple deprivation, IMD), clinical complications, survival and re-interventions will be examined.

Results
HRA and REC have been granted and data collection is underway. The results are anticipated in advance of the VSGBI ASM.

Conclusion
This study will evaluate the current HL associations with adverse outcome. Given that HL is potentially modifiable, it is hoped that the HeaLTHI study will drive improvements in a shared patient and clinician priority area.

P75

P75 - Arterial and venous thromboembolism in critically ill, SARS-CoV-2 positive patients admitted to Intensive Care Unit

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Background

Several reports signalled increased incidence of arterial thrombosis associated with COVID-19. The aim of our study was to investigate the incidence of arterial thrombosis in critically ill patients with SARS-CoV-2 infection.

Methods

We audited patients treated on ITU in April 2020 and in corresponding months of 2019. Clinical presentation, demographics, comorbidities, and 30-day mortality were collected and analysed using R statistical package. The primary outcome was new diagnosis of arterial thromboembolism (lower/upper limb/visceral ischaemia, stroke).

Results

During April 2020, 317 patients were treated in ITU (median age 56 years [47, 66], 94 (29%) female); 198 (62.5%) were treated for severe COVID-19 pneumonitis.

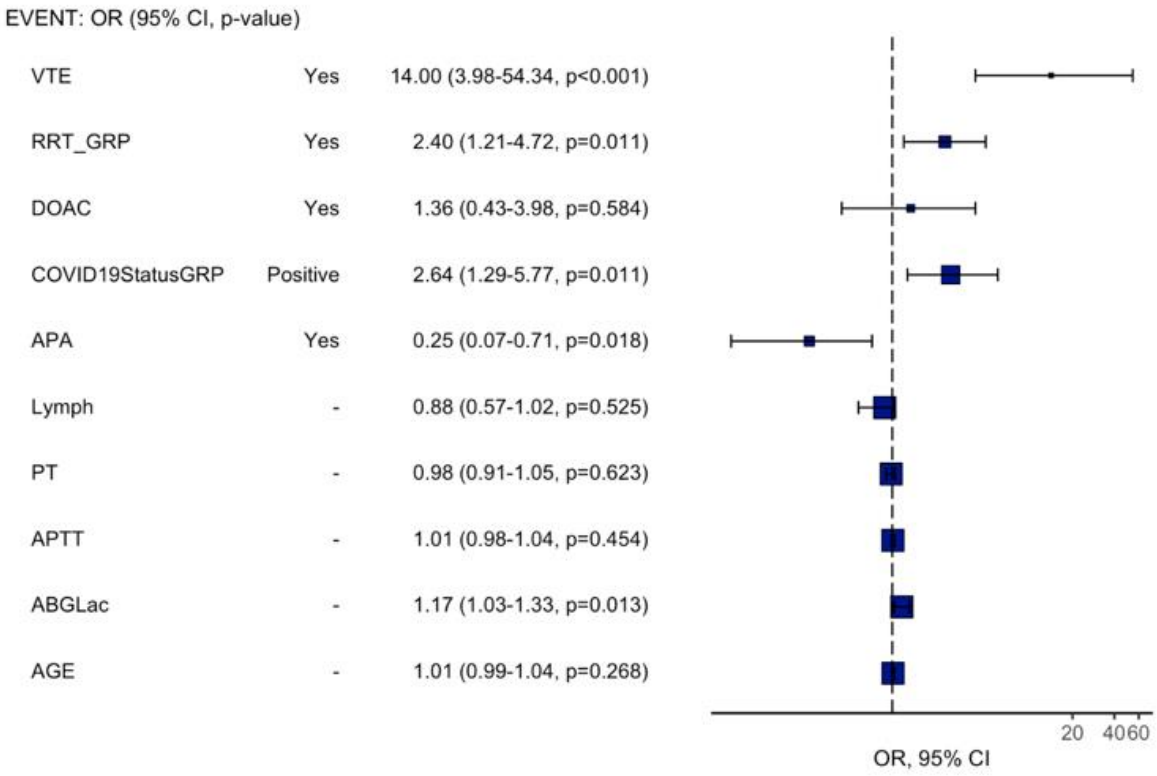
Arterial events occurred in 26 patients (8.2%, 95%CI 5.4-11.8); this was higher than in 2019, however, this was not statistically significant (OR 1.22, 95%CI 0.69-2.10, p=.546).

Arterial events were not associated with COVID-19, but they were associated with increased 30-day mortality. This was significant irrespective of COVID-19 status (all patients: 65.4% v. 30.2%, OR 4.34 95%CI 1.75-11.49, p<.001; COVID-19 positive only: 64.7% v. 34.3% OR 3.49, 95%CI 1.12-12.08, p=.018).

Conclusions

We found no evidence of increased risk of arterial thrombosis in patients with severe COVID-19. Acute arterial thrombosis is associated with poor survival in ITU patients.

Figure 1: Multi-variate analysis for composite outcome (EVENTS).The analysis includes only patients from April 2020.



P76

P76 - Are we too nervous about Synchronous Bilateral Carotid Endarterectomy?

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Introduction
Current ESVS guidelines[1] for the treatment of atherosclerotic carotid disease suggest that in patients with bilateral severe internal carotid artery (ICA) stenosis, a two-staged (non-synchronous) bilateral carotid endarterectomy (NSBCEA) or bilateral carotid artery stenting (BCAS) should be considered; SBCEA[23] is deemed 'feasible'[1].

Methods
We present a comparative retrospective analysis of 16 patients receiving NSBCEA/SBCEA between 2010-2021. Data analysis including demographics and focused outcomes including length of stay (LOS), neurological complications was undertaken using Minitab 19.

Results
Six patients underwent NSBCEA (66.7% male; mean age 71±9 years) and the remaining 10 (70% male; mean age 73±6 years) had SBCEA [Table 1]. Mean operating time per side was shorter during SBCEA compared to NSBCEA (85±11min versus 103±15min, p=0.001, two-sample T-test). LOS was similar between both groups (p=0.41, ANOVA). 30-day mortality/stroke rate was nil (both groups).There were no hypoglossal[45] or recurrent laryngeal nerve injuries observed in either group.

Conclusion
This small series shows that with appropriate patient selection and a skilled operating team, SBCEA is a safe and feasible option for patients with significant bilateral carotid stenosis, and can be considered where delay in surgery or prolonged hospital stays (e.g. pandemic scenario) pose potential risk. Larger studies may be impossible to undertake.

Table 1. Outlining the patient characteristics and outcomes after bilateral carotid endarterectomy.

Characteristics (total CEA, n=32)	**NSBCEA (n=6)**	**SBCEA (n=10)**	***p***
Baseline demographics			
Age - *years*	71±9	73±6	.76
Male	4 (66.7)	7 (70)	.9
Indication for BCEA			
Bilateral Stroke/TIA*	2 (33.3)	1 (10)	
Unilateral Stroke/TIA with contralateral significant asymptomatic ICA Stenosis	3 (50)	5 (50)	
Bilateral significant asymptomatic ICA Stenosis	1 (16.7)	4 (40)	
Operative Details			
Bovine pericardial patch repair	6 (100)	10 (100)	
GA with bilateral shunting	2 (33.3)	5 (50)	
GA with unilateral shunting	0	1 (10)	
Clamp time (minutes)	-	17	
LA with bilateral shunting	0	1 (10)	
LA with unilateral shunting	0	1 (10)	
Clamp time (minutes)	-	29	
LA without shunting	4 (66.7)	1 (10)	
Clamp time per side (minutes)	39±8	30±0	
LA converted to GA without shunting	0	1 (10)	
Clamp time (LA) - minutes	-	40	
Clamp time (GA) - minutes	-	20	
Operating time per side- *minutes*	103±15	85±11	**.001**
Postoperative antiplatelet therapy			
DAPT	3 (50)	4 (40)	
SAPT	3 (50)	6 (60)	
Outcomes			
30-day mortality	0	0	
30-day morbidity†	0	0	
Length of hospital stay- *days, median (IQR)*	2 (0)	2.9 (4.3)	.41

All data presented as n (%) or mean (±standard deviation) unless stated otherwise
** TIA includes amaurosis fugax*
† One patient in SBCEA group had PEA intra-operatively - made full recovery
NSBCEA - non-synchronous bilateral carotid endarterectomy, SBCEA - synchronous bilateral carotid endarterectomy, SD - standard deviation, BCEA - bilateral carotid endarterectomy, TIA - transient ischaemic attack, ICA - internal carotid artery, GA - general anaesthesia, LA - locoregional anaesthesia, DAPT - dual antiplatelet therapy, SAPT - single antiplatelet therapy, PEA - pulseless electrical activity, IQR - interquartile range

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P77

P77 - Systematic review of preoperative magnetic resonance angiography, computed tomography angiography and duplex ultrasonography for diagnosis and planning of surgical, endovascular or hybrid procedures for lower limb revascularisation

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Introduction
This systematic review assessed literature concerning preoperative magnetic resonance angiography (MRA), computed tomography angiography (CTA), and duplex ultrasonography to determine the sensitivity and specificity at detecting lower limb arterial stenosis and/or occlusion, with digital subtraction angiography (DSA) as the reference standard. The aim was to identify if any, or a combination of, methods could replace DSA.

Methods
10 databases were searched on Ovid from 1995-2021 for studies involving MRA, CTA and/or duplex ultrasonography of the lower limb arteries. Included studies were published in Europe, the USA, Canada and Australia.

Results
41 studies were included. For detecting ≥50% stenosis, contrast-enhanced MRA, multi-detector CTA and duplex ultrasonography reported median sensitivities and specificities of 91.1% and 91.9%, 93.9% and 93.4%, and 82.7% and 90.6%, respectively. For detecting occlusions, contrast-enhanced MRA, multi-detector CTA and duplex ultrasonography had median sensitivities and specificities of 92.0% and 96.5%, 88.6% and 98.3%, and 92.3% and 99.5%, respectively.

Conclusion
Contrast-enhanced MRA had the best overall diagnostic accuracy. Multi-detector CTA detected ≥50% stenosis well, but the sensitivity for occlusions was lower. Duplex ultrasonography detected occlusions better than MRA and CTA, but it was less accurate for ≥50% stenosis. Consequently, contrast-enhanced MRA could be used as an alternative to DSA.

P78

P78 - Real-world utility of routine Toe Pressure Measurements in ambulatory patients with Chronic Limb Threatening Ischaemia and their impact on short-term outcomes

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Introduction
Despite the use of toe pressures (TP) in vascular practice, their diagnostic and prognostic value in chronic limb-threatening ischaemia (CLTI) remains debated.

Methods
A retrospective analysis of patients seen in CLTI Clinic between October 2019 and October 2020 was undertaken (follow up until 28th February 2021). Data collected included co-morbidities, medication history and management strategy (revascularization, amputation, palliation) as well as TP. The primary outcome was major limb amputation

Results
129 patients were included in the study (median age: 74 years; 89 males; median follow up 9 months). 18 patients reached the primary outcome, which was associated with history of ischaemic heart disease and stroke.
52 patients had TP available for analysis (median value of 37.5mmHg). 35 patients did not have TP attempted and in 41 cases TP was unrecordable. Among 52 patients who had a TP recorded, there was no association between primary outcome and the TP value (p=0.071) or the intended management (p=0.250). Subsequent analysis of the ROC curve revealed AUROC of 0.714 (95% CI: 0.527 – 0.900).

Conclusion
Whilst useful for screening, isolated measurements of TP are a poor predictor of outcome in patients with CLTI and should be considered in the context of clinical presentation.

P79

P79 - Palliative Care Interventions for Peripheral Artery Disease - A Systematic Review

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Introduction
Peripheral artery disease (PAD) encompasses conditions with poor outcome and severe suffering, both mentally and physically, yet utilisation and research into palliative care interventions remain sparse. This paper aims to review the evidence which exists for palliative care interventions used in PAD.

Method
Systematic review of all study designs published between 1991 and 2020 in which people with PAD received palliative care interventions and at least one patient outcome was recorded.

Results
Eight studies involving 87024 patients met inclusion criteria (four cohort studies and four cross sectional studies). Methodological quality of the studies ranged from low to moderate. The small number of studies and study heterogeneity precluded meta-analysis. Only two papers recorded patient reported outcomes. Five papers found an association between palliative care and reduction in health care utilisation. Most of the studies reported that palliative care was likely underused.

Conclusion
Despite high mortality and morbidity, evidence of the effectiveness of palliative care for PAD is lacking. There are only a handful of papers on palliative care for people with PAD and the majority are small, methodologically flawed and lack meaningful patient reported outcomes. High quality research of palliative care interventions in patients with PAD is needed.

P80

P80 - Endovascular treatment of the coeliac axis offer meaningful symptomatic improvement and does not simply delay surgical intervention

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Aim

Chronic mesenteric ischaemia (CMI) is an under-recognised and under diagnosed. The durability of coeliac axis (CA) angioplasty/ stenting is uncertain given the anatomical configuration of the median arcuate ligament. We describe a requirement for secondary intervention following angioplasty/stenting of the CA.

Methods

Retrospective review of procedures performed in a single Scottish Health Board. Cases were identified through the CRiS system and CHI numbers recorded. Included were procedures performed for CMI. Primary patency was assumed unless there were recurrent symptoms with further imaging.

Results

There were 84 cases of endovascular treatments for CMI. Of these 21 patients had isolated treatment of the CA and 4 had treatment of both the CA and superior mesenteric arteries. Most patients were female (n=19) and still smoking (n=18) at the time of presentation. Lesions were primarily stented in 17 patients. During the follow-up period there were 5 re-interventions for mesenteric ischaemia. There were 16 deaths during follow-up, 5 of these were attributed to mesenteric ischaemia.

Discussion

Despite concern about the anatomical configuration around the diaphragm with the potential for extrinsic force on the CA it would appear that endovascular treatment can be a durable treatment option.

P81

P81 - The Non-Inferiority of Omniflow® Vascular Grafts to current Prosthetic Vascular Grafts in Clinical Use

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Introduction
In patients with no autologous vein option and requiring an infection-resistant prosthetic graft option, a bio-synthetic graft (Omniflow®) maybe a viable alternative. Our aim is to compare patency rates between Omniflow® and Dacron® vascular grafts in infra-inguinal arterial bypasses.

Methods
A retrospective review of patients between March 2017 and April 2021 was undertaken. Patients undergoing infra-inguinal bypasses using prosthetic grafts were identified. Patient demographics, V-Possum score, presence of active infection, operative details and complications were recorded. The primary outcome measures were patency rates and mortality.

Results
44 patients were identified (22 Omniflow® and 22 Dacron®) in both emergency and elective settings. 65.9% were males, 29.5% were diabetics and 40.9% had ischaemic heart disease. The average V-POSSUM score was 45.72±24.97 for morbidity and 7.45±8.93 for mortality. The primary patency rates for Omniflow® at 6 months, 12 months and 18 months were 45.5%, 36.4%, 31.8% respectively. This was compared with Dacron®.The patency rates of Omniflow® and Dacron® were not statistically significant (P value 0.13, 0.76, 0.30).

Conclusion
Our study has shown that the patency rates of Omniflow® is comparable to prosthetic grafts like Dacron. In emergent cases and patients with an infective source, Omniflow® biosynthetic grafts should be considered.

P82

P82 - Outcomes of patients referred to the acute vascular clinic for carotid and aneurysmal disease management during COVID-19 pandemic.

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Background
During the COVID-19 pandemic, we set up an emergency vascular clinic to allow urgent outpatient reviews. This study presents the outcomes of patients with aneurysmal and symptomatic carotid disease reviewed in the clinic.

Methods
Retrospective analysis of outcomes in patients reviewed between February and October 2020 (followed until February 2021), including comorbidities, mortality and progression to surgery.

Results
36 patients presented with aneurysms (any site) and 69 with carotid disease. No patients died in the carotid cohort and 2 (6%) died in the aneurysm cohort. Endarterectomy or stenting was completed in 33 (48%) carotid patients (median time to treatment of 10 days), remaining patients managed conservatively. 13 (36%) patients with aneurysms were managed conservatively and 22 (61%) planned for a repair (median time to surgery for Abdominal Aortic Aneurysms of 99 days). Compared with the unit's 2019 data, the lead time to carotid surgery was 4 days shorter, while for AAAs 22 days longer. The underlying pathology (aneurysmal vs carotid disease) did not affect the decision to operate (p=0.095).

Conclusions
Our results show that during the COVID-19 pandemic patients with carotid disease can be managed within acceptable timeframes, however, the reconfiguration of services can delay aneurysm management.

P83

P83 - The fate of patients who underwent opportunistic screening for abdominal aortic aneurysms when attending for transthoracic echocardiograms or peripheral arterial duplexes

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Methods
Males and females aged 65 and over were invited for AAA screening when attending for TTE or lower limb arterial duplexes. Ultrasonographic AAA screening was performed at the end of their scans. Patients were excluded on the basis of having had previous abdominal aorta intervention or had a known AAA.

Results
762 patients were enrolled in the study; 486 had transthoracic echocardiograms and 276 had lower limb arterial duplexes. The overall incidence of AAA was 54 (7.1%) in the combined cohort, 25 (5.1%) in the TTE group, and 29 (10.5%) in the PAD group. Median aortic diameter was 20mm. Median AAA diameter was 35mm. Females were found to have a larger AAA mean diameter (40mm) compared to males (34mm).

After a median follow-up duration of 7.6 years, 2 of the 54 AAAs received intervention in the form of endovascular repair. 3 additional patients reached treatment threshold of 55mm however they were conservatively managed. The overall intervention rate is thus 3.7% of all AAAs detected.

Conclusion
Whilst high-risk populations attending for TTE or PAD scans demonstrate a much higher prevalence of AAA compared to the rate observed through the UK's population-based screening program, the proportion offered intervention was low.

P84

P84 - The impact COVID-19 has had on the indication for carotid endarterectomy (CEA) and intervention timeline; one tertiary centre's experience.

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Introduction
NICE recommend that CEA be performed within two weeks from diagnosis if indicated.(1) A previous audit identified variable time delays in pathways across NHS regions. Our aim was to establish how our unit was performing in both of these aspects.

Methods
CEA cases(stents excluded) between January 2019-December 2020 were analysed from National Vascular Registry data.

Results
150 CEAs were performed: 2019 n=77, 2020 n=73. M=99:F=51 (65.6%:34.4%).

April-June 2020, significantly fewer CEAs were performed(9 vs. 21, p=0.028), however overall 2020 numbers are comparable to historic data.

The indications for intervention in 2019 and 2020 appear dissimilar(Figure 1). In 2020, fewer procedures were performed for stroke(8.2% vs. 46.8%) and more for TIA(47.9% vs. 29.9%). Chi-Squared Test for Independence showed a significant association between indication and procedure year, $\chi^2(4,N=150)=32.649$, $p<0.001$.

Table 1 shows the intervention timeline for symptomatic CEAs in 2020(n=64). These data show a comparable timeline to historic regional data. 50%(n=32) patients had surgery within two weeks of diagnosis.

Conclusion
A significant change in CEA indication is noted in 2020, however the total number of interventions and timeline are comparable to 2019. Previous progress in streamlining access to timely CEA has stalled in 2020, likely as a result of the pandemic.

References

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P85

P85 - Improving the Quality of Vascular Interventional Procedure Referrals

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Introduction
Vascular teams should give accurate information in interventional procedure requests to reduce errors and delays in procedures. We audited and graded the quality of referrals made by the Vascular team for patients undergoing peripheral endovascular procedures in our unit using a novel scoring system.

Methods
We retrospectively reviewed electronic referrals for patients undergoing an endovascular procedure for peripheral arterial or deep venous disease between June 2020 and June 2021.
Quality of the referral was assessed using a scoring system awarding points for documenting: symptoms; affected side; disease location; presence of femoral pulse; relevant PMH; anticoagulation; and MDT discussion.

Results
100 referrals were identified (80 arterial, 20 venous). Scores ranged from 0 (n=16) to 6 (n=1). The median score for arterial cases was 2 (range 0-6); for venous cases it was 2 (range 0-4). Affected side (66%) and location (60%) were most commonly included; palpable femoral pulse (2.5%) and MDT discussion (9%) were seen least. Current anticoagulation was not included in any referral.

Conclusions
We identified that significant improvements can be made to referrals for endovascular procedures to help improve patient safety and potentially reduce delays. This scoring system will be disseminated amongst the vascular team as a referrals checklist.

P86

P86 - Trends in Carotid Patch Restenosis by Synthetic Patch Type

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Introduction
Carotid endarterectomy (CEA) with patch angioplasty is associated with lower restenosis rates than primary closure. However, the optimal patch material is unclear. In this retrospective observational study, we investigated the restenosis rates among four commercially-available carotid patches.

Methods
All primary CEA with patch angioplasty performed between 2007-2019 at a single university hospital were identified from theatre records. Individual operation note were reviewed for patch type. All subsequent surveillance duplexes were reviewed for evidence of restenosis >50% (PSV>125cm/sec and/or EDV>40cm/sec). Restenosis rates were analysed using SPSS.

Results
One-hundred-and-two CEAs with >12 months follow-up were included. Sixty-one patients(59.8%) were male and median age was 65.0 years(range 32.0-86.0). Patches used included 63 Bovine Pericardium(61.8%), 25 PTFE(24.5%), 12 B-Braun(12.8%) and 2 Dacron(2%). Median follow-up with duplex was 39.0 months(range 12.0-144.0). Restenosis >50% was observed in 34 cases(33%). Bovine was significantly associated with restenosis compared to other patches (p=0.002, OR 4.40, 95% CI 1.616-11.982). Kaplan-Meier Curves demonstrated 44% of Bovine patches had restenosed at five years, compared to 25% B-Braun(n=3/12) and 12% PTFE(n=3/25) (p=0.004).

Conclusions
Our results suggest that Bovine Pericardium is vulnerable to restenosis when used for carotid patch angioplasty. However, further well-designed randomised control trials are warranted to definitively answer this question.

P87

P87 - Re-amputation rates following minor amputation for vascular disease and diabetes: a population cohort study

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Introduction

Patients with diabetes and peripheral arterial disease (PAD) are at increased risk of minor amputation(1-4). The aim of this study was to assess the re-amputation rate after an index minor amputation and identify factors associated with increased risk of ipsilateral major amputation.

Methods

All patients over 40 years old, who underwent minor amputation for PAD or diabetes between 2014 and 2018 were extracted from Hospital Episode Statistics.The primary outcome was ipsilateral major amputation and secondary outcomes were other re-amputations after the index procedure. The association between ipsilateral major amputation rates and patient factors was modelled using competing risks survival analysis to account for mortality(5-6).

Results

The study included 24,668 patients with index minor amputation, 72.8% of which had diabetes(Table 1). The estimated risk of ipsilateral major amputation was 9.5% at 1-year and 11.7% at 3-year follow-up(Table 2). The adjusted rate of ipsilateral major amputation was higher for emergency admissions, patients with index transmetatarsal amputations, severe frailty, previous/concurrent revascularisation, gangrene, history of PAD compared to diabetes and the most deprived(Figure 1).

Conclusion

Patients undergoing minor amputation in this study had a 1-year major amputation rate of 9.5%. Close surveillance should be considered for patients with risk factors for major amputation.

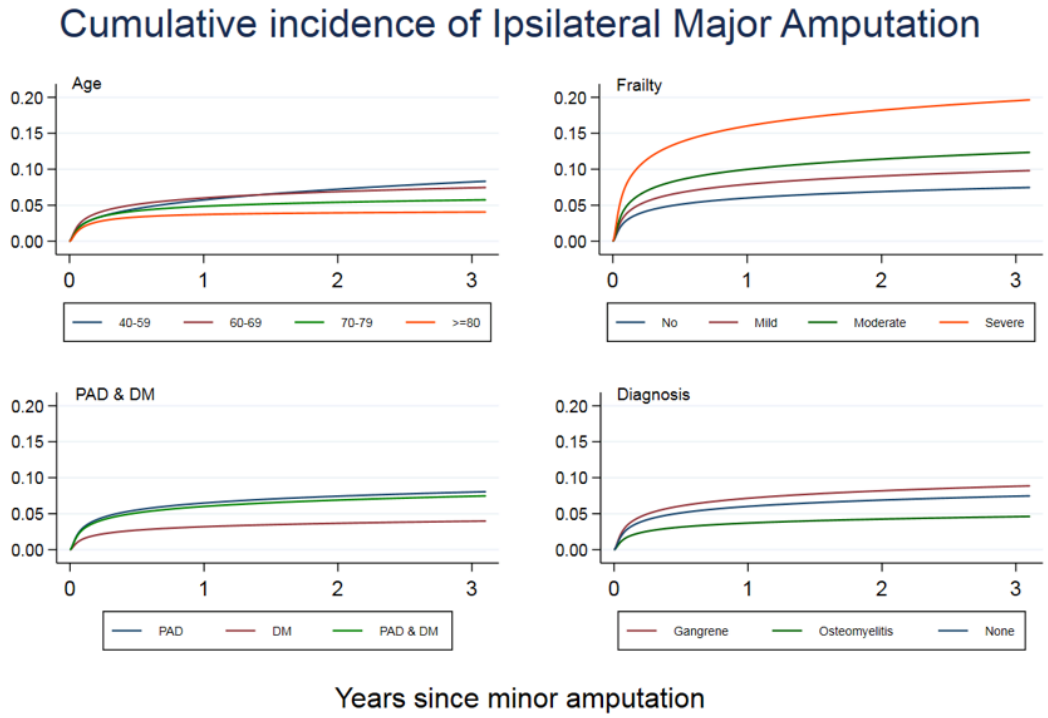
Table 1. Patient baseline characteristics

	Total	No re-amputation	Any re-amputation	Ipsilateral major amputation
	n=24,668	n=16,079	n=8,589	n=2,918
	%	%	%	%
Age				
40-59	26.7	24.4	31.0	28.6
60-69	25.1	23.4	28.1	29.8
70-79	26.4	26.6	26.0	26.3
>=80	21.9	25.6	14.9	15.4
Male gender	73.3	69.9	79.5	78.7
Diabetes	72.8	67.5	82.7	78.9
PAD	54.2	49.1	63.7	78.9
Previous revascularisation	36.9	33.1	44.0	58.4
Scarf Frailty Index				
Fit	4.1	5.4	1.8	0.6
Mild frailty	15.0	17.3	10.8	7.1
Moderate frailty	41.6	42.2	40.6	33.7
Severe frailty	39.2	35.2	46.8	58.6
Deprivation				
1 (Least deprived)	13.7	14.4	12.5	11.6
2	17.4	18.3	15.7	13.8
3	20.6	20.9	20.1	18.7
4	21.9	21.6	22.6	22.9
5 (Most deprived)	26.4	24.9	29.2	33.0
Method of admission				
Elective	39.3	42.5	33.3	28.9
Emergency	60.7	57.5	66.7	71.1
Diagnosis				
Osteomyelitis	36.9	38.8	33.3	23.2
Ulcer	52.4	50.9	55.2	53.6
Gangrene	37.4	34.6	42.6	47.2
Index amputation				
Toe amputation	83.1	84.5	80.6	71.4
Foot amputation	16.9	15.5	19.4	28.6

Table 2. Estimated risk of re-amputations at 1- and 3-year follow-up and 95% Confidence Intervals, by type of re-amputation

	Follow-up	
	1 year	3 years
Ipsilateral minor amputation	15.37% (14.93%, 15.81%)	19.97% (19.46%, 20.48%)
Ipsilateral major amputation	9.46% (9.10%, 9.82%)	11.65% (1.25%, 12.06%)
Contralateral minor amputation	3.80% (3.57%, 4.03%)	9.13% (8.75%, 9.51%)
Contralateral major amputation	1.65% (1.50%, 1.81%)	4.19% (3.92%, 4.46%)

Figure 1. Comparison of factors affecting the cumulative incidence of ipsilateral major amputation after index minor amputation



For the Age graph (1) cumulative incidence is presented for men with PAD and diabetes, not frail, admitted in an emergency with diagnosis other than gangrene or osteomyelitis
For the Frailty graph (2) cumulative incidence is presented for men aged 60-69 with PAD and diabetes, admitted in an emergency with diagnosis other than gangrene or osteomyelitis
For the PAD/DM graph (3) cumulative incidence is presented for men aged 60-69, not frail, admitted in an emergency with diagnosis other than gangrene or osteomyelitis
For the Diagnosis graph (4) cumulative incidence is presented for men aged 60-69 with PAD and diabetes, not frail, admitted in an emergency

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P88

P88 - Management of lymphorrhoea following groin dissection: a systematic review

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Introduction
Groin dissection is commonly used for open reconstructive procedures. Disturbance of lymphatics may lead to formation of a lymphatic fistula, delayed wound healing and risk of surgical site infection, resulting in eventual breakdown of the reconstruction. No consensus exists on how lymphatic leaks are best managed.

Methods
An EMBASE, MEDLINE, CINAHL and EMCARE search was completed using MeSH terms 'groin', 'inguinal', 'dissection', 'lymph leak', 'fistula' and 'lymphocele'. Full papers available in English were included. 148 cases were found.

Results
Conservative methods were initially used in all cases and were sufficient in 46 (31%). Negative pressure wound therapy was successful in 17 patients (11.4%), and used adjunctively with surgical intervention in a further 13 patients (8.8%). Sclerotherapy was used in 19 patients (12.8%) unsuccessfully. Open ligation was described in 52 cases (35.1%), microsurgical lymphovascular anastomosis in 17 cases (11.4%) and transposed muscle flaps in 14 cases (9.4%). 2 novel methods were described in 1 case each (0.6%). All reported cases resolved without complication.

Conclusion
A range of interventions are used to manage lymphatic leakage in the groin, however a lack of comparative studies and heterogeneity of case reports excludes the ability to identify the optimal strategy.

P89

P89 - A randomised controlled trial to assess the clinical-, technical- and cost-effectiveness of a cloud-based, ARtificially Intelligent image fusion system in comparison to standard treatment to guide endovascular Aortic aneurysm repair (ARIA)

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Introduction
Accurate image guidance is key to successful endovascular aortic repair. Cydar EV is a software-as-a-medical-device utilising cloud computing, machine learning and computer vision to intelligently augment case planning and fluoroscopic guidance with information derived from pre-operative imaging.

We present details of a randomised controlled trial to determine whether there is clinical evidence that Cydar EV leads to improved outcomes and cost-effectiveness.

Methods
ARIA will randomise patients with aortic aneurysms suitable for endovascular repair to either treatment assisted by Cydar EV or a control group of guidance by standard two-dimensional fluoroscopic imaging. The trial started in July 2021 and is powered for 340 patients to detect a 17% reduction in procedure time (primary outcome) when using Cydar EV. Recruitment is from 10 centres across England. Secondary outcomes include cost-effectiveness, procedural efficiency, technical success and clinical outcomes.

Discussion
Cydar EV is an integrated cloud platform for planning, guidance and review to assist in the treatment of endovascular procedures. The introduction of artificial intelligence and machine learning methods and technologies into the care of new patients with aortic disease will allow clinical decisions to be informed with information from all previous patients and will improve clinical and health economic outcomes.

P90

P90 - Can Remote Ischaemic Preconditioning reduce pro-inflammatory burden in participants diagnosed with intermittent claudication?

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Remote Ischaemic Preconditioning(RIPC) refers to the induction of short periods of non-lethal ischaemia followed by reperfusion in one organ or tissue. It is proposed that RIPC triggers complex endogenous signalling cascades in other organs, including down-regulation of pro-atherogenic cytokines and up-regulation of anti-inflammatory cytokines. A pilot study was conducted to investigate cytokine expression in patients with intermittent claudication(IC) who underwent RIPC compared to healthy volunteers(HV).

Seven healthy volunteers and six claudicants were recruited(Table 1). Venous blood was taken before and after the RIPC intervention(Figure 1). TNF-α,IL-10,IL-6,E-Selectin,ICAM-1 and Malondialdehyde were analysed using a multiplex analyser(Bio-Plex,Bio-Rad Laboratories,Inc.). A $p<0.05$ value was considered significant.

There was a reduction in TNF-α levels in the IC group(16.63pg/ml vs 10.59pg/ml,p=0.043) compared to the HV group(18.41pg/ml vs 13.64pg/ml,p=0.063) and a reduction in E-selectin in the IC group(51.49ng/ml vs 35.41ng/ml,p=0.046) compared to HV group(60.69ng/ml vs 57.52ng/ml,p=0.237). There were no differences observed between groups for IL-6 (IC = -0.07pg/ml vs HV = 0.07pg/ml,p=0.628), for IL-10 (IC = -0.1550pg/ml vs HV = 0pg/ml,p=1) for ICAM-1 (IC = 38.05ng/ml vs HV = -10.8ng/ml,p=0.836) and for Malondialdehyde (IC = 0.5uM vs HC = 1.064uM,p=0.945).

RIPC produced a reduction in TNF-α and E-selectin levels suggesting it can reduce pro-inflammatory burden in IC.

Figure 1. Induction of RIPC Intervention

- Inflate blood pressure cuff to 20mmHg above participants systolic blood pressure
- Ensure no palpable pulse over radial artery
- Cuff stays inflated at constant pressure for 5 minutes and is then deflated for 5 minutes. This is one cycle.
- Four consecutive cycles were performed over four consecutive days

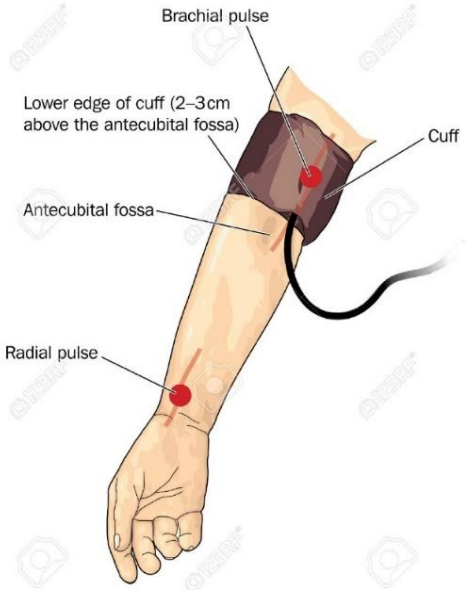

Table 1. Baseline Characteristics of Study Participants

		Intermittent Claudication	Healthy Volunteers	Statistical test	P value
Age Median *(IQR)*	Years	60.0 *(14.5)*	40.0 *(30.5)*	Mann-Whitney Test	0.027
Sex	Male Female	5 1	4 3	Fisher's Exact Test	0.294
Smoking status	Smoker Non-smoker	6 0	0 7	Fisher's Exact Test	<0.001
Systolic Blood Pressure (mmHg) Mean *(SD)*		129 *(11)*	124 *(20.5)*	Mann-Whitney Test	0.277
Diastolic Blood Pressure (mmHg) Mean *(SD)*		81.5 *(19.75)*	80.0 *(13.5)*	Mann-Whitney Test	0.541

P91

P91 - Interventions for great saphenous vein incompetence

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The availability of multiple interventions for treating great saphenous vein (GSV) superficial venous incompetence has required an update of the previous 2014 Cochrane review. This now includes endovenous steam ablation (EVSA), cyanoacrylate glue (CA) and mechanochemical ablation (MOCA)

The Specialised Trials Register and clinical trials databases were searched for randomised control trials (RCTS) of endovenous laser ablation (EVLA), radiofrequency ablation (RFA), EVSA, ultrasound guided foam sclerotherapy (UGFS), CA, MOCA and high ligation and stripping (HL/S). Outcomes of interest included technical success, recurrence, complications and QoL. Two review authors independently selected trials, applied Cochrane's risk of bias tool and extracted data. We calculated odds ratios (ORs) with 95% confidence intervals (CIs) and assessed the certainty of evidence using GRADE.

24 RCTs with 5135 participants were included. Technical success may be better in EVLA participants up to five years compared to HL/S (OR 2.31, 95% CI 1.27 to 4.23) and compared to UGFS at up to five years (OR 6.13, 95% CI 0.98 to 38.27). Quality RCT data for CA and MOCA remain sparse.

Conclusions are limited due to the small number of studies for comparisons and heterogenicity in outcome definitions and time points reported. Technical success was comparable between most modalities.

P92

P92 - Introduction of routine completion angiography after infra-inguinal bypass in a UK vascular unit

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Introduction
Completion assessment following infra-inguinal bypass surgery aims to detect technical defects that could result in early graft failure. Recent Global Vascular Guidelines on the Management of Chronic Limb-Threatening Ischaemia recommend intraoperative angiography. The aim of this study was to describe the introduction of routine completion angiography following infra-inguinal bypass surgery in a UK Vascular unit.

Methods
Consecutive patients undergoing infra-inguinal bypass surgery were assessed. Outcome of completion angiography or reason for not performing angiography was collected. The number of interventions required following angiography, graft patency at discharge and at 6 weeks was also recorded.

Results
33 infra-inguinal bypass operations were performed during the study period. Completion angiography was performed in 20 cases. Angiography led to further intervention in 7 cases (35%). The most common reason for completion angiography not being performed was that no radiographer was available (11/13). Overall patency at discharge was 88% (29/33), with patency at 6 weeks 82% (27/33). Patency at discharge in the group that underwent angiography was 80% (16/20) and at 6 weeks 75% (15/20).

Conclusion
Completion angiography allows identification of technical errors, giving opportunity to correct them. The effect on overall patency is unclear.

P93

P93 - Income deprivation and groin wound surgical site infection: cross-sectional analysis from the Groin wound Infection after Vascular Exposure (GIVE) multicentre cohort study.

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Introduction

Living in deprived areas is associated with poorer outcomes following certain vascular procedures. Objectives were to determine whether living in income-deprived areas was associated with groin wound surgical site infection (SSI), consequences of SSI, and mortality following arterial intervention.

Methods

Postcodes of patients in England included in the international multicentre GIVE study were used to acquire small-area income-deprivation based on the English Indices of Deprivation (EIoD). The sample was grouped based on EIoD rank. EIoD score was used in regression analyses.

Results

772 groin incisions (624 patients) from 22 centres were analysed. There were 75/772 (9.7%) groin wound SSIs in 64/624 (10.3%) patients. SSI was equivalent between income deprivation tertiles: tertile 1=9.5%, tertile 2=10.3%, tertile 3=8.6%; p=0.828. SSI consequences and mortality were equivalent between tertiles. Income deprivation was not associated with SSI (OR 0.574, 95%CI 0.038-8.747, p=0.689). Median age at time of procedure was significantly lower for patients living in more income-deprived areas: tertile 1=68, tertile 2=72, tertile 3=74; p<0.001.

Conclusion

We found no association between living in an income-deprived area and groin wound SSI, clinical consequences of SSI, and mortality in this sample. Patients living in more income-deprived areas presented for operative intervention at a younger age.

P94

P94 - Preservation of the internal iliac artery via fenestrated Anaconda limb to preserve spinal cord and pelvic perfusion

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Introduction
Sacrifice of the internal iliac arteries in the management of aortoiliac disease is associated with significant morbidity including spinal cord ischaemia. We present a novel method of maintaining internal iliac artery patency via a custom fenestrated limb in the endovascular repair of aortoiliac aneurysms.

Methods
A single-centre study was conducted. Patients were identified based on anatomical suitability for fenestration using the Anaconda device. Data was prospectively collected. Outcome measures included technical success, fenestration patency at follow up imaging, re-intervention and complication rates. There was no loss to follow-up.

Results
Between 2017-2020, 11 patients underwent endovascular repair of abdominal aortic aneurysms utilising ring supported fenestrations without the need for branch grafts. Mean follow up was thirty months. The procedure was a technical success in 10/11 (91%) of cases. Of the successful procedures, 100% maintained patency at follow up imaging. We found no documented incidences of buttock necrosis or spinal cord ischaemia.

Conclusion
Our results show this novel technique is a successful method of maintaining internal iliac artery patency with high rates of technical success. We propose that this method provides a quicker and cheaper alternative to current techniques of internal iliac artery preservation. A formal multi-centre cohort study is recommended.

P95

P95 - Lower limb weakness due to spinal venous congestion in chronic inferior vena cava occlusion – a case report.

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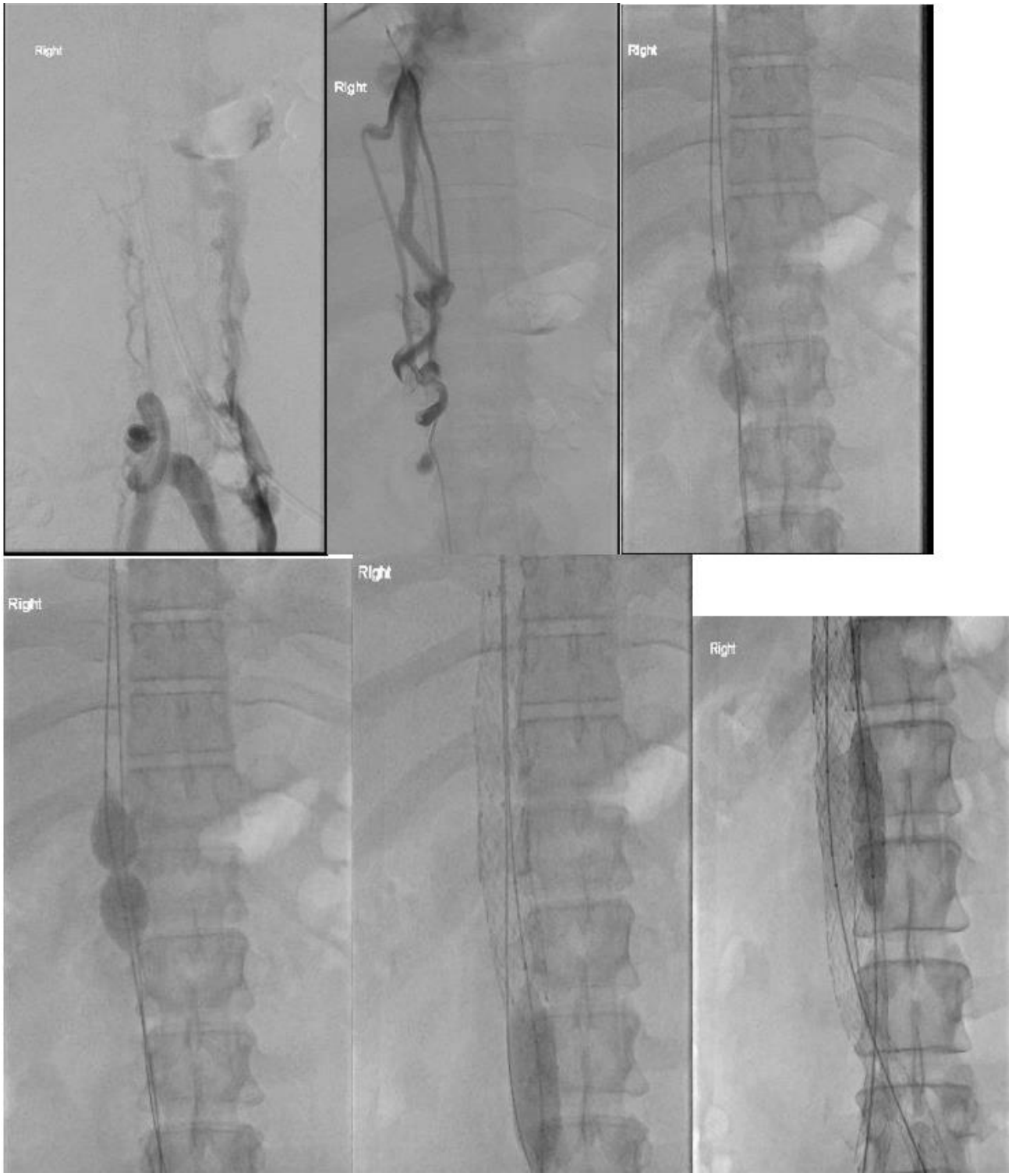
Introduction
We describe a case of inferior vena cava (IVC) occlusion and spinal venous congestion with associated neurological symptoms, treated with caval reconstruction.

Case report
A 31 year-old male presents with a long history of reduced sensation and motor function in his lower limbs and inability to walk upon waking every morning, lasting 30-50 minutes. He was involved in a severe road traffic accident as a child, and was born prematurely, requiring prolonged neonatal hospitalisation. MR venography identified absence of the inferior vena cava, with patent common femoral and iliac veins draining into large spinal collaterals, and no other neurological cause was identified for his symptoms. After multidisciplinary counselling, the patient proceeded to have endovascular reconstruction of his IVC and common iliac veins. The occlusion was stented with open-cell venous stents in a double-barrelled configuration up to the intrahepatic IVC, with intravascular ultrasound. Post-operatively, the patient reported an immediate resolution of neurological symptoms, along with improvement in disease-specific quality of life scores. Venous stents remain patent at two-month follow up.

Conclusion
IVC obstruction with spinal venous congestion is a rare condition which may be successfully treated with endovascular vena cava reconstruction, although long-term outcomes of this treatment are still unknown.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P96

P96 - Predictors of short-term mortality in patients undergoing major lower limb amputations due to underlying peripheral arterial disease: a systematic review and meta-analysis

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Background
In the UK, approximately 5,000 major lower limb amputations are performed annually. This systematic review aims to identify predictors of short-term mortality in patients with peripheral artery disease-related major lower limb amputations.

Method
The review was conducted according to PRISMA guidelines. Electronic searches were performed using MEDLINE and EMBASE from inception until June 2021. Published studies reporting short-term mortality following major lower limb amputation in adult patients with peripheral artery disease in the English language were included. Meta-analysis was performed using random-effects models.

Results
Ninety-nine cohort studies, containing data from 375,656 patients, met predefined inclusion criteria. Forty-five predictors of short-term mortality were identified, seventeen were amenable to meta-analysis. Thirty-day mortality was higher in patients with above-knee amputations (combined odds ratio 2.03, 95% CI: 1.82-2.27), dialysis dependence (1.94, 95% CI 1.03-3.66) congestive heart failure (1.39, 95% CI: 1.08-2.63) and higher American Society of Anaesthesia grade (2.78, 95%CI: 1.39-5.53).

Conclusions
Predictors of short-term mortality include amputation level, chronic kidney disease, renal replacement therapy, congestive heart failure and higher American Society of Anaesthesia grade. Analysis was limited as most predictors were reported in single studies and few studies corrected for confounders.

Outcome	No. studies	No. patients	Odds Ratio	95% C.I.	NOS Mean (Range)	Grade
30-day mortality						
AKA vs. BKA	17	16813	2	1.78-2.25	6.7(5-9)	⊕⊕◯◯
TKA vs. AKA	3	843	1.05	0.69-1.59	6.3(5-7)	⊕◯◯◯
TKA vs. BKA	3	495	2.15	0.47-9.93	5.7(5-7)	⊕◯◯◯
Bilateral vs. Unilateral	3	2174	2.62	0.77-8.92	7.7(7-9)	⊕◯◯◯
Diabetes	8	11542	0.66	0.55-0.79	7(5-9)	⊕◯◯◯
Age (continuous)	4	18075	1.03	1.03-1.04	7.8(5-9)	⊕◯◯◯
Emergency vs. Elective*	3	11663	1.27	0.95-1.70	9(9)	⊕◯◯◯
RA vs. GA	4	12888	1.02	0.86-1.20	7.7(6-9)	⊕◯◯◯
Gender	10	19907	1.05	0.82-1.34	7.3(5-9)	⊕◯◯◯
Tourniquet use	2	163	0.79	0.20-3.14	7(7)	⊕◯◯◯
Previous revascularisation	3	3210	1.59	0.58-4.39	8.3(7-9)	⊕◯◯◯
Dialysis dependence	2	7705	1.94	1.03-3.66	7.3(5-9)	⊕◯◯◯
Chronic renal disease	3	9802	0.46	0.30-0.72	8.7(8-9)	⊕◯◯◯
Congestive heart failure	3	7804	1.68	1.08-2.63	7(5-9)	⊕◯◯◯
Cerebrovascular disease	3	9802	1.39	0.82-2.35	8.7(8-9)	⊕◯◯◯
Admission from care facility	2	488	0.8	0.44-1.47	7.5(7-8)	⊕◯◯◯
ASA Grade	2	6797	2.78	1.39-5.53	7(5-9)	⊕◯◯◯
In-Hospital mortality						
AKA vs. BKA	10	5174	2.58	1.92-3.48	6.3(5-8)	⊕⊕◯◯
TKA vs. AKA	4	513	1.02	0.26-4.07	5.8(5-8)	⊕◯◯◯
TKA vs. BKA	4	235	4.05	0.52-31.8	5.8(5-8)	⊕◯◯◯
Diabetes	2	259	0.47	0.07-3.22	7.5 (7-8)	⊕◯◯◯

* Confounder adjusted
NOS - Newcastle-Ottowa Score

P97

P97 - An evaluation of major lower limb amputations before and during the CoViD-19 pandemic in a single tertiary centre

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Introduction
This study evaluates the prevalence, cause, pathways and outcomes of major lower extremity amputations before and at different stages of the CoViD-19 pandemic.

Methods
Consecutive patients undergoing transtibial or transfemoral amputation between May 2019 and Feb 2021 in a single, tertiary Vascular Surgery centre were evaluated. Patients were classified into a 'pre-lockdown' and 'post-lockdown' (after 23/03/2020) cohort. Data relating to referral pathways, care during admission, number and type of previous interventions, post-operative outcomes and mortality were collected retrospectively and compared between the two cohorts.

Results
A total of 102 patients underwent major amputations; 60 patients pre-lockdown (mean age 69.8 years, SD 14.1, 45/60 male) and 42 post-lockdown (mean age 68.2 years, SD 14.1, 38/42 male). In the post-lockdown group, there was a trend towards more acute ischaemia and diabetic foot sepsis, more emergency admissions, and higher proportion of above-knee amputations (Table 1). Patients in the pre-lockdown group had more ipsilateral vascular interventions prior to amputation (median 1, range 0-9) compared to post-lockdown (medial 0, range 0-5)(p=0.046). Referral times and admission durations were similar in the two cohorts (Table 1).

Conclusion
The findings suggest that post-lockdown, patients undergoing major amputations had more advanced clinical presentations and fewer revascularization attempts.

P101

P101 - The impact of Duplex Ultrasound surveillance in early detection and salvage of vein grafts following infrainguinal bypass surgery

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Vein grafts following infrainguinal bypass surgery are susceptible of developing stenosis in 25% to 30% of grafts within the first year. Graft surveillance is currently the best method for detecting stenotic lesions. There is literature controversy regarding its clinical value and cost-effectiveness.

Methods
Patients who underwent infrainguinal bypass surgery from 2016 to 2021 were included. The data regarding numbers and outcomes of surveillance excluding synthetic grafts was collected.

Results
Out of 240 patients offered bypass surgery 201 had vein grafts versus 39 synthetics. A total of 458 scans were done on 6 weeks, 3,6,12,24 months, 183 (39.95%) detected positive findings regarding anastomostic or in-graft stenosis/occlusion.

Thirty-two (15.6%) of 205 patients on surveillance offered re-intervention for graft salvage as following; 26,3 and 3 grafts offered balloon angioplasty, thrombolysis and combined procedure respectively, including open surgical repair in 1 case for graft rupture with 4 grafts treated twice.

Twenty-three (71.87%) versus 9 re-interventions were done on the first and second year respectively, consistent with the pathophysiology of intimal hyperplasia.

Conclusion
DUS surveillance has proved high clinical value and cost-effectiveness in early detection and treating failing vein grafts, which potentially saves limbs and high costs spent on re-vascularisation procedures following graft failure.

P102

P102 - Critical ischaemic legs in the second wave of Covid-19

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Introduction
Critical limb ischaemia (CLI) has recommended 'time-to-treat' targets (Peripheral-Artery-Disease Quality-Improvement Framework (PAD-QIF). There was concern that Covid-19 might have resulted in delay to treatment. We analysed our management of CLI during the second-peak of Covid.

Methods
Prospective data collection of all emergency and elective patients admitted with CLI between January-March 2021. Data collected: patient demographics, length-of-stay (LOS), intervention, time-to-intervention.

Results
50 CLI patients admitted; 11 elective, 39 emergency. Median LOS 6 days (range 1-48). Of the 11 elective patients, median time-to-intervention was 27 days. Interventions included; 2 angioplasty, 1 amputation, 4 hybrid, 4 bypass.
Of the 39 emergency patients, 27 proceeded to operation (7 amputation, 5 hybrid, 11 angioplasty, 4 bypass). Median time-to-intervention was 2 days. A further 6 were palliated, 5 managed conservatively and 1 died.

Conclusion
A large proportion of patients were emergency admissions. For these, time-to-intervention fell within the PAD-QIF guidelines suggesting diagnosis, investigation and management of these patients was prompt and efficient. Fewer elective admissions were admitted with delayed suggesting potential delays to intervention in an outpatient setting.

P103

P103 - The Current Landscape for Patient and Public Awareness of Peripheral Arterial Disease (PAD)

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Background
PAD is a common condition with major impact on patients and communities, especially if progresses to Critical Limb Ischemia (CLI). Public awareness of the condition seems poor with a significant impact on patient's engagement and compliance leading to poor outcomes and increasing source of complaints. We aimed to analyse current the literature regarding patient and public awareness of PAD.

Methods
Literature search from EMBASE and MEDLINE of all studies that investigated patient and/or public awareness of PAD over the last 10 years. 12 articles were identified for analysis and the main results were summarised.

Results
Overall understanding of PAD is poor, especially when compared to disease of the coronaries. There is poor understanding of the timeline of PAD - viewing it is a temporary condition by 27% of the public in a Swiss study. Likewise, 44% of smokers denied the association between PAD and smoking. Patients also had little insight regarding need for treatment, and 86% of the public did not associate death as a consequence of PAD.

Conclusion
There is still a wide gap in patient and public awareness of PAD. More work is needed from the vascular societies to address this vital issue.

P104

P104 - Comparative study between effect of revascularization interventions and amputations on patient mental health

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Introduction
Management of peripheral vascular diseases requires many of the patient's many interventions and multiple hospital admissions, affecting the patient's mental and psychological health. Our study compares the effect of infra-inguinal bypasses and endovascular interventions versus different levels of amputations on the patient's mental health.

Methods
A prospective review of patients who underwent revascularization interventions or amputation surgeries between January 2021 and June 2021 was conducted. Patients were asked to fill in the hospital anxiety and depression score (HADS) 1-week pre and 6-8 weeks post interventions. Patient demographics and hospital stay duration were identified. HADS-A and HADS-D were collected, and outcomes were statistically analyzed.

Results
A total of 122 patients (73 re-vascularisations vs. 49 amputations) were included in the study; 57.4% had diabetes, 43.4% had hypertension,31.1% had ischaemic heart disease, and 42.6% had previous re-vascularisation interventions. The median and interquartile range of inpatient admission days was 10(5-21) and 14(9-21) for re-vascularisation and amputation groups, respectively (p=0.04). Comparing the difference in pre-and post-operative HADS-D revealed 0(-4-1) in the re-vascularisation group vs. 2(-1-5) in the amputation group, p=0.002.

Conclusion
Amputation affects the patient's mental and psychological health as compared to revascularization.

P105

P105 - Outcomes after lower limb distal arterial bypass: An observational study

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Introduction
Lower limb distal arterial bypass represents a high tariff revascularisation option for patients with critical limb ischaemia. The aim of the present study was to audit patency and outcomes of distal arterial bypass in our unit.

Methods
Patients undergoing distal bypass between 2012 and 2020 were identified from the department operative database. Data was analysed using Microsoft Excel and SPSS statistical software.

Results
117 patients were included, the majority of patients were Fontaine III (n=38, 32%) and Fontaine IV (n=77, 68%). 35% (n=42) had intervention to maintain graft patency. Overall primary patency rates at 6, 12, 24 and 48 months were 62%, 51%, 47% and 40% respectively. Mean patency was 42. Primary patency rates at 6, 12 and 24 months were 57%, 50% and 40% for diabetics, and 56%, 48% and 43% for smokers, respectively. In this studied cohort 20% of patients required major limb amputation and 15% suffered a major adverse cardiovascular event in the follow-up period.

Conclusion
Overall, this audit demonstrates that distal arterial bypass offers good primary and secondary patency rates, but highlights this group continue to have comparably high amputation rates and cardiovascular events which perhaps reflect their advanced disease state.

P106

P106 - Development of a machine learning approach to identify landing zones suitable for infrarenal endovascular repair

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Introduction
Cloud systems integrating endovascular planning, guidance and review depend on artificial intelligence (AI)-driven clinically significant image-feature identification. We used machine learning to extract CT encodings identifying landing zones suitable for infrarenal repair.

Methods
A deep convolutional neural network based on 3D U-Net architecture, implemented in TensorFlow, an open-source machine learning framework, was trained using anonymised CT and fluoroscopy image data. Relevant anatomy was algorithmically segmented and a block region-of-interest around the aneurysm was automatically extracted.

Deep learning algorithmically extracted completion angiograms were labelled for operation type by subject matter experts using labelstudio.io, a GUI review tool. A neural network was trained to link CT encodings to subsequent operation performed.

Results
1200 and 30 CT scans and 150 angiograms (inter-observer agreement high) respectively trained the segmentation, aneurysm detection and predictive models.

In initial experiments, overfitting led to poor accuracy. Reducing classes to complex vs. standard infrarenal EVAR only, improved categorical accuracy predicting operation type to 75%, with 66% precision (PPV) and 72% sensitivity.

Conclusion
Machine learning can identify infrarenal landing zones. Finding meaningful latent spaces in 3D image data encoding features such as aneurysm size, tortuosity or landing zone quality is a key step towards using AI to predict outcomes.

P107

P107 - Surgical techniques for performing a through knee amputation: a systematic review and development of an operative classification system

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Introduction
The through knee amputation (TKA) creates a stable end weight-bearing lever, which can improve mobility. However, many different surgical techniques for performing a TKA have been described. We aimed to identify all published TKA operative techniques, and to develop an operative classification system for the TKA.

Methods
A systematic review was performed to identify papers reporting an operative technique for TKA. A classification system was subsequently developed based on key surgical differences.

Results
28 papers (1,132 patients) were included. 20 were papers describing a modification to a previously reported TKA technique. A total of 8 different TKA operations were described (types 1-8). The most important difference was the level of femoral division; disarticulation without dividing any femur (types 1-3), transcondylar amputation (types 4-7) and supracondylar amputation (type 8). Other important differences reported were regarding management of the medial, lateral and posterior condyles, the patella, and the use of a gastrocnaemius flap. 5 different skin incisions were described. Mortality was 6-32%, and delayed healing rates were 7-59%. No papers compared different TKA types

Conclusion
This review describes a classification system for TKA techniques. This will allow improved, standardised reporting of future studies, and easier pooling of clinical results.

P110

P110 - Time to change to ultrasound (USS) based surveillance scans for endovascular aneurysm repair (EVAR).

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Background
There is no formalised national surveillance protocol for post-EVAR surveillance with a lot of variation across the UK trusts. The NICE guidance seems to be vague and more units are adopting the European Society recommendations. We investigated whether USS combined with plain Abdominal X-Ray (AXR) surveillance would be a reasonable alternative.

Methods
A retrospective analysis of all the patients who underwent EVAR at regional vascular centre over a 6-year period. Full follow up data was available for 207 patients. The surveillance scans were assessed in terms of imaging modality and findings. Data for patient demographics, need for further intervention, reasons for re-intervention after 1-year post-EVAR and long term survival were collected. 'At risk' EVARs were identified early and kept on CT surveillance.

Results
Only 12 patients (5.80%) needed re-intervention after a satisfactory CTA at 1-year. Of those 50% were type-2 endoleaks with sac expansion, 25% had evidence of stent retraction or limb kink and 25% presented with symptoms. All could have been picked up with a simple USS + AXR approach.

Interpretation
There seems to be no detrimental effect on patient safety associated with a switch to a primarily USS+AXR screening programme after 1-year post EVAR in our cohort.

P111

P111 - Stent graft surveillance after elective EVAR: can less be more?

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Background
Surveillance protocols after Endovascular Aortic Aneursym Repair (EVAR) vary significantly. Our local protocol is for a CT angiogram (CTA) at 30 days, six months, one year and then annual CTA or ultrasound. The European Society for Vascular Surgery (ESVS) advocates a single CTA every five years, if the 30 day CTA is satisfactory. We investigated whether this reduced imaging surveillance would have detected all significant complications.

Methods
We retrospectively studied patients with bifurcated EVAR grafts using Medtronic Endurant II within the Instructions For Use for asymptomatic aneurysmal disease between 2014-2015, with a five-year follow-up period. Data was gathered using the National Vascular Registry and local records.

Results
Of the total 29 patients, 97% were male with an average age of 75 years (60-85). Two patients underwent secondary intervention. Patient mortality at the time of the study was 45% (13 patients) for which none was aneurysm-related. Three patients were lost to follow-up.
Following ESVS surveillance would have prevented 67 CTAs (average of 2.5 scans/patient) and eight ultrasounds, without missing any significant endoleaks.

Conclusions
Al patients in this study would have benefited from reduced surveillance. The ESVS surveillance provides the opportunity to preserve our limited NHS resources whilst reducing radiation exposure.