



BSET

British Society of
Endovascular Therapy

Annual Meeting 2015

Thursday 2nd – Friday 3rd July
Walton Hall, Warwickshire

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BSET

British Society of
Endovascular Therapy

Annual Meeting 2015

Thursday 2nd – Friday 3rd July
Walton Hall, Warwickshire

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Thursday 2nd July

09.00 – 09.30 **WELCOME AND ROULEAUX CLUB SYMPOSIUM**

INTERNATIONAL ENDOVASCULAR TRAINING MODELS

USA **Allan Conway**
Australia **Martin Claridge**
Netherlands **Jorg de Bruin**

GUEST LECTURE

"Endovascular interventions should be performed by specialists, not vascular surgeons or interventional radiologists"

Chairs:
Jonathan Boyle,
BSET President
Paul Blair,
VS President
Hosaam Nasr,
Rouleaux Club President

Paul Blair,
VS President

09.30 – 10.30 **Abstract Session 1**

Chairs: Ian Loftus
& Rao Vallabhaneni

09.30 – 09.36 **Rupture after endovascular aortic aneurysm repair in a 5-year dual centre study**

B Telgenkamp¹ N Rudarakanchana^{1,2} M Sallam¹
CD Bicknell² R Bell¹ R Gibbs² H Zayed¹ MP Jenkins²
¹*Department of Vascular Surgery, Guy's & St Thomas' NHS Foundation Trust*
²*Imperial Vascular Unit, Imperial College NHS Trust & Imperial College London*

09.36 – 09.42 **An International Comparison of Long-term Mortality after Ruptured Abdominal Aortic Aneurysm in England and Sweden**

A Karthikesalingam¹ A Wanhainen² I Shpitser³
MM Thompson¹ MM Bjorck² PJE Holt¹ A Vidal-Diez¹ K Mani²
¹*St George's Vascular Institute*
²*Department of Surgical Sciences, Section of Vascular Surgery, Uppsala University Hospital, Uppsala, Sweden*
³*Department of Mathematical Sciences, University of Southampton*

09.42 – 09.48 **Late rupture of abdominal aortic aneurysm after previous endovascular repair**

L Iazollino G Antoniou S Neequaye J Brennan F Torella R Vallabhaneni
Liverpool Vascular and Endovascular Service, Royal Liverpool University Hospital

09.48 – 09.54 **EVAR Results in Increased Cardiovascular Risk**

VJ Gokani MJ Bown RD Sayers
University of Leicester

09.54 – 10.00 **Nellix Endovascular Aneurysm Sealing System Expands Endovascular Options with Excellent Short Term Results**

H Lee N Al-Zuhir M Chowdhury A Winterbottom
JR Boyle PD Hayes
Addenbrooke's Hospital, Cambridge

10.00 – 10.06 **Endovascular aneurysm repair (EVAR) surveillance – what do patients think?**

V Hansrani A Abbas N Tyson CN McCollum
Academic Surgery Unit, Institute of Cardiovascular Sciences, University of Manchester

10.06 – 10.12 **Effect of endovascular sealing (EVAS) on aortic thrombus volume**

F Torella¹ T Chan¹ U Shaikh¹ RG McWilliams¹ A England²
O Oshin¹ RK Fisher¹
¹*Liverpool Vascular & Endovascular Service*
²*University of Salford*

10.12 – 10.18 **Does Repositioning of AAA Endoprosthesis cause Renal Failure?**

D Hildebrand¹ D Pang¹ B Tohill² P Bachoo¹
¹*Department of Vascular Surgery, Aberdeen Royal Infirmary, Aberdeen*
²*Clinical Research, W.L.Gore & Associates*

10.18 – 10.24 **Re-intervention rates following EVAR for ruptured AAA are higher than after elective repair**

CTA Parker MM Chowdhury GK Ambler PA Coughlin
MS Gohel S Kreckler K Varty PD Hayes JR Boyle
Cambridge University Hospitals NHS Foundation Trust

10.30 – 11.00	Quick Fire TEVAR Debate	<i>Chairs:</i> Mike Jenkins & Rachel Bell	14.00 – 14.55	Abstract Session 2	<i>Chairs:</i> Paul Hayes & Femi Oshin
	TEVAR in the acute phase in all patients with type B confers better remodeling and survival benefit – it is proven	<i>For:</i> Christoph Nienaber <i>Against:</i> Jan Brunkwall	14.00 – 14.06	Comparison of CT and Duplex Ultrasound for the detection of early endoleak after Endovascular Sealing (EVAS) for Infraarenal AAA with the Nellix Device P Moxey ¹ A Karthikesalingam ¹ J De Bruin ¹ F D Abate ² R Morgan ³ P Holt ¹ I Loftus ¹ MM Thompson ¹ ¹ St George's Vascular Institute, St George's Hospital, London ² Vascular Laboratory, St George's Vascular Institute, St George's Hospital, London ³ Department of Radiology, St George's Hospital, London	
	GUEST LECTURE Experience with branched graft solutions for aortic arch pathology	Frank Arko			
11.00 – 11.15	The paper that changed my practice Ben Starnes Jos van den Berg	<i>Chairs:</i> Colin Bicknell & Tom Browne	14.06 – 14.12	A vascular network's experience of the novel GORE® TIGRIS® stent in the treatment of atherosclerotic popliteal arterial disease T Khan P Leighton P Mezes G Collin A Weale N Collin M Brooks J Hardman Major arterial centre, Southmead Hospital, Bristol Bath and Weston Vascular Network	
11.15 – 11.45	Tea/Coffee		14.12 – 14.18	Thrombolysis of Ilio-Femoral Deep Vein Thromboses: Early Results of a Locally Developed Protocol J Duthie ¹ J Monteiro de Barros ² T Hardy ² N Gafoor ² S Ashley ² J Barwell ² F Dix ² C Parry ² ¹ South Devon Healthcare NHS Foundation Trust ² Plymouth Hospitals NHS Trust	
11.45 – 12.00	The paper that changed my practice Frank Arko Jan Brunkwall Michael Jacobs	<i>Chairs:</i> Jonathan Boyle & Ian Loftus	14.18 – 14.24	Crural vessel angioplasty for critical ischaemia: 7 year results E Katsogridakis M Khoshkhoo T Rashid D Murray Department of Vascular and Endovascular Surgery, Central Manchester University Hospitals NHS Foundation Trust, Manchester Academic Health Science Centre, Manchester	
12.00 – 12.30	Quick Fire Venous Debate	<i>Chairs:</i> Ray Ashleigh & Chris Twine	14.30 – 14.36	Aorto-Iliac Stent Grafts for Severe Aorto-Iliac Occlusive Disease – Are they a safe and durable alternative? MA Popplewell M Ahmad P Bevis D Adam M Claridge Birmingham Complex Aortic Team, Heart of England Foundation Trust	
	Venous stenting is now the gold standard for chronic venous occlusion	<i>For:</i> Jos van den Berg <i>Against:</i> Pete Holt			
	GUEST LECTURE Pelvic Congestion syndrome	Mark Whiteley			
12.30 – 13.00	IMPROVE 12 MONTH RESULTS Janet Powell and Rob Hinchliffe	<i>Chairs:</i> Rachel Bell & Jos van den Berg			
13.00 – 14.00	Lunch				

14.36 – 14.42 **Comparison of operative parameters during EVAS with standard infrarenal EVAR**

S Franks¹ R Bell¹ M Sallam¹ P Saha¹ A Patel¹ J Wilkins²
K Katsanos³ M Dialynas¹ MR Tyrrell¹

¹Department of Academic Surgery, Guy's and St Thomas' NHS Foundation Trust

²Department of Interventional Radiology, King's College Hospital

³Department of Interventional Radiology, Guy's and St Thomas' NHS Foundation Trust

14.42 – 14.48 **EVAR with Internal Iliac Artery Embolisation**

D Hildebrand D Pang P Bachoo

Department of Vascular Surgery, Aberdeen Royal Infirmary, Aberdeen

14.48 – 14.54 **Fenestrated endovascular repair for failing Infrarenal stent grafts**

S Franks¹ P Gkoutziou² R Salter² T Carrell¹ A Patel¹
S Abisi¹ B Modarai¹

¹Department of Academic Surgery, Guy's and St Thomas' NHS Foundation Trust

²Department of Interventional Radiology, Guy's and St Thomas' NHS Foundation Trust

14.55 – 15.25 **Spinal Cord Injury After TAAA Repair**

Chairs: Colin Bicknell
& Tom Browne

Lessons From open surgery
Lessons from endovascular interventions

Michael Jacobs
Tara Mastracci

15.25 – 16.05 **Sponsor Presentations**

Developments to increase the efficacy of endovascular procedures

Chairs: Matt Thompson
& John Brennan

Cook Medical

Can we future-proof aortic repairs?

Tara Mastracci

Endologix

How EVAS has changed our practice

Ian Loftus

16.05 – 16.35 **Tea/Coffee**

16.35 – 17.15 **Sponsor Presentations**

Chairs: Matt Thompson
& John Brennan

Developments to increase the efficacy of endovascular procedures

Gore

Evolution of the GORE® EXCLUDER® AAA Endoprosthesis: past, present & future

Rao Vallabhaneni

Medtronic

The application of Intraoperative Neuro-monitoring in TAAA surgery

Axel Fudickar

17.15 – 17.45 **TRAUMA UPDATE**

Chairs: Jonathan Boyle
& Ben Starnes

Endovascular skills are essential for the modern day trauma surgeon

For: Mike Jenkins
Against: Paul Blair

GUEST LECTURE

Aortic Balloon Occlusion for traumatic haemorrhage control

Ben Starnes

17.45 – 18.40 **Peripheral Prize Abstract Session** *Chairs: Tom Browne
& Michael Jacobs*

17.45 – 17.54 **Multi-modality imaging of inflammation and calcification within the lower limb arterial tree: a PET/CT study**
MM Chowdhury¹ GC Makris² JM Tarkin³ H Lee¹
JR Boyle¹ PD Hayes¹ JH Rudd³ PA Coughlin¹
¹*Division of Vascular & Endovascular Surgery, Addenbrooke's Hospital, Cambridge University Hospital Trust, Cambridge,*
²*Division of Radiology, Addenbrooke's Hospital, Cambridge University Hospital Trust, Cambridge*
³*Division of Cardiovascular Medicine, Addenbrooke's Hospital, Cambridge University Hospital Trust, Cambridge*

17.54 – 18.03 **Midterm outcomes of salvage angioplasty on threatened distal bypass grafts**
L. Biasi¹ S. Patel¹ T. Lea¹ S. Padayachee¹ T. Donati¹
K. Katsanos² H. Zayed¹
¹*Department of Vascular Surgery, Guy's and St Thomas' NHS Foundation Trust*
²*Department of Interventional Radiology; Guy's and St Thomas' NHS Foundation Trust*

18.03 – 18.12 **Wearable Sensor Technology Efficacy in Peripheral Vascular Disease (wSTEP): A Randomised Clinical Trial**
P Normahani^{1,2} C Bicknell^{1,2} L Allen¹ R Kwasnicki²
M Jenkins¹ R Gibbs¹ N Cheshire^{1,2} A Darzi² C Riga^{1,2}
¹*Imperial Vascular Unit, Imperial College Healthcare Trust*
²*Academic Division of Surgery, Imperial College*

18.12 – 18.21 **Catheter Delivered Treatment (CDT) for Deep Vein Thrombosis. A Multi-Centre Study of Current Practice**
N Charlwood¹ C Lowe¹ C Goatman¹ J Buxton¹ J Packer¹
J Ghosh²
¹*North West Deanery*
²*University Hospital of South Manchester*

18.21 – 18.30 **Keeping an eye on the target: Direct or indirect revascularisation of the Angiosome?**
AE Sharrock¹ T Barker² EL Kershaw³ C Watts⁴
¹*NHLI, Imperial College, London*
²*Department of Vascular Surgery, Queen Elizabeth Hospital, West Midlands*
³*Department of General Surgery, Southampton General Hospital, Hampshire*
⁴*Department of Radiology, Salisbury District Hospital, Wiltshire*

18.30 – 18.39 **Combined infra-popliteal angioplasty has no advantage over direct angiosomal revascularisation**
AL Stimpson¹ U Hanif² S Germain² C Chick¹ N Goyal¹
CP Twine¹
¹*Royal Gwent Hosspital, Newport*
²*Cardiff University*

19.00 **Drinks reception**

20.00 **Dinner**

08.00 – 09.00 **Abstract Session 3**

*Chairs: Dave Lewis
& Bijan Modarai*

08.00 – 08.06 **Endovascular repair of asymptomatic thoraco-abdominal aortic aneurysms with fenestrated and branch devices: a single centre experience**

A Koutsoumpelis¹ M Vezzosi¹ PM Bevis¹ PFJ Clift²
AM Ranasinghe³ JG Mascaro³ MW Claridge¹ DJ Adam¹
¹Birmingham Complex Aortic Team; Vascular and
Endovascular Unit, Heart of England NHS Foundation Trust
²Adult Congenital Heart Unit, University Hospital Birmingham
NHS Foundation Trust
³Cardiothoracic Aortic Unit, University Hospital Birmingham
NHS Foundation Trust

08.06 – 08.12 **Post-Operative Cognitive Decline following endovascular aortic aneurysm surgery: A prospective clinical pilot study**

RA Benson¹ BA Ozdemir¹ D Matthews² V Loftus³
MM Thompson¹ IM Loftus¹
¹St George's Vascular Institute, London UK
²Croydon Memory Service, South London and Maudsley
NHS Foundation Trust
³South West London and St George's Mental Health NHS Trust

08.12 – 08.18 **Early outcomes of patients transferred with ruptured suprarenal aneurysm or dissection undergoing endovascular aortic repair**

N Rudarakanchana¹ R Gibbs¹ CD Bicknell¹ M Hamady²
E Kashef² S Harris¹ E Afify¹ MP Jenkins¹
¹Imperial Vascular Unit, Imperial College NHS Trust
& Imperial College London
²Department of Interventional Radiology, Imperial College
NHS Trust & Imperial College London

08.18 – 08.24 **Percutaneous EVAR: Is it effective?**

S A R Mustafa C Chick C Twine A D McLain N Goyal
Royal Gwent Hospital, Newport

08.24 – 08.30 **Early outcomes after Left Subclavian Artery revascularisation in association with Thoracic Endovascular Aortic Repair**

D Oladokun B Patterson J Brownrigg A Karthikesalingam
P Holt I Loftus M Thompson
St George's Vascular Institute, St George's Hospital, London

08.30 – 08.36 **Endovascular repair for the ascending aorta**

P Sharma¹ R Gibbs¹ M Jenkins¹ E Kashef² M Hamady²
C Bicknell¹
¹Department of Vascular Surgery, Imperial College Healthcare
NHS Trust
²Department of Radiology, Imperial College Healthcare
NHS Trust

08.36 – 08.42 **Urgent and emergency endovascular repair of juxtarenal and thoraco-abdominal aortic aneurysms with surgeon-modified and commercially-available fenestrated and branch devices**

M Vezzosi¹ A Koutsoumpelis¹ PM Bevis¹ PFJ Clift²
AM Ranasinghe³ JG Mascaro³ DJ Adam¹ MW Claridge¹
¹Birmingham Complex Aortic Team; Vascular and Endovascular
Unit, Heart of England NHS Foundation Trust
²Adult Congenital Heart Unit, University Hospital Birmingham
NHS Foundation Trust
³Cardiothoracic Aortic Unit, University Hospital Birmingham
NHS Foundation Trust

08.42 – 08.48 **Occupational Radiation Exposure During FEVAR: A Stage-By-Stage Analysis**

MM Li¹ CD Bicknell^{1,2} S Cheung¹ A Massoumi¹
N Burfitt² R Thomas² MP Jenkins² NJ Cheshire^{1,2}
MS Hamady² CV Riga^{1,2}
¹Division of Surgery, Department of Surgery and Cancer,
Imperial College London
²Imperial Vascular Unit, Imperial College Healthcare
NHS Trust, London

08.48 – 08.54 **Transcranial Doppler detection of micro-embolic signals during endovascular aortic aneurysm repair**

RA Benson L Gould MM Thompson IM Loftus
St George's Vascular Institute, London

09.00 – 09.30	BSET FELLOW REPORTS	<i>Chairs:</i> Mike Jenkins & Eddie Wright	11.40 – 12.35	Aortic Prize Abstract Session	<i>Chairs:</i> Jonathan Boyle & Ben Starnes
	Introduction and discussion				
	Current endovascular fellow	Sarah Franks	11.40 – 11.49	The endovascular sealing device in combination with parallel grafts to treat juxta- and suprarenal aneurysms JL de Bruin JR Brownrigg A Karthikesalingam B Patterson L Rossi PJ Holt RJ Hinchliffe RJ Morgan IM Loftus MM Thompson <i>St George's Vascular Institute, St George's Hospital, London</i>	
	The COOK Fellows – Where are they now?	Leith Williams Chris Twine	11.49 – 11.58	The role of 3D fusion computed tomography in the enhancement of the safety profile of FEVAR A Rolls ¹ S Rosen ¹ M Desai ¹ D Stoyanov ² J Constantinou ¹ M Davis ¹ J Cole ³ G Hamilton ¹ T Mastracci ¹ ¹ <i>Aortic Team, Royal Free Foundation Trust, London</i> ² <i>Centre for Medical Image Computing and Department of Computer Science University College London</i> ³ <i>Radiation Physics, Royal Free Foundation Trust, London</i>	
	BSET Thoracic Aortic Reporting Standards	Dave Bosanquet Chris Twine	11.58 – 12.07	Endovascular Aneurysm Sealing for Infraarenal Abdominal Aortic Aneurysms: 30-Day Outcomes of 105 Patients in a Single Centre JRW Brownrigg J de Bruin A Karthikesalingam B Patterson PJ Holt RJ Hinchliffe R Morgan IM Loftus MM Thompson <i>St George's Vascular Institute, St George's Hospital, London</i>	
09.30 – 09.50	Quick Fire Lower Limb Debate	<i>Chairs:</i> Klaus Overbeck & Jan Brunkwall	12.07 – 12.16	A 19-year experience of secondary interventions following EVAR A Burdess MJ Clarke MG Wyatt <i>The Freeman Hospital Newcastle</i>	
	Drug eluting balloons for SFA stenoses will never be cost effective	<i>For:</i> Dave Lewis <i>Against:</i> Jos van den Berg	12.16 – 12.25	Repair of thoraco-abdominal and peri-renal aneurysms with the multi-layer flow-modulating stent: the UK pilot study C Lowe ^{1,2} A Worthington ¹ F Serracino-Inglott ³ R Ashleigh ² C McCollum ¹ ¹ <i>Institute of Cardiovascular Sciences, University of Manchester</i> ² <i>Department of Vascular and Endovascular Surgery, University Hospital South Manchester</i> ³ <i>Department of Vascular and Endovascular Surgery, Manchester Royal Infirmary</i>	
09.50 – 10.10	Quick Fire EVAR Debate	<i>Chairs:</i> Janet Powell & Frank Arko			
	Your IMPROVE results are because you Brits can't do ruptured EVAR cases properly!	<i>For:</i> Ben Starnes <i>Against:</i> Matt Thompson			
10.10 – 10.25	GUEST LECTURE	<i>Introduced by</i> Dave Lewis			
	The added benefits and efficacy of atherectomy, eluting balloons and stents in the lower limb	Jos van den Berg			
10.25 – 11.00	Tea/Coffee				
11.00 – 11.40	Sponsor Presentations	<i>Chairs:</i> Matt Thompson & John Brennan			
	Developments to increase the efficacy of endovascular procedures				
	Vascutek Anaconda Stentgraft: Vascutek's solution to durability	Mike Jenkins			
	Bolton Endovascular developments for the aortic arch	David Murray			

12.25 – 12.34 **Preoperative Morphological Factors of Thoracic Aortic Aneurysm Sac Enlargement after Endovascular Repair**

J Sobocinski^{1,2} BO Patterson² PJ Holt² MM Thompson²

¹Aortic Centre, Vascular surgery, Hopital cardiologique,
University of Lille, France

²St George's Vascular Institute NHS Trust,
University of London, London, UK

12.35 – 13.05 **CHEE SOONG MEMORIAL LECTURE**

*Introduced by
John Brennan*

Centralisation – has it worked?

Rob Sayers

13.05 – 13.20 **Presentation of Prizes and Close**

Lunch



Abstracts

Abstract Session 1

Rupture after endovascular aortic aneurysm repair in a 5-year dual centre study

B Telgenkamp¹ N Rudarakanchana^{1,2} M Sallam¹ CD Bicknell² R Bell¹
R Gibbs² H Zayed¹ MP Jenkins²

¹Department of Vascular Surgery, Guy's & St Thomas' NHS Foundation Trust, London

²Imperial Vascular Unit, Imperial College NHS Trust & Imperial College London

Rupture after endovascular aneurysm repair is rare but associated with high mortality. This study investigates outcomes in patients with rupture following aortic stentgrafting.

Retrospective observational study at 2 specialist vascular centres over a 5-year period (2010-2015).

There were 18 patients (median age=81years, range 58-93; 14 male) with rupture following aortic stentgrafting (10 EVAR; 1 FEVAR; 2 TEVAR; 1 TEVAR+EVAR; 1 arch hybrid; 3 visceral hybrid). Median time from initial aortic repair to rupture was 60 months (interquartile range 57-72). Eleven patients had known endoleaks, 5 had undergone previous procedures to attempt to seal these.

One patient did not undergo surgery due to frailty. Of the remaining 17 patients, 5 received open repair (4 EVAR explants, 1 interposition graft to existing thoracic stentgraft), 11 had further endovascular procedures (2 proximal cuff and iliac extensions, 3 iliac limb extensions, 2 TEVAR extensions, 2 relinings, 1 aortouniliac stentgraft with femorofemoral crossover, 1 endosealing Nellix graft with renal chimney stents) and 1 underwent visceral hybrid repair. Aortic repair was complicated by myocardial infarction (N=2), respiratory failure (N=7), renal failure requiring haemofiltration (N=2). One patient had a type IB endoleak on completion angiography and 2 patients developed late type IA endoleaks; all were sealed with stentgraft extensions. There were no intraoperative deaths and 30-day, in-hospital and 3-month mortalities were 12%, 24% and 33% respectively.

This study suggests that the majority of ruptures following endovascular aortic aneurysm stentgrafting occur many years after initial repair, in patients undergoing continued imaging surveillance and procedures for known endoleaks. Treatment of such patients at specialist vascular centres appears to be associated with acceptable mortality rates following complex aortic repair.

An International Comparison of Long-term Mortality after Ruptured Abdominal Aortic Aneurysm in England and Sweden

A Karthikesalingam¹ A Wanhainen² I Shpitser³ MM Thompson¹ MM Björck²
PJE Holt¹ A Vidal-Diez¹ K Mani²

¹St George's Vascular Institute, London

²Department of Surgical Sciences, Section of Vascular Surgery, Uppsala University Hospital, Uppsala, Sweden

³Department of Mathematical Sciences, University of Southampton

Concern has been raised regarding international discrepancies in perioperative mortality after repair of ruptured abdominal aortic aneurysm (AAA). The variation in in-hospital mortality is however difficult to interpret, due to international differences in discharge strategies. This study compared 90-day and 5-year mortality for patients with ruptured AAA in England and Sweden.

Patients undergoing rAAA repair were identified from English Hospital Episode Statistics and the Swedish Vascular registry (Swedvasc) between 2003-2012. 90-day and 5-year mortality were compared after age/gender matching. Within-country analyses examined the impact of co-morbidity, hospital teaching status or hospital annual caseload; adjusted with causal inference techniques.

12,467 patients underwent rAAA repair in England, of whom 83.16% were male with median (IQR) age 75 (10) years. 2,829 Swedish patients underwent rAAA repair, of whom 81.28% were male, with median (IQR) age 75 (11) years. 90-day (44.47% vs 33.40%, $p<0.001$) and 5-year mortality (freedom from mortality 38.6% vs 46.3%, $p<0.0001$) were worse in England. In England, lower mortality was seen in teaching hospitals with larger bed-capacity, higher annual caseloads, and greater utilisation of EVAR. In Sweden, lower mortality was associated with EVAR, high annual caseload, or surgery on weekdays compared to weekends.

Short- and long-term mortality after rAAA repair is higher in England than Sweden. In both countries, the lowest mortality was seen in centres performing greater numbers of AAA repairs/annum, with greater utilisation of EVAR. These common factors suggest strategies to improve the outcomes of patients with ruptured AAA.

Late rupture of abdominal aortic aneurysm after previous endovascular repair

L Iazollino G Antoniou S Neequaye J Brennan F Torella R Vallabhaneni
Liverpool Vascular and Endovascular Service, Royal Liverpool University Hospital

Our objective was to perform a systematic literature review of late rupture of abdominal aortic aneurysm (AAA) after endovascular aneurysm repair (EVAR) and conduct a pooled analysis of causes, treatment and outcomes.

We searched electronic information sources and bibliographic reference lists. A combination of free text search and controlled vocabulary search was applied. We performed a meta-analysis of all included observational studies for 30-day/in-hospital lower mortality using the random effects model.

Twenty-five studies (11 case series and 14 case reports) reporting a total number of 210 cases were included in qualitative synthesis. A total of 157 ruptures occurred after 17,769 EVAR procedures giving an occurrence of 0.88% (95% CI 0.75-1.03). The mean time to rupture was 37 months. Twenty-eight per cent (95% CI 21-38) of the patients had at least one previous secondary endovascular intervention following the initial EVAR, and 35 per cent (95% CI 29-43) were not compliant with surveillance. Type I and III endoleak were the predominant causes of rupture. Open surgical treatment was undertaken in 61% (95% CI 54-68) of the patients who underwent treatment. The pooled estimate for perioperative mortality was 32% (95% CI 24-41). A trend toward a lower mortality with endovascular treatment than open surgical management was found ($p=0.062$).

Graft-related endoleaks appear to be the predominant causes of late aneurysm rupture. Quality of and compliance with post-EVAR surveillance remain important with prompt remedial secondary intervention when appropriate. A large proportion of late ruptures are amenable to endovascular treatment.

EVAR Results in Increased Cardiovascular Risk

VJ Gokani MJ Bown RD Sayers
University of Leicester, Leicester

Abdominal aortic aneurysms (AAA) remain in the top 10 causes of mortality for older people in the Western world. First-line treatment is open or endovascular surgery, with endovascular aneurysm repair (EVAR) fast becoming the gold standard. Aortic stiffness, as measured by carotid-femoral pulse-wave velocity (cfPWV), is a strong prognosticator for cardiovascular risk: a 1m/s increase equates to a 15% increase in cardiovascular death. As AAA-repair has been shown to have no benefit on all-cause mortality, and repair involves insertion of a semi-rigid conduit into the circulation, we aimed to determine whether AAA-repair increases cardiovascular risk.

All patients attending assessment for AAA-repair in a single UK tertiary referral Vascular Unit were invited to take part in this observational cohort study. The Vicorder was employed to measure cfPWV at four peri-operative time-points. Pre-AAA repair; 1-, 6- and 52-week post-operative cfPWV measurements were taken. Statistical testing was performed using the ANOVA test.

This study reports the change in cfPWV in 100 patients undergoing AAA-repair. 95/100 patients underwent EVAR. 90/100 patients were male. The mean pre-operative cfPWV was 10.2 m/s. At 1- 6- and 52-weeks, the mean PWV was 10.0 (9.4-10.5), 11.4 (10.9-13.2), and 11.6 (10.9-13.0), respectively ($p<0.001$).

AAA-repair results in sustained functional stiffening of the aorta. Increasing aortic stiffness has deleterious effects on cardiovascular risks by increasing the likelihood of stroke and myocardial infarction in this already high-risk population.

Nellix Endovascular Aneurysm Sealing System Expands Endovascular Options with Excellent Short Term Results

H Lee N Al-Zuhir M Chowdhury A Winterbottom JR Boyle PD Hayes
Addenbrooke's Hospital, Cambridge

The Nellix™ Endovascular Aneurysm Sealing System (EVAS) utilizes polymer to seal the sac of the abdominal aortic aneurysm (AAA). This unique mechanism of aneurysm sac exclusion allows for an expanded range of morphology to be treated when compared to conventional devices. This study reports early results of using EVAS in a single tertiary vascular centre in the United Kingdom.

Data was collected prospectively for all elective infra-renal aortic aneurysms treated using EVAS. Aneurysm morphology was measured to determine whether anatomical parameters were within the instructions for use (IFU) for both EVAS and conventional Endovascular Aneurysm Repair (EVAR) stent grafts. Complications, Endoleaks and secondary interventions were recorded.

One hundred and four patients had an infra-renal non-ruptured AAAs and were operated on using EVAS between February 2013 and April 2015. The 30 day mortality rate was 1.7% (two patients, not aneurysm-related). Eight patients had stent stenosis/occlusion. Eleven patients had endoleak of which five had resolved and six are still awaiting follow-up. The re-intervention rate was 5% within 30-days post-operatively, and 8% within 6-12 months follow-up. The aneurysm neck length was <15mm in 26%, 17% had a neck angulation of >75° and 41% had a neck flare of >20%. The median number of branches to potentially give rise to a type II endoleak was 3 (Range 1-6). Out of patients treated, 30% were out of IFU for EVAS, and 63% for conventional EVARs.

In this anatomically and physiologically challenging cohort of patients, NELLIX EVAS has good short-term results with comparable mortality to other EVAR stent-grafts. It offers versatility in treating complex aortic aneurysms, especially those with unfavourable necks. Longer term follow-up is required to further evaluate outcomes and re-intervention rates.

Endovascular Aneurysm Repair (EVAR) Surveillance – What Do Patients Think?

V Hansrani A Abbas N Tyson CN McCollum
*Academic Surgery Unit, Institute of Cardiovascular Sciences,
University of Manchester*

Background: Endovascular aneurysm repair (EVAR) requires life-long surveillance using either CT angiography (CTa) or duplex ultrasound. The aim of this study was to provide insight into patients' views regarding the type of surveillance modality preferred, and what can influence their decision.

Methods: A six point questionnaire was completed by patients attending the EVAR surveillance clinic at three UK hospitals. All patients were asked to record whether they were aware that EVAR surveillance is life-long, and involves complications such as cumulative radiation and contrast nephropathy. Patients were also asked which surveillance modality they preferred and why. Patient responses and preferences were compared between the groups.

Results: A total of 200 of the 211 questionnaires were completed. Of this, 127 of 200 (63.5%) of patients knew that EVAR surveillance was life-long. Only 63 of 200 (31.5%) were aware that CTa involves radiation, compared with 96 of 200 (48%) reporting they did not know, and 41 of 200 (20.5%) reporting that they 'never considered this'. Only 33 of 200 (16.5%) patients were aware that CTa involves contrast which may harm their kidneys. In total, 23 of 200 (11.5%) patients chose CTa as their preferred form of EVAR surveillance, compared with 106 of 200 (53%) of patients who preferred surveillance by duplex ultrasound, with the most common reason it being more comfortable (31%).

Conclusion: Patients undergoing surveillance after elective EVAR prefer to undergo duplex ultrasound rather than CTa because it is quicker, more comfortable, and can provide information instantly.

Effect of endovascular sealing (EVAS) on aortic thrombus volume

F Torella¹ T Chan¹ U Shaikh¹ RG McWilliams¹ A England² O Oshin¹
RK Fisher¹

¹Liverpool Vascular & Endovascular Service

²University of Salford

EVAS is a new technique to treat abdominal aortic aneurysms. The effect of EVAS on the native aortic anatomy is poorly understood. The aim of this study was to investigate the effects of EVAS on aortic volumes, with particular reference to intra-luminal thrombus.

We reviewed pre- and post-operative images of consecutive patients who underwent EVAS to document changes in intra-luminal thrombus volume. Volume measurement methods were standardised and validated to guarantee accuracy.

Twenty-five patients, 17 men, with a mean (SD) age of 78 (7.1) years were studied. All procedures were performed successfully, without endoleaks or peri-operative deaths. Median (IQR) pre-operative aneurysm volume was 147 (137-175) and median (IQR) pre-operative thrombus volume was 71 (53-79) ml. Aneurysm volume was greater on post-operative scans, by a mean (95%CI) of 17 (10-23.7) ml ($P < .001$). Post-operatively, the aortic volume occupied by thrombus had decreased by a mean (95%CI) of 11 (4.7-18.2) ml ($P < .001$). There was a strong correlation between changes in thrombus volume and the time elapsed between the planning CT and EVAS ($r = .567$; $P = .003$).

There are significant changes in thrombus volumes post-EVAS. These changes may be a direct consequence of endobag inflation and have implications for the planning and performance of EVAS. Further research is necessary to ascertain the clinical relevance of these findings.

Does Repositioning of AAA Endoprosthesis cause Renal Failure?

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We aimed to determine whether repositioning of the GORE® EXCLUDER® AAA Endoprosthesis featuring C3 Delivery System in subjects with challenging aortic neck anatomy undergoing EVAR is associated with post-operative renal impairment.

The Global Registry for Endovascular Aortic Treatment was interrogated. In this study challenging neck anatomy was defined as aortic neck length <15mm and/or aortic neck angle >60 degrees.

Sixty-eight patients were identified. The median neck length was 15mm (range 0.2-5.0cm), with median neck angulation of 65 degrees (range 5-100 degrees). 10 patients had pre-operative renal insufficiency and 1 was dialysis dependent. 94.1% of cases were carried out under general anaesthesia. Repositioning occurred in 41 cases (60.3%), to allow positioning closer to the renal arteries in 80.5%. The median number of repositioning procedures required was 1 (range 1-4). The median volume of contrast used was 200ml (range 55-910ml) and the median procedure duration was 126 minutes (range 60-667 minutes). Two patients sustained acute kidney injury, the first on day 0 and the second on day 7 post-operatively. Neither had any repositioning reported. The former recovered to their baseline renal function. The latter succumbed to hospital acquired pneumonia within 30 days. One patient sustained perforation of the right kidney with a guidewire. 30-day survival was 98.5% and no endoleaks were identified at 30-days. Median hospital stay was 6 days (range 1-39 days). Repositionable devices ensure optimal positioning of the proximal landing zone during EVAR. Re-positioning does not appear to cause post-operative renal impairment.

Re-intervention rates following EVAR for ruptured AAA are higher than after elective repair

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Endovascular aortic aneurysm repair (EVAR) has an increasing role in the treatment of ruptured abdominal aortic aneurysms (rAAA). Some recent trials have raised concerns about the long-term durability of EVAR and the need for re-interventions. The aim of this study was to examine re-intervention rates after EVAR for ruptured AAA and factors contributing to re-intervention.

Retrospective analysis of a prospectively collected database identified 87 CT-confirmed infrarenal rAAA treated with EVAR between 2006-2014. Data collected included demographics, and aneurysm morphology. Analysis was performed using SPSS. Binomial logistic regression was used to assess association with re-intervention.

Twenty-nine (30%) patients (mean age 76.9±8.5 years, 83% male) had a total of 44 re-interventions (open and endovascular), giving an incidence rate of 16.7 per 100 person-years. This is significantly higher than the re-intervention rate reported from EVAR1 ($p<0.001$). Median follow-up was 1633 days, and overall mortality was 49%. The peak times for re-intervention were within the first 30 days (9 patients) and between 12 and 24 months (7 patients). The all-cause 30-day mortality rate was 16.9%. The analysis did not find aneurysm morphology or demographic factors to be predictive of re-intervention, but suggested a significant association between re-intervention and time elapsed since EVAR ($p = 0.015$). The commonest reasons for re-intervention were endoleak (9 patients) or an intra-abdominal event (9 patients).

Re-intervention rate following EVAR for rAAA are higher than after elective repair. This underlines the need for intense surveillance of this group. Further study is required to identify factors that predict re-intervention.

Comparison of CT and Duplex Ultrasound for the detection of early endoleak after Endovascular Sealing (EVAS) for Infrarenal AAA with the Nellix Device

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Endovascular sealing of abdominal aortic aneurysms (EVAS) with the Nellix device is a novel treatment modality, with new challenges in the detection, classification and treatment of endoleaks. This study assessed the accuracy of endoleak detection with either duplex ultrasound or CT angiography.

Patients undergoing EVAS for non-ruptured infrarenal AAA were subject to an investigational surveillance programme comprising un-blinded CT and Duplex scans. The primary outcome measures were "suspected type 1a or 1b endoleak", defined by the initial scan report; and "confirmed type 1a and 1b endoleak", defined by consensus re-interpretation of all available imaging with clinical correlation.

116 patients underwent EVAS between March 2013 and December 2014, with median 13 months follow-up (IQR 8-19). 526 duplex scans were performed (mean 4.5 SD +/- 1.8 per patient) and 282 CT scans (mean 2.5 (SD +/- 0.9) per patient).

114 duplex/CT scan-pairs were analysed. 24 "suspected endoleaks" were identified for further scrutiny; 5/24 (20.8%) by both CT and duplex, 15/24 (62.5%) by CT alone and 4/24 (16.7%) by duplex alone. After secondary review with clinical correlation and panel discussion, 6/116 (5.2%) endoleaks were deemed clinically relevant and required re-intervention (5 1a and 1 1b). 4/6 (66.6%) clinically-relevant endoleaks were detected by duplex ultrasound; 6/6 (100%) by CT. All re-intervention was technically successful. Postoperative surveillance of the Nellix EVAS system remains an area of emerging evidence. CT and duplex ultrasound should continue to be used in combination until mid-term data are available to describe the surveillance performance of both modalities for EVAS technology.

A vascular network's experience of the novel GORE® TIGRIS® stent in the treatment of atherosclerotic popliteal arterial disease.

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Different popliteal artery stents have been deployed to treat complex atherosclerotic disease with non-conclusive results. The objective was to evaluate the outcome of the novel GORE® TIGRIS® stent in the endovascular treatment of non-aneurysmal atheromatous lesions.

The data was collected retrospectively from computerised records. The study period extended from October 2013 (first stent) to March 2015. Data was analysed for disease distribution, patency, complications and mortality outcomes.

Forty one patients (M:F = 3:1) were treated. After the intervention, dual antiplatelet agents (69%) or previous anticoagulants (24%) were commenced. Thirty patients (73%) required 2 PA TIGRIS® stents and 11 patients (27%) needed 1 stent. In one case a TIGRIS® was deployed in the tibio-peroneal trunk (TPT). Concurrent SFA Everflex® stents were needed in 20 cases (49%). Crural or TPT angioplasty was required in 15 cases (37%). Completion angiography confirmed either single vessel run-off (34%), 2 vessel run-off (46%), 3 vessel run-off (15%) or no crural vessel flow (5%). Mean follow up was 148 days. Restenosis occurred in 1 TIGRIS® stent after 34 days. One TIGRIS® occluded after 385 days and another after 227 days. One SFA stent occluded. Two patients did not benefit despite a patent channel. One patient could not tolerate the procedure. One patient suffered from mal-deployment of an Angioseal®. One patient died within 30 days.

The TIGRIS® stent is a relatively novel device which may be a suitable device for treating significant PA disease.

Thrombolysis of Ilio-Femoral Deep Vein Thromboses: Early Results of a Locally Developed Protocol

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NICE recently recommended catheter directed thrombolysis (CDT) for treatment of ilio-femoral deep vein thrombosis (IFDVT) rather than oral anticoagulation alone. We developed a local protocol to capture and treat patients with IFDVT.

Sequential patients with duplex confirmed IFDVT (Feb 2013 – Jan 2015) were included (before and after NICE guidelines). Inclusion criteria were age <65 years with leg swelling of <14 days. Exclusion criteria included intravenous drug use and confirmed or suspected malignancy. The protocol required initiation of therapeutic Clexane, placing of an IVC filter and antegrade popliteal vein tPA infusion. On venography at 24hrs, residual thrombus was cleared with Angiojet™ plus further thrombolysis, venous angioplasty or venous stent as required. Patients were discharged on Rivaroxaban, with follow up duplex at 6 weeks, 6 months and 1 year. IVC filters were removed after eight weeks.

Fifteen patients were treated for IFDVT. Three were treated prior to the protocol and discharged on Warfarin alone. Of these, two had recurrent thrombosis and one was lost to follow-up. Twelve patients were treated after the protocol was instigated and all were discharged with successful clearing of IFDVT. Ten patients had venous patency at 6 weeks. Two patients had re-occlusion (one had post-partum haemorrhage and one had been treated for femoral DVT not IFDVT). All patients had successful removal of IVC filter.

CDT of IFDVT is very successful in carefully selected patient groups. In order to achieve good results it is important to adhere to strict inclusion criteria.

Crural vessel angioplasty for critical ischaemia: 7 year results

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In the management of lower limb critical limb ischaemia, for comorbid patients, distal vessel angioplasty has emerged as an alternative to surgical bypass. Longterm outcomes particularly restenosis, occlusion, requirement for reintervention and prevention from major limb amputation remain a concern.

Patients undergoing elective or emergency distal angioplasty for limb salvage were included prospectively from December 2007 to April 2014. Demographic data along with procedural parameters and complications were recorded. All patients were followed up by duplex to detect restenosis. Reintervention and limb salvage rates were recorded.

A total of 170 patients (45 women) underwent 171 primary interventions for tissue loss or rest pain. Mean age $\pm$ standard deviation was 74.4 ± 11.6 years. Main comorbidities included hypertension (n=141, 82.9%) and diabetes mellitus (n=106, 62.3%). Median time to treatment was 4 days. Primary patency was achieved in 144/171 (82%), procedural complications were minimal (haematoma n = 7, dissection n = 2, retroperitoneal haematoma n = 1). Median follow up was 25 months. Target vessel restenosis/occlusion rate observed 26/144 (18%). 31/170 (18%) patients required major amputation; there were 20 minor amputations.

Infrapopliteal angioplasty is safe, effective primary treatment modality in the setting of critical limb ischaemia, associated with few periprocedural complications and good primary patency rates. Freedom from major limb amputation is acceptable.

Aorto-Iliac Stent Grafts for Severe Aorto-Iliac Occlusive Disease – Are They a Safe and Durable Alternative?

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The use of aorto-iliac stent grafting (AISG) is increasing for the treatment of severe atherosclerotic inflow disease. This study examines if AISG is as durable and safe as anatomical (AB) and extra-anatomical bypass (EAB).

A retrospective analysis was performed of 158 consecutive patients with TASC C & D lesions undergoing AB (n=83), EAB (n=46) or AISG (n=29) between May 2006 and December 2013 for critical limb ischaemia (n=70) and claudication (n=88). Endpoints were all-cause mortality, amputation-free survival and re-intervention rates. A micro-costing exercise was performed using 10 randomly selected patients from each intervention cohort.

Mean follow up for the entire cohort was 42 months (range 0-101 months) from date of intervention to date of censor. 30-day mortality for AB, EAB and AISG was 2.4%, 4.3% and 0% respectively and 12-month mortality was 7.3%, 4.3% and 3.4% respectively. Differences in survival between cohorts was not statistically significant. Overall comparison did not show a significant difference in amputation rates. However, patients undergoing EAB had a significantly higher amputation rate when compared with AB ($p>0.022$) alone. Both AB ($p>0.000$) and AISG ($p>0.01$) had significantly lower re-intervention rates than EAB. Average total treatment cost per patient for AB was £9,926, AISG £9,626 and EAB £15,464.

These data demonstrate that AISG is comparable to AB in terms of survival, amputation, re-intervention and costs. EAB is associated with inferior outcomes and should only be considered in exceptional circumstances.

Comparison of operative parameters during EVAS with standard infrarenal EVAR

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To compare intra-operative procedural differences between EVAS using Nellix® with standard EVAR.

80 patients treated with either EVAS using Nellix® (Endologix, N=40) or a standard EVAR device (N=40) were included in this study. All patients were treated over the same time period and by the same group of surgeons. Data collected included: number of endoleaks; operative time; screening time; fluoroscopic dose and volume of contrast media used.

All devices were deployed successfully with no endoleaks on completion angiography. The median operative time was significantly lower in the EVAS group compared with those having EVAR (median 2.2hrs EVAS vs. 2.55hrs EVAR, P=0.003). The median screening time was 10.1mins in the EVAS group compared with 25.2mins in the standard EVAR group (P=<0.001) and this was associated with a significantly lower fluoroscopic median skin dose (171mGy EVAS vs. 465mGy EVAR P=0.0003) and a significantly lower median total fluoroscopic dose (38592mGy/cm² EVAS vs. 89672mGy/cm² EVAR P=0.0002). The median contrast dose was also 80mls in EVAS and 140mls in EVAR P=0.0003).

Our initial experience of EVAS using Nellix® has demonstrated that this device can be deployed faster than standard EVAR using significantly smaller doses of radiation and requiring less volume of contrast agent.

EVAR with Internal Iliac Artery Embolisation

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Aorto-iliac aneurysms are commonly treated by endovascular means. In order to utilise standard graft technology the distal landing zone is extended into the external iliac artery (EIA) by internal iliac artery (IIA) embolisation. We aimed to determine whether altering pelvic haemodynamics has been associated with increased occurrence of type II endoleak following EVAR.

A retrospective review of a prospectively maintained database of all patients undergoing EVAR at our centre between April 2000 and January 2015 was carried out. Those patients who had IIA embolisation were identified and electronic records evaluated.

EVAR was carried out in 298 patients (263 male, 35 female, mean age 75 years). Of these, 59 patients (19.8%) underwent IIA embolisation. The mean AAA AP diameter was 65mm in both the IIA embolisation and the control groups (p=0.23). The number of type II endoleaks following embolisation was 22/59 (37%) compared to 31/239 (13%) in the control group (p<0.0001). In the embolisation group 4/22 (18%) type II endoleaks required intervention due to sac expansion whilst 11/31 (35%) required intervention in the control group (p=0.17). Type II endoleaks became apparent on follow-up surveillance between month 1 and month 24.

IIA embolisation appears to significantly increase the rate of type II endoleaks occurring between 1 and 24 months after index EVAR. However, it would appear that type II endoleaks after IIA embolisation are no more likely to require intervention than in a non-embolised group. Branched iliac devices avoid disturbing pelvic blood flow and may therefore reduce the occurrence of type II endoleaks.

Fenestrated endovascular repair for failing Infrarenal stent grafts

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We present our experience of fenestrated endovascular repair (FEVAR) after failed standard infra-renal endovascular aortic aneurysm repair (EVAR).

A prospective database was used to identify all FEVAR carried out between October 2012 and October 2014 to treat failed EVAR.

The mean time between EVAR and FEVAR was 4.6 (+/- 3.0) years. Indications for intervention in the eleven patients [(10 male), median age 78 (65-80)] were either (i) aneurysmal dilatation of supra-renal aorta (n=5) or (ii) sac expansion (n=6). 5 patients had a type Ia endoleak. The devices implanted were either a proximal fenestrated cuff (n=9) or a bifurcated fenestrated stent graft incorporating an inverted limb (n=2). 43 patent visceral arteries were targeted. Five coeliac fenestrations were left unstented because of difficulties with vessel catheterisation and stent tracking. Technical success was achieved in all patients with no type Ia endoleak post-operatively. There was no in hospital or 30 day mortality. There were two aortic re-interventions: (i) Amplatz plug to unstented coeliac fenestration (persistent sac enlargement) and (ii) embolization of type II endoleak. There was one late death, at 2 years, from sepsis secondary to aorto-enteric fistula.

FEVAR is an effective solution for failing EVAR and it is associated with low morbidity and mortality.

Multi-modality imaging of inflammation and calcification within the lower limb arterial tree: a PET/CT study

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Atherosclerosis is linked with both inflammatory and calcific processes occurring at the vessel wall. Novel imaging techniques (PET CT analysis) have been developed to assess such processes using 18F-sodium fluoride (18F-NaF – calcification) and 18F-fluorodeoxyglucose (18F-FDG – inflammation). Such imaging has been predominantly undertaken within the coronary and carotid circulation. This study is the first to prospectively validate PET CT analysis in peripheral arterial disease (PAD).

8 patients (16 legs; 5 men, median age 74.5 years) with intermittent claudication underwent PET CT analysis using the 18F-NaF and 18F-FDG tracers using standard protocols. For each scan, the lower limb arterial tree was examined from the aortic bifurcation to the ankle. The degree of arterial calcification (AC) was measured using the modified Agatston score. Atherosclerotic disease burden was analysed using Bollinger scoring method.

Overall whole limb median (IQR) TBR levels for 18F NaF was 1.30 (0.98-1.74) and for 18F FDG was 1.42 (1.11-1.75). The median limb AC score was 1954.5 (1198-2216). Significant correlations were seen between FDG uptake and both NaF uptake and AC and there was an inverse relationship between NaF tracer uptake and AC (all p<0.05). Increasing burden of atherosclerosis was associated with lower NaF uptake and a higher AC (p<0.05).

This study is the first to validate PET CT analysis in patients with PAD. It also starts to assess potential relationships between inflammation and calcification. Further studies are required to look at longer-term consequence of such findings with regard to atherosclerotic progression / development.

Midterm outcomes of salvage angioplasty on threatened distal bypass grafts

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Infra-popliteal bypass is an established and effective method for limb salvage in patients with critical limb ischaemia (CLI). Secondary interventions maybe required in order to maintain graft patency. The aim of this study was to look at the frequency and outcomes of such interventions.

Consecutive patients undergoing bypasses onto the infra-popliteal vessels for CLI (Rutherford 4-6) at a single institution were analysed between 2009-2013. The primary end points were graft patency, limb salvage and amputation-free survival at 12 months by Kaplan-Meier analysis.

A total of 122 infra-popliteal bypasses were performed in 108 patients. Distal anastomosis was on to the Anterior Tibial (n=37), Posterior Tibial (n=28), Peroneal (n=24), Tibio-Peroneal Trunk (n=24) or Dorsalis Pedis artery (n=9). Primary-patency, assisted primary-patency and secondary-patency was 67%, 73% and 81% respectively at 12 months and 58%, 68% and 78% respectively at 24months. Amputation free survival was 79% at 12 months and 73% at 24 months. There were 101 endovascular and 14 open secondary interventions performed on 61 (50%) threatened grafts. Endovascular interventions included angioplasty of inflow/proximal anastomosis (28%), outflow/distal anastomosis (39%), graft stenosis (17%) and thrombolysis (17%). Amputation-free survival was significantly better in salvaged threatened grafts compared to non-threatened grafts (Log rank test, P=0.043) and in grafts requiring re-intervention later (>6months from bypass) compared to those requiring early re-intervention (<6months, P=0.047).

Secondary interventions in threatened distal bypass grafts are successful at maintaining graft patency. Careful duplex surveillance of these complex bypasses and timely intervention is associated with improved amputation free survival.

Wearable Sensor Technology Efficacy in Peripheral Vascular Disease (wSTEP): A Randomised Clinical Trial

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Exercise is effective in improving walking distances and quality of life (QoL) in patients with intermittent claudication. The aim of this RCT was to determine whether the use of a wearable activity tracker (Nike FuelBand; NFB) was more effective than standard conservative therapy alone.

Thirty-seven claudicants were randomly allocated to either the NFB (n=20) or control group (n=17). Three patients withdrew from the study and seven (2 NFB, 8 control) were unable to attend follow-up. Claudication distance (CD), maximum walking distance (MWD), patient reported walking distance (PRWD) and QoL (VascuQol questionnaire) were measured at 0 (baseline) and 3-months.

Groups were well matched for age, sex, smoking status and supervised exercise programme enrolment (NFB 11% vs control 33.3%, p=0.19). At 3-months patients in the NFB group made significant improvements in median (IQR) CD(45 (25.3-61.5) vs 54 (40.8-87.5)) m, p=0.017, MWD(80 (50-118.5) vs 111.5(91.3-210.3) m, p=0.013) and PRWD(201.5 (100-295) vs 382.5(187.3-550) m, p<0.001). VascuQol score was also significantly improved: 4.7(3.8-5.3) vs 5.4(5.2-5.7), p<0.001. Patients in the control group did not demonstrate any significant differences in CD(28 (11-41) vs 26(24-49) m, p=0.26), MWD(53.5 (43-70) vs 69(50-91) m, p=0.107), PRWD(120 (55-220) vs 102.5(55-250) m, p=0.50) or VascuQol score (2.8(2.8-5.0) vs 3.2(2.4-5.2), p=0.64). At 3-months significantly higher improvements were seen in the NFB group, as compared to the control group, for VascuQol score(0.8 (0.4-1) vs 0.04 (-0.3-0.3), p=0.004) and PRWD(143.5 (51.3-309) vs 0 (0-5) m, p=0.015), but not for MWD(15.5 (-3-58.3) vs 20 (-5-48), p=0.78) or CD(11.5 (1-22.3) vs 8 (-5-10) m, p=0.32).

At 3-months the use of wearable activity tracker technology improved PRWD and QoL to a greater extent than standard conservative therapy and may be used to encourage exercise habits. NCT01822457 (<http://www.clinicaltrials.gov>)

Catheter Delivered Treatment (CDT) for Deep Vein Thrombosis. A Multi-Centre Study of Current Practice

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NICE guidance recommends consideration of CDT for proximal DVT, with the aim of preventing post-thrombotic syndrome. This study aimed to review practice in CDT for DVT across the North West of England

Retrospective case note review of all CDT for DVT between March 2012-April 2014. The following data was collected from four vascular units covering a population of 2.9 million: patient demographics, risk factors, site, interval from presentation to intervention, intervention, complications and follow up.

Of 2560 cases of DVT identified, only 15 cases underwent CDT (0.58%). Patients were mostly females (11F:4M) with median age 43 years (16-64). Twelve patients underwent catheter thrombolysis and 3 mechanical thrombectomy. Median treatment duration was 36 hours (range 1-96). IVC filter was deployed in 6 patients and venoplasty/stenting performed in six. Complete lysis was achieved in 13 patients. There were two bleeding complications; one minor, one major (managed conservatively). No patients had PE. Median inpatient stay was 7 days (range 5-23) and follow up range was 6-24 months.

CDT was safe and effective though the number treated was lower than would be expected and significant variation in practice was noted between units. Vigilance should be heightening amongst admitting physicians to ensure that patients who would benefit from CDT are referred acutely to their regional vascular unit.

Keeping an eye on the target: Direct or indirect revascularisation of the Angiosome?

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It has been postulated that direct revascularisation (DR) of tributary vessels supplying a foot ulcer may have superior outcome in terms of wound healing and amputation when compared to indirect revascularisation (IR). This study aims to clarify this hypothesis in diabetic patients with Rutherford 5/6 skin changes.

A six year retrospective single-centre analysis of diabetic patients with Rutherford 5/6 distal lower limb skin changes undergoing an associated angioplasty was undertaken. All interventions were performed using a standardised technique. Healing, amputation and mortality data was recorded over 36 months. A provisional analysis was performed of 60 patients, then formalised in 72.

72 patients were included. No differences were identified between DR and IR in groups for median time to healing (152.0 days and 144.0 days respectively) (p=NS), mortality (p=NS) or amputation.

This study adds to the few published studies which assess outcomes by targeted revascularisation in diabetic patients. The authors recommend maximising blood flow through both direct and indirect revascularisation.

Combined infra-popliteal angioplasty has no advantage over direct angiosomal revascularisation

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Meta-analysis has shown direct (the artery leading directly to the tissue loss) angiosomal reperfusion to be superior to indirect reperfusion. Some units perform combined (direct and indirect i.e. open up as many tibial vessels as possible) reperfusion of the tibial vessels. There was inadequate data published on combined tibial angioplasty to perform meta-analysis in 2014. Our unit performs combined infra-popliteal angioplasty routinely, where possible, so the aim was to assess any advantage over traditional direct or indirect tibial angioplasty and to examine the effect of diabetes on the angiosome model.

Analysis of consecutive infra-popliteal angioplasties over a 5-year period. Kaplan Meier survival curves were used to examine differences between groups; p-values were corrected. Combined angioplasty was performed routinely wherever possible.

Two hundred and sixteen tibial angioplasties were performed. 24.5% underwent combined revascularisation, 52.3% direct and 23.1% indirect. There was a significant improvement in amputation free survival (Hazard Ratio HR=1.652, p=0.019) in the direct and combined groups over indirect revascularisation. However, there was no improvement in wound healing (HR = 1.163, p=0.117.) The direct vs combined comparisons showed no difference for any outcome (wound healing HR=0.947, p=0.849 and amputation HR=0.971, p=0.906). All trends were lost in diabetic patients alone (n=149, 69% of group).

In this the largest series of combined angioplasty in the literature there was no advantage in opening up all the tibial vessels with angioplasty if the angiosome directly supplying the ischaemic tissue could be opened. The angiosome model does not appear valid, however, in diabetic patients.

Endovascular repair of asymptomatic thoraco-abdominal aortic aneurysms with fenestrated and branch devices: a single centre experience

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Endovascular repair (EVAR) of thoraco-abdominal aortic aneurysms (TAAA) is a challenging procedure in a high-risk patient population. We examined the early outcome of elective fenestrated and branch EVAR (FEVAR/BEVAR) for TAAA.

Between June 2007 and April 2015, 140 patients underwent elective FEVAR/BEVAR for TAAA [median diameter 70 (range 53-110) mm]. Aneurysms were classified according to anatomical extent (57 anatomical extent I-III, 67 extent IV, 16 juxtarenal with supracoeliac coverage) and extent of endovascular repair [93 extent I-III aortic coverage, 47 extent IV coverage (defined as up to 35mm above the coeliac)]. 40 (29%) patients had undergone prior aortic reconstruction.

Of 532 branch vessels (mean 3.8/patient) targeted for preservation, 494 (mean 3.5/patient) were stent-grafted and 4 (3 renal, 1 coeliac) were lost intra-operatively without clinical consequences. The 30-day mortality was 0.7% (n=1). Seven (5%) patients required early re-operation and one (0.7%) commenced unplanned permanent renal dialysis. Five (3.5%) patients developed spinal cord ischaemia (SCI) [5/93 (5.4%) extent I-III aortic coverage vs. 0/47 extent IV coverage]. The incidence of SCI improved with the introduction of a spinal cord protection protocol (SCPP) for extent I-III aortic coverage [4/22 (18%) pre-SCPP vs. 1/71 (1.4%) with SCPP].

These data demonstrate that elective endovascular TAAA repair can be performed with high technical success and a low risk of adverse outcome in a high-volume multidisciplinary complex aortic unit.

Post-Operative Cognitive Decline following endovascular aortic aneurysm surgery: A prospective clinical pilot study

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Post-operative cognitive decline (POCD) following open aneurysm repair has been reported to be as high as 50% at 3 months. POCD following endovascular aortic aneurysm repair is far less well studied. The objective of this prospective pilot study was to examine incidence of POCD following endovascular aneurysm repair.

30 patients undergoing elective endovascular aortic aneurysm repair were prospectively recruited. Patients underwent a battery of cognitive tests preoperatively and 3 months postoperatively.

No patients suffered from post-operative delirium. All completed post-operative testing at a mean period of 109 days (range 89-164). 11/30 patients demonstrated significant decline (>20%) in at least one cognitive domain. 6/30 patients had significant decline in two cognitive domains. Trail B test and visuospatial function were the most common areas affected, both linked to frontal and parietal lobe function. Only one patient had a stroke, but did not demonstrate POCD three months. All 6 patients with decline in 2 domains were >64 years old (range 64-83).

POCD remains a poorly explained but devastating consequence of surgery. Patients remain at risk of cognitive decline even after endovascular surgery. Endovascular surgery has been linked to cerebral microembolisation via the middle cerebral artery and new ischaemic brain lesions linked to POCD. The most common tests affected in this study are linked to the frontal and parietal lobes, supplied by the middle cerebral artery. This suggests alternative mechanisms such as microembolisation could play an important role in POCD following EVAR.

Early outcomes of patients transferred with ruptured suprarenal aneurysm or dissection undergoing endovascular aortic repair

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This study investigates outcomes in patients with ruptured suprarenal aneurysm or dissection (rSRAD) transferred to a specialist centre undergoing endovascular aortic repair and estimates the incidence of rSRAD in England and Wales.

Retrospective observational study over a 5-year period (2009-2014). Data extracted from national databases on hospital admissions and procedures for rSRAD (2004-2013).

Fifty-two patients (median age=73 years, 32 male) with rSRAD were transferred, and a further 4 died during transit. The mean distance of patient transfer was 35 miles (range 4-211). One patient did not undergo intervention due to frailty and two died before reaching the operating theatre. Twenty-three patients underwent endovascular repair and a further 9 hybrid endovascular repair (2 arch, 7 visceral). Median follow-up was 13 months (range 4-21). Complications included paraplegia(N=3), stroke(N=1), type IA endoleak(N=4). Thirty-day and in-hospital mortality were 16% and 25%. For patients who were discharged alive from hospital, 1-year survival was 83%. From 2004 to 2013, hospital admissions for ruptured thoracic and thoracoabdominal aneurysm rose from 0.53 to 0.60, emergency admissions for aortic dissection rose from 1.10 to 1.68. Since 2006, emergency endovascular procedures for SRAD have quadrupled, from 0.06 to 0.21. All figures per 100,000 population.

Although the number of patients with rSRAD is low and those who are transferred alive are a self-selecting group, this study suggests that transfer of such patients to a specialist vascular centre is associated with acceptable mortality rates following emergency complex endovascular aortic repair.

Percutaneous EVAR: Is it effective?

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Abdominal aortic aneurysm (AAA) is a vascular condition with significant morbidity and mortality especially in case of rupture. Endovascular approach significantly reduces morbidity related to AAA repair. Percutaneous Endo Vascular Repair (PEVAR) technique promises to reduce this morbidity further. We present our experience of PEVAR and describe the efficacy and safety of the procedure.

A retrospective analysis was done for all PEVARs performed in our institute from July 2012 to April 2015.

118 endovascular aneurysm repairs were done in this time. Percutaneous access with pre-deployment of suture mediated closure devices was established in 42 groins to treat 24 patients. Sheath size varied from 9 Fr to 24 Fr. Median age of the patients was 82 years (67-87years) and 83% had significant co-morbidities (ASA grade 3 or above). Inpatient stay was less than 48 hours in 92% (range 1-30 days). 3 groins required surgical intervention due to suture failure and all presented at the time of closure. There were no wound complications.

PEVAR when performed by skilled operators in selective patients is a safe and effective technique with potential to reduce surgical morbidity. There is a sharp learning curve and therefore appropriate training and careful patient selection are required to ensure successful, sustainable outcomes. With further development of devices and skills, PEVAR can make day case aneurysm repair a possibility.

Early outcomes after Left Subclavian Artery revascularisation in association with Thoracic Endovascular Aortic Repair

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Approximately 40-50% of patients undergoing Thoracic Endovascular Aortic Repair (TEVAR) require left subclavian artery (LSA) coverage to achieve adequate proximal landing zone. LSA coverage has been associated with increased risk of strokes, spinal cord and left arm ischaemia. Despite this, routine prophylactic LSA revascularisation remains controversial. Better understanding of outcomes following LSA revascularisation is needed in order to balance associated risks against potential benefits. 70 LSA revascularisation procedures, performed at a tertiary hospital between 2004-2015, were retrospectively reviewed. Perioperative and 30-day outcomes data were analysed in patients undergoing staged and simultaneous LSA revascularisation with TEVAR. Outcomes data were censored at point of TEVAR for those who underwent staged procedures to identify revascularisation-related outcomes.

46 (66%) carotid-subclavian bypass, 17 (24%) carotid-carotid-subclavian bypass and 7 (10%) aorto-innominate-carotid-subclavian bypass procedures were performed. Median age was 69 years and majority of patients were male (67%). 41 (59%) of the revascularisation procedures were staged prior to TEVAR with a median staging interval of 46.5 days. There were no strokes or mortalities following LSA revascularisation procedures alone. Three (7%) minor complications occurred including a seroma, a haematoma and temporary hoarseness. There were four mortalities (10%), one stroke (2%), one paraplegia (2%) and three haematomas (7%) among patients who underwent simultaneous procedures.

Separation of complications following LSA revascularisation, from those resulting from the associated TEVAR procedure, can be fraught with difficulty. Early outcomes data from 41 patients who underwent LSA revascularisation in isolation indicate that the procedure is safe with low complication rates.

Endovascular repair for the ascending aorta

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Ascending aortic pathology traditionally mandates open surgery, but there is an increasing interest in the endovascular approach. We present our experience of stenting the ascending aorta.

Five patients (all female, mean age 68 yrs) underwent ascending thoracic aortic stenting at our institution between January 2011 and June 2014. All patients were considered unfit for open cardiothoracic surgery. The underlying pathology was type A dissections in 2 patients and pseudoaneurysms, post previous aortic intervention, in 3 patients. One of these was a pseudoaneurysm in a young Marfan's patient with multiple previous cardiac procedures. Two patients underwent isolated stenting of the ascending aorta, 2 required carotid-carotid bypass in addition and one required stenting in conjunction with chimneys to the innominate and the left common carotid artery. All patients were followed up with clinical review and CT scans. Mean follow up was 12 months.

Completion angiograms in all 5 cases revealed technical success with no endoleaks visualised. There were 2 complications (1 stroke, 1 paraplegia) and 2 reinterventions (a late gutter endoleak that required carotid-subclavian bypass, tie off of the right subclavian, extension of the innominate stent to the common carotid artery and a carotid thrombo-embolism for a perioperative stroke). Two patients died during follow up from unrelated causes.

Stenting for ascending aortic pathology is a viable option and should be considered in highly selected patients who are thought to be unfit for open surgery.

Urgent and emergency endovascular repair of juxtarenal and thoraco-abdominal aortic aneurysms with surgeon-modified and commercially-available fenestrated and branch devices

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Complex aortic aneurysm repair in the acute setting is a major challenge. We examined the outcome of urgent and emergency fenestrated/branch endovascular repair (FEVAR/BEVAR) for juxtarenal (JRAAA) and thoracoabdominal aortic aneurysms (TAAA).

Between October 2009 and April 2015, 39 patients underwent urgent/emergency FEVAR/BEVAR (31 non-ruptured, 8 ruptured). Aneurysms were classified according to anatomical extent (16 anatomical extent I-III, 21 extent IV, 2 JRAAA) and extent of endovascular repair for 37 TAAA [29 extent I-III aortic coverage, 8 extent IV coverage (defined as up to 35mm above the coeliac)]. Patients were treated with surgeon-modified FEVAR (SM-FEVAR; n=24), commercially-available FEVAR (n=3) and BEVAR (n=12). Chimney (n=5) and bypass grafts (n=2) were also used in 5 of the first 12 SM-FEVARs. Sixteen (41%) patients had prior aortic reconstruction. 13 had mycotic aneurysms.

Of 125 branch vessels (mean 3.2/patient) targeted for preservation, 119 (mean 3.1/patient) were stent-grafted and 1 renal was lost intra-operatively. Two patients required re-intervention for target vessel complications within 30 days. The overall 30-day mortality was 26% (n=10; 6/31 non-ruptured; 4/8 ruptured); 23% (3/13) for mycotic aneurysms; and 29% (4/20 non-ruptures, 3/4 ruptures) for SM-FEVAR. No patients survived with spinal cord ischaemia or requiring permanent renal dialysis.

Urgent/emergency FEVAR/BEVAR for complex aneurysms is associated with acceptable outcomes compared with open repair. The early results of SM-FEVAR in patients with acute non-ruptured TAAA justify its continued use until an acceptable alternative is available.

Occupational Radiation Exposure During FEVAR: A Stage-By-Stage Analysis

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FEVAR is a complex endovascular procedure requiring long operating and screening times, which potentially translate to significant occupational radiation exposure.

Radiation exposure data was collected prospectively during 18 consecutive FEVAR cases over a 14-month period at a tertiary referral centre. Digital over-lead dosimeters measured operator exposure (OE) during pre-defined procedural stages. Patient exposure (PE) for the entire procedure was also measured. Dose area product (DAP), cannulation technique (robotic/manual), operator positioning, c-arm angulation, procedure and fluoroscopy times were noted. Non-parametric tests were used for comparisons.

Median OE per case was 0.42mSv [IQR(0.24-0.69)] compared with 1.87mSv (1.16-3.04) for PE. OE readings per stage were: stent alignment [0.03(0.03-0.27)], renal cannulation [0.03(0.03-0.03)], visceral cannulation [0.07(0.03-0.21)], completion [0.12(0.04-0.27)]. OE during visceral cannulation was significantly higher compared to renal cannulation ($p=0.0003$). Median DAP was 866.3Gycm² [IQR(569.6-1449.8)]. OE for robotic renal cannulation was minimal (<0.03 mSv) with no associated increase in procedure/fluoroscopy time despite the robot being used for the more anatomically challenging configurations. Dosimeter readings were significantly affected by operator positioning, with the highest doses observed in the cephalad position [0.08(0.03-0.27)] during visceral vessel manipulation via the axillary/brachial approach.

Operator and patient radiation exposure for FEVAR is considerable and higher than reported figures for conventional EVAR. With increasing caseloads and anatomical complexity, a significant cumulative OE is likely. Radiation awareness and staff education is therefore essential. Alternative approaches such as remote robotic navigation for high-risk stages should be explored.

Transcranial Doppler detection of micro-embolic signals during endovascular aortic aneurysm repair

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Thoracic endografting has been linked to high incidence of cerebral microembolisation (MES). However the incidence of MES during endovascular repair of abdominal aortic aneurysm has not been reported. The aim of this study was to quantify incidence of MES during different endovascular techniques.

65 patients underwent transcranial Doppler monitoring of the left middle cerebral artery (19 bifurcated stents, 8 fenestrated grafts, 19 EVAS stents, 5 thoracic grafts, 14 Chimney grafts). Monitoring was recorded, and frequency of MES correlated to procedure type and stage. Data on anti-platelet and statin therapy was collected.

TEVAR had the highest mean number of MES (36, range 0-84) followed by chimney repairs (mean 13, range 0-53), fenestrated grafts (mean 9, range 0-44), bifurcated grafts (mean 6, range 0-21) and EVAS stents (mean 2, range 0-15). During TEVAR, MES were most frequent during arch wiring and graft positioning. During chimney procedures, MES were most frequent during cannulation of the upper limb, visceral arteries and during removal of the sheath from the brachial artery. Overall, anti-platelet and statin agents had no effect on MES counts. However when examined by procedure, significant association was found between Clopidogrel and reduction in MES volume during chimney procedures. There was no association with carotid stenosis.

This study demonstrates that any endovascular procedure involving arch wiring can cause cerebral embolisation. TCD monitoring is able to identify procedures and procedural aspects most associated with MES. Clopidogrel's beneficial effect on MES volume during chimney procedures may suggest a cause of emboli other than arch atheroma.

Aortic Prize Abstract Session

The Endovascular Sealing Device in Combination with Parallel Grafts to treat Juxta- and Suprarenal Aneurysms

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The chimney technique offers an alternative to fenestrated/branched endovascular solutions for juxtarenal and suprarenal aneurysms. Application of the chimney technique using the Nellix device may offer some advantages with respect to seal between the endograft and chimney grafts. This study aimed to investigate the feasibility and efficacy of the Nellix Endovascular Aneurysm Sealing (EVAS) system in conjunction with chimney grafts.

A prospective evaluation of patients treated for juxtarenal and suprarenal non-ruptured aortic aneurysms using the Nellix system and chimney grafts was undertaken in a single Vascular Unit in the United Kingdom.

Between February 2013 and April 2015 28 patients were treated with EVAS in a chimney graft configuration. Mean age was 74 years ($\pm$ 8 years) and mean aneurysm size 67 mm ($\pm$ 10 mm). Eight patients underwent suprarenal aneurysm repair including a chimney graft in the superior mesenteric artery. Five patients had a double chimney configuration; all the other patients were treated with a single chimney configuration. There was one 30-day or in-hospital mortality (3.6%) due to Multi-Organ Failure (MOF) after repair of a symptomatic aneurysm; three other patients died within one year, due to pancreatic cancer (diagnosed after surgery), pneumonia, and sepsis respectively. One patient experienced a transient ischemic attack (TIA), followed by a full recovery and two patients suffered from a minor stroke (7%). No patient required postoperative renal replacement therapy.

The chimney technique, in combination with endovascular aneurysm sealing, appears to offer an effective solution for juxtarenal and suprarenal aneurysms with adverse morphology in the short-term.

The role of 3D fusion computed tomography in the enhancement of the safety profile of FEVAR

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Three-dimensional (3D) fusion computed tomography (CT) is a new technology that may reduce radiation in FEVAR (fenestrated endovascular aneurysm repair). The aim of this study was to evaluate the radiation dose effect of introducing fusion imaging to an expert team.

Procedural details were gathered prospectively 18 consecutive patients receiving fusion-guided (Fusion Group) FEVAR and compared with 21 patients treated in the 12 months prior to the implementation of routine fusion imaging (Standard Group). Procedure time (PT), radiation dose, dose-area product (DAP), fluoroscopy time (FT), estimated blood loss (EBL) and pre- and post-operative estimated glomerular filtration rate (eGFR) were compared between groups.

The Fusion group (n=18) received three 2 vessel-, ten 3 vessel-, four 4 vessel-, and one single vessel- fenestrated graft(s). The Standard group (n=21) received five 4 vessel-, eleven 3 vessel-, four 2 vessel-, and one single-vessel graft(s). There was a significant reduction in PT for the Fusion group (median 285 mins; interquartile range 265-323) compared with the Standard group (420 mins; IQR 330-310 p=<0.001). There were significant reductions in radiation skin dose for the Fusion group (1.65 Gy; 1.22-2.22) compared with the Standard group (4.39 Gy; 3.28-7.05 p=<0.001), and DAP; Fusion (173.64 Gy cm²; 138.33-232.77) vs (264.93 Gy cm²; 173.37-366.85) for Standard (p=0.001). EBL was reduced for Fusion (350 mls; 250-560) compared with Standard (1000 mls; 420-2300 p=0.01). There was no difference in FT.

Implementation of fusion imaging significantly reduces radiation dose and other performance measures, and improves the overall safety profile of FEVAR.

Endovascular Aneurysm Sealing for Infrarenal Abdominal Aortic Aneurysms: 30-Day Outcomes of 105 Patients in a Single Centre

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Endovascular aneurysm sealing (EVAS) is a potential alternative to endovascular aneurysm repair (EVAR) in patients with infrarenal abdominal aortic aneurysms (AAA). The early clinical experience, technical refinements, and learning curve of EVAS in the treatment of AAA at a single institution are presented.

105 patients were treated with EVAS between March 2013 and November 2014. Prospective data were recorded on consecutive patients receiving EVAS, including demographics aneurysm morphology, and 30-day outcomes, including rates of endoleak, limb occlusion, reintervention, and death. Postoperative imaging consisted of duplex ultrasound and computed tomographic angiography.

Mean age was 76±8 years and 12% were female. Adverse neck morphology was present in 72 (69%) patients, including aneurysm neck length <10 mm (20%), neck diameter >32 mm (18%), angulation >60° (21%), and conical aneurysm neck (51%). One death and four Type 1 endoleaks (4%) occurred within 30 days. All four proximal endoleaks were associated with technical issues that resulted in procedure refinement, and all were in patients with adverse proximal aortic necks. Following treatment with transcatheter embolization, the persistent Type 1 endoleak rate at 30 days was 0%. There were no Type 2 or Type 3 endoleaks. Angioplasty and adjunctive stenting were performed for postoperative limb stenosis in three patients (3%).

EVAS is associated with reasonable 30-day outcomes, with applicability to patients with challenging aortic morphology. Endoleak rates should reduce with procedural experience. The utility of EVAS will be defined by its durability in long-term follow-up, although the absence of Type 2 endoleaks is encouraging.

A 19-year experience of secondary interventions following EVAR

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EVAR is increasingly used as the primary mode of treatment for aneurysmal disease. However, this technique is associated with complications that mandate life-long follow up. We present a 19-year single-centre experience with EVAR, specifically examining the indications for re-intervention and the methods used.

A retrospective analysis was conducted of all EVAR cases performed at the Freeman Hospital from 1995-2014.

In a 19-year period 1100 standard EVARs were performed (947 abdominal; 161 thoracic). There were a total of 303 re-interventions in 212 patients (19%). Indications for re-intervention included: Endoleak (n=180;16%); sac expansion without endoleak (n=38; 14%); limb occlusion (n=40; 0.03%); disease progression (n=28; 0.03%) and rupture (n=10; 0.9%). There were 214 endovascular interventions (71%) for endoleak and disease progression. 89 open interventions were required (29%). Almost half of open interventions were for limb ischaemia or groin complications. Open conversion was required for the majority of ruptures (n=8/10) and continued sac expansion without endoleak (n=33). The mortality associated with open conversion was 10%.

This series represents one of the largest in the literature and has a re-intervention rate of 19%, in line with previous reports. Although re-intervention is common, most complications can be successfully treated with endovascular techniques. However, if open abdominal intervention is required, there is a high mortality and the authors therefore propose a 'stent conserving' approach to open intervention.

Repair of thoraco-abdominal and peri-renal aneurysms with the multi-layer flow-modulating stent: the UK pilot study

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The multi-layer flow modulating stent (MFMS) is a novel approach for the treatment of complex aortic aneurysms. We report outcomes in a UK pilot study of treatment of aortic arch, thoraco-abdominal (TAAA) and perirenal aneurysms (PAA).

With MHRA Devices Agency and ethical approval, patients who were unfit for open surgery and had no option for complex endovascular repair were recruited. Follow-up included CTA at one, three, six and 12 months, then annually for three years. Outcome measures included 30 day mortality, rupture, branch vessel patency, complications, re-intervention and maximal aortic diameter.

Fourteen patients (6 PAA, 6 TAAA, 2 arch) were treated between October 2011 and March 2014; mean follow up is 19.4 months. Seven patients (50%) have died including one fatal rupture. 30 day mortality was 7.14%. 12 month survival was 78.6%. In those alive at 12 months, four remained stable while aneurysm size had increased by >5mm in seven. To date, three of the seven surviving patients have remained stable on the most recent available imaging. 50 of 51 covered aortic branches remained patent with no embolic stroke or visceral ischaemia. Six re-interventions were performed in five patients (35%). There was one post re-intervention death.

The early MFMS devices have had little influence on the natural history of complex aortic aneurysms. Side branch patency was maintained but these MFMS frequently dislocated. Further development is needed if this novel technology is to have a role in treating aortic aneurysm.

Preoperative Morphological Factors of Thoracic Aortic Aneurysm Sac Enlargement after Endovascular Repair

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The effect of thoracic endovascular aortic repair (TEVR) on the aneurysm sac remains undefined. The aim of this study was to characterize the incidence of aneurysm sac expansion rate after TEVR and the effect of aortic morphology on sac behaviour.

A database of patients with pre and post-operative computed tomography angiogram (CTA) was provided by M2S, Inc. (2004 to 2013). All patients underwent TEVR for thoracic aortic aneurysms. Preoperative aortic anatomy including diameters, lengths and angulations were available for each patient. Post-TEVR sac expansion was defined as a >5mm increase between the preoperative and follow up CTA. The influence of pertinent aortic morphology on sac expansion was assessed using Kaplan-Meier analysis.

Of 899 patients undergoing TEVR, 46% had a maximum aneurysm diameter above the 55-mm threshold. The 5-year freedom from sac expansion was 61%. Several preoperative morphological factors were found to be associated with significant sac expansion after TEVR. The length of the proximal sealing zone <20mm (p=0.020), distal sealing zone <30mm (p= 0.008), proximal and distal neck diameters over 38mm (both, p<0.001), distal aortic arch angle <60° (p=0.049) and a maximal preoperative sac diameter >50mm (p=0.003) were more likely to be associated with sac expansion after 5 years.

This observational study demonstrated that post-TEVR aneurysm sac expansion is higher than expected, and this appears to be significantly influenced by several preoperative morphological factors. Meticulous preoperative patient selection and procedural planning is required to ensure favourable long-term results



Posters

Posters

POSTER 1

Systematic review and meta-analysis of the left Subclavian artery coverage in Thoracic Aorta Endovascular Exclusion (TEVAR)

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POSTER 2

Outcomes of standard and low profile limbs in infrarenal endovascular aneurysm repair (EVAR)

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POSTER 3

Outcomes of internal iliac artery [IIA] occlusion during endovascular abdominal aneurysm repair [EVAR]

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POSTER 4

The incidence and success of re-intervention following endovascular aneurysm repair

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POSTER 5

An analysis of factors impacting outcome in Thoracic Endovascular Aortic repair [TEVAR]

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POSTER 6

10 year experience of the endovascular repair of complex aortic aneurysms

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POSTER 7

Early and Mid-term Outcomes following repair of ruptured infra-renal aortic aneurysms in octogenarians treated at a single vascular hub

B Telgenkamp P Saha C Farinas R Bell T Donati M Modarai M Tyrrell
H Zayed M Sallam

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POSTER 8

Aortic Arch Morphology in Thoracic Aneurysm – An Observational Study

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POSTER 9

Combining the Nellix endovascular sealing system with the AFX stent graft and 2 chimneys to treat a difficult juxtarenal aneurysm

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POSTER 10

Transcatheter venous embolization for high-flow arteriovenous malformations with a dominant outflow vein

AM Conway K Qato J Drury A Rachakonda AM Borowski RJ Rosen

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POSTER 11

Early experience of an institutional algorithm for the management of intermediate-risk pulmonary embolism

AM Conway B Mina K Qato RJ Rosen G Giangola A Carroccio

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POSTER 12

How significant is pain during lower limb angioplasty?

R Rogoveanu MD Kay D Hanu-Cernat RK Vohra

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POSTER 13

Can infrapopliteal angioplasties delay the need for major amputation?

D Urriza Rodriguez B Lett G Collin N Collin P Mezes AR Weale

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POSTER 14

Outcome of vascular surgeons undertaking peripheral angioplasty

D Lowry M Kay A Tiwari

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POSTER 15

Single centre femoropopliteal drug eluting balloon angioplasty; 1-year data

E Lake R Ashleigh D Seriki S Butterfield

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POSTER 16

Reliability of Duplex ultrasound (DUS) in post EVAR surveillance – A two-centre study

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POSTER 17

Are patients undergoing EVAR fitter?

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POSTER 18

Is Prehabilitation feasible and necessary in complex patient groups?

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²*Imperial College London*

POSTER 19

Training in EVAR – Does simulation and directed learning improve performance?

JS Stephen D Harrison C Warwick D Martin A Hilley DR Lewis

NHS Lothian

POSTER 20

Is there a role for training on live animal models in the Endovascular era?

Experience of the first UK pilot live animal course

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Faculty

Faculty



Frank Arko, MD is currently Director, Endovascular Surgery and Co-director of the Aortic Institute at Carolinas Medical Center, Sanger Heart and Vascular Institute in Charlotte, NC. He received his B.S. from Texas A&M University graduating Summa Cum Laude and his M.D. with honors in 1994 from Texas A&M University. He completed his internship and his residency at Scott & White Hospital, Texas A&M University Health Science Center in 1999. Dr. Arko completed his Clinical Vascular Fellowship in 2000 and his Endovascular Fellowship in 2001 from Stanford University Hospital, CA. He completed a Post-Doctoral Research Fellowship

from Stanford University Hospital in 2001. Dr. Arko was an Assistant Professor, Director of Endovascular Surgery at Stanford University Medical Center from July 2001 to August 2004. Following this he was the Chief, Endovascular Surgery at University of Texas Southwestern in Dallas from 2004-2011. His work has resulted in more than 150 scientific articles, abstracts, books, book chapters and numerous presentations.

Dr. Arko's clinical expertise is in stent graft treatment of thoracic and abdominal aortic aneurysmal disease, stenting and endarterectomy in carotid arterial disease, renovascular hypertension, aortoiliac occlusive disease, mesenteric vascular and minimally invasive therapy in venous disease. His research interests include simulation-based medical planning for cardiovascular disease and aortic wall microarchitecture and cyclic strain as well as device development. He is involved with multiple clinical trials.



Paul Blair, Consultant Vascular Surgeon, Belfast Trust, graduated in Medicine from Queen's University Belfast in 1982. He was appointed Consultant Vascular Surgeon/Director of Trauma at the Royal Victoria Hospital, Belfast in 1995. He is currently President of The Vascular Society.



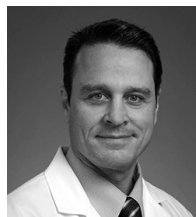
Jan Brunkwall has been Professor of Vascular and Endovascular Surgery at the University of Cologne since August 1999. He was Associate Professor of Surgery at Lund University from 1990-1999, and Associate Professor for the Department of Vascular Surgery in Malmo from 1984-1999. He was President of the ESVS from 1987-1988.



Michael Jacobs graduated from medical school at the Maastricht University in 1982. He then started as a clinical research fellow at the department of Physiology until 1984 under supervision of Prof Rob Reneman. Following, he served as a general surgery resident at the Department of Surgery of the Academic Hospital Maastricht (Chief: Prof Co Greep). In 1985 he defended his PhD-thesis entitled "Capillary microscopy and haemorheology in vasospastic and occlusive vascular diseases". In 1988 he left for a clinical cardiovascular fellowship at the Texas Heart Institute in Houston, Texas under the leadership of Dr Denton Cooley and Dr George Reul. In 1990 he returned to Maastricht and was appointed as a staff vascular surgeon at the Academic Hospital. In 1993 he was invited to chair the vascular surgical program at the Academic Medical Center in Amsterdam and he was appointed as Professor in 1995. In 2000 he accepted the chair of Surgery at the Academic Hospital Maastricht. In 2005 he was also invited to build a new academic department of Vascular Surgery at the University Hospital in Aachen, Germany and until now he combines both Professorships in both countries. His main interest is in aortic pathology and especially in the treatment of thoraco-abdominal aneurysms. He has organised the European Vascular Course for the past 15 years.



Rob Sayers trained in Birmingham, Leicester and Adelaide, and is currently Professor of Vascular Surgery at the University of Leicester. He runs an active research programme into clinical and basic science studies on aortic aneurysm disease. He will be President of The Vascular Society in 2016-17.



Benjamin W. Starnes, M.D., FACS, University of Washington Medicine Professor of Surgery and Chief, Vascular Surgery Division is an international expert in the management of aortic disease and vascular trauma. He was recruited to the University of Washington in 2007 after a 15 year career in the U. S. Army; he had operative experience in three combat tours. When he was a fellow at Walther Reed Army Medical Center, he led a team to the scene of the 9/11 attack on the Pentagon, and he was recognized for his service by former First Lady Laura Bush.

Dr. Starnes is actively involved in research, having published more than 80 articles, edited professional medical journals and authored numerous textbook chapters.



Jos C. van den Berg was born September 20, 1961. He graduated from the Medical School of the State University of Leiden, The Netherlands, in 1986. After finishing his residency in radiology in 1994 he started working as an interventional radiologist at the Department of Radiology in the St. Antonius Hospital, Nieuwegein, The Netherlands. Currently his main interest is in interventional and vascular radiology. He successfully defended his thesis entitled "Groin hernia: the role of diagnostic imaging" dealing with the role of Magnetic Resonance Imaging in the diagnosis of groin hernia in April 2001. Since July 2001 he was Head of the Department of Radiology of the St. Antonius Hospital. In July 2004 he started working as head of the Service of Interventional Radiology in the Ospedale Regionale di Lugano, Switzerland.

He is past-president of the Dutch Endovascular Forum. He is an active member of the Dutch Society of Radiology (Nederlandse Vereniging voor Radiologie), the ECR (European Congress of Radiology), CIRSE (Cardiovascular and Interventional Radiological Society of Europe) and the SSCVIR (Swiss Society of Cardiovascular and Interventional Radiology), and corresponding member of the SIR (Society of Interventional Radiology) and ESR (European Society of Radiology). Since January 2007 he is associate professor of vascular surgery at the University of Pisa, Italy. Since 2011 he is a lecturer at the Medical Faculty of the University of Bern, Switzerland, and since May 2015 he is an associate professor of radiology at the Medical Faculty of the University of Bern.



Mark Whiteley is a Consultant Vascular Surgeon specialising in walk-in, walk-out surgery for varicose veins. He trained at St. Bartholomew's Hospital in London and was a lecturer in surgery at Oxford University from 1995 to 1998. Mark was appointed Consultant Vascular Surgeon in 1998 and performed the first endovenous "keyhole" surgery for varicose veins in the UK in March 1999. He has subsequently moved on from VNUS to introducing EVLA, RFITT, Foam Sclerotherapy and other office based vein surgery techniques to The Whiteley Clinic.

He invented the TRLOP procedure – radiofrequency closure of perforating veins – with his colleague Judy Holdstock in 1999 and performed the first VNUS Closure FAST in the UK in March 2007.

In 2000, he realised that Pelvic Congestion Syndrome was linked in many women to Vaginal or Vulval varicose veins, as well as recurrent varicose veins, and he developed a treatment for these conditions with Dr Tony Lopez – called transjugular pelvic vein embolisation (www.vulval-varicose-veins.co.uk).

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