

Early outcomes of elective and non-elective open and endovascular repair of distal arch, descending thoracic and thoracoabdominal aorta disease

Maciej Juszczyk, David Quinn, Massimo Vezzosi, Hosaam Nasr, Ahmed Ashoub, Paul Clift, Jorge Mascaro, Martin Claridge, Donald Adam
Complex Aortic Team, University Hospitals Birmingham NHS Foundation Trust, Birmingham

Objectives

The proposed national service specification for thoracic aortic disease stipulates that designated supraregional aortic centres must offer elective and non-elective open (OR) and endovascular (EVAR) treatments for all aortic segments.

Methods

Interrogation of prospectively-maintained cardiothoracic and vascular surgical databases identified consecutive patients who underwent OR and EVAR for aortic disease involving the distal arch, descending thoracic (DTA) and thoracoabdominal aorta (TAA) in a single institution between January 2012 and December 2018.

Results

A total of 647 patients were treated (450 elective, 120 urgent, 77 emergency) for disease affecting the distal arch/DTA (n=287) or TAA (n=360; 212 extent I-III, 148 extent IV) by OR (n=172; 91 arch with frozen elephant trunk, 81 DTA/TAA), standard thoracic EVAR (n=116) or complex EVAR (n=359; 33 arch with DTA/TAA, 326 TAA alone). The 30-day mortality for elective repair was 4% (n=18): OR 10.7% (13/121), standard thoracic EVAR 1.9% (1/52), complex EVAR 1.4% (4/277). The 30-day mortality for non-elective repair was 15.7% (n=31): OR 7.8% (4/51), standard thoracic EVAR 17.2% (11/64), complex EVAR 19.5% (16/82).

Conclusions

In a high-volume aortic centre, a multi-disciplinary approach is associated with good early outcomes in patients presenting with distal arch, descending thoracic and thoracoabdominal aortic disease.

Short- and long-term outcomes of treatment strategies for isolated penetrating aortic ulcers (PAUs)

Safa Salim^{1,2}, Rossella Locci^{1,2}, Guy Martin^{1,2}, Rick Gibbs^{1,2}, Michael Jenkins^{1,2}, Mohamad Hamady^{1,2}, Celia Riga^{1,2}, Colin Bicknell^{1,2}

¹Department of Surgery and Cancer, Imperial College London, London ²Imperial Vascular Unit, Imperial College Healthcare NHS Trust, London

Background

The optimum management of isolated PAUs with no associated intramural haematoma (IMH) or aortic dissection (AD), is not clear. We evaluate the short- and long-term outcomes in isolated PAU patients to better inform management strategies.

Methods

Electronic records and CT imaging were retrospectively reviewed to identify 40 patients with isolated PAUs (excluding IMH/AD), managed in a surveillance programme or undergoing surgery (39%-arch ulcers; 45%-thoracic; 16%-abdominal). Conservative and surgical groups were analysed separately. Primary outcomes included mortality, PAU progression and interventional complications.

Results

Overall long-term mortality was 30% (mean follow up=3.86 years, range 0.10-11.02 years) with no significant difference between conservative and surgically managed groups ($p=0.53$). 68% ($n=27$) asymptomatic patients were initially managed conservatively; they had significantly smaller PAU depths compared to those undergoing initial surgical repair ($n=13$) and fewer PAUs were aneurysmal ($p<0.05$, Mann-Whitney U test). Three patients were converted from conservative to surgical management at a mean 4.2 years (range 1.6-8.7 years), primarily due to aneurysmal change. No aortic deaths were documented. For those undergoing intervention there were 15/16 endovascular and 6/16 urgent procedures. 2/15 endovascular cases involved supra-aortic debranching, 7/15 utilised scalloped/fenestrated/chimney stents. 1/16 died in-hospital following repair. 30-day reintervention rate was 5/16; all for type I /III endoleaks, predominantly during complicated arch repairs. 5/16 died during follow up (mean 4.5 years, range 0.19-8.39 years)—1/16 aortic related.

Conclusion

Isolated, asymptomatic, small PAUs may be safely managed conservatively with regular surveillance, rarely progressing. Those with high-risk features or progress with aneurysmal change require complex strategies for successful treatment.

A comparison of reinterventional options following endovascular aneurysm sealing for abdominal aortic aneurysm

Sarah Shaw¹, Jorg de Bruin¹, Robert Morgan², Ian Loftus¹, Peter Holt¹, Katherine Stenson¹

¹St George's Vascular Institute, St George's Hospital, London ²Department of Interventional Radiology, St George's Hospital, London

Background

Despite initial positive outcomes endovascular aneurysm sealing (EVAS) with the Nellix device has been associated with mid-term therapeutic failure. Reinterventions are complex, with no consensus on the optimal treatment of therapeutic failure.

Methods

A retrospective cohort study including all cases whereby reintervention was undertaken following EVAS at a single centre. Outcomes of reintervention were compared by indication and treatment modality undertaken.

Results

69 patients underwent 96 reinterventions, with the initial intervention at a median of 1.98 years. This represented 23.4% (69/295) of EVAS cases undertaken from 2013 onwards. Indications for re-intervention were variable, and often presented as a combination. When analysing for therapeutic failure (migration, sac expansion, type1a endoleak, type1b endoleak and rupture) treatment success was defined by resolution with no need for further intervention. Explantation had the highest success rate (12/13, 92%) followed by Nellix-in-Nellix application (16/24, 66%), proximal and/or distal graft extension (9/12, 64%) and embolization (9/27, 33%). Intervention for early signs of therapeutic failure i.e. migration alone was associated with increased treatment success.

Conclusions

Complications following EVAS are challenging to detect and difficult to treat, often associated with multiple reinterventions. Early signs of therapeutic failure were associated with improved treatment outcomes, advocating early intervention. Where patient morbidity allowed, explantation appeared to offer the most durable form of treatment, conversely embolization offered the lowest chances of resolution.

Predicting recovery from paraplegia after thoracoabdominal aneurysm repair

Jamie Kelly¹, Ashish Patel¹, Said Abisi², Rachel Bell², Mark Tyrrell², Morad Sallam², Marwah Salih¹, Chris Seet¹, Manuel Mayr¹, Elizabeth Bardbury¹, Jun Cho¹, Prakash Saha¹, Alberto Smith¹, Bijan Modarai¹

¹Kings College London, London ²St Thomas' Hospital, London

Introduction

Spinal cord ischaemia (SCI) is perhaps the most feared complication post-thoracoabdominal aortic aneurysm (TAAA) repair. We examined cellular and proteomic changes in cerebrospinal fluid (CSF) and related these to neurological outcome.

Methodology

Patients undergoing TAAA repair with CSF drainage were recruited. CSF was collected pre-operatively and 24-hourly until drain removal. Daily neurological examinations were performed. CSF cell/protein content was characterised by flow cytometry and tandem-mass-tag labelled proteomics respectively.

Results

CSF was analysed from 52 patients (*age: 70.27 +/-11.4 years; 66% male; Crawford Type I (10.8%) II (29.2%), III (26.2%), IV (30.8%), V (3.1%); open (n=9), total endovascular (n=43)*). 12 patients developed SCI; 5 remaining permanently-paraplegic. All permanently paraplegic patients had undergone endovascular repair. CSF from Permanent-paraplegics contained more CD45⁺ leucocytes ($P<0.0001$). Levels of aquaporin-4, an astrocyte osmoreceptor essential in maintaining blood/spinal cord barrier integrity, was >7-fold higher in permanently-paraplegic CSF versus recovered patients ($P=0.0008$). Patients with CSF aquaporin-4 >15ng/ml predicted permanent paraplegia with a specificity of 100%, and were more likely to have pathological spinal cord swelling on T2-weighted MRI ($P<0.05$).

Conclusion

The present study is the largest analysis of CSF post-TAAA repair in-man. Our results suggest that permanent paraplegia is associated with shedding of bound-AQP4 from parenchymal cord into CSF and a breakdown of blood/spinal-cord barrier. This breakdown allows the migration of oedema/leucocytes into the cord and may explain the pathogenesis of irreversible paraplegia after TAAA repair. The CSF signature we have described may prove useful in predicting prognosis after SCI and identifies AQP4 as a potential therapeutic target.

Carbon-dioxide versus saline flushing of thoracic aortic stents-grafts to reduce vascular brain infarcts: An observational study

Lydia Hanna^{1,2}, Gagandeep Grover¹, Anisha Perera², Muzaffer Chaudhery³, Ammar Abdullah^{1,2}, Abhinav Singh¹, Colin Bicknell², Bijan Modarai³, Mohammad Hamady^{1,4}, Richard Gibbs^{1,2}

¹Imperial Vascular Unit, Imperial College Healthcare NHS Trust, London ²Department of Surgery and Cancer, Imperial College, London ³Guy's and St Thomas's NHS Foundation Trust, London ⁴Department of Interventional Radiology, Imperial College, London

Background

Vascular brain infarcts (VBI) formerly known as 'silent' cerebral infarction detected on neuroimaging have been shown to occur in up to 70% following thoracic endovascular aortic repair (TEVAR). Inadequately de-aired delivery devices following standard saline flushing may contribute to cerebral embolization during TEVAR. Carbon-Dioxide (CO₂) is heavier than air and has been shown to effectively displace air from the surgical field in cardiac surgery.

Methods

A prospective observational study was conducted between 2015 and 2018 at two tertiary vascular units in London comparing the rate of VBI in patients undergoing TEVAR with standard saline versus CO₂ flushing. All patients suitable for TEVAR with no adjunctive revascularisation procedures for all aortic pathology were eligible. In the first half of the study period consecutive patients underwent TEVAR with standard saline flushing according to IFU (TEVAR-S group). In the second half of the study period consecutive patients underwent TEVAR with 100% CO₂ flushing at 2.8bar for 1-minute (TEVAR-CO₂ group). TEVAR-S patients were randomly selected and compared to the TEVAR-CO₂ group.

Results

Pre and post-operative diffusion-weighted MRI was performed in 57 patients undergoing TEVAR. Total VBI rate was 61% (35/57). In 25 TEVAR-S patients the VBI rate was 56% (14/25) versus 25% (4/16) in 16 TEVAR-CO₂ patients. Median number of lesions in TEVAR-S group was 1 (range 0-5) versus 0 (range 0-3) in TEVAR-CO₂ (p=0.044).

Conclusions

CO₂ flushing of TEVAR stent-grafts resulted in significant reduction in VBI following TEVAR. A multi-centre randomised controlled trial is currently underway to validate these findings.

Fenestrated and branch endovascular repair for juxtarenal and thoracoabdominal aortic aneurysms: A 12 year experience

Maciej Juszcak, Massimo Vezzosi, Martin Claridge, Donald Adam

Complex Aortic Team, University Hospitals Birmingham NHS Foundation Trust, Birmingham

Objectives

To report the medium-term outcome of elective fenestrated and branch endovascular repair (FEVAR-BEVAR) for juxtarenal (JRAAA) and thoracoabdominal aortic aneurysms (TAAA).

Methods

Interrogation of a prospectively-maintained database identified consecutive patients who underwent elective FEVAR-BEVAR for JRAAA and TAAA in a single institution between August 2006 and February 2019.

Results

A total of 518 patients [427 men; median age 74 years (IQR 69, 79), median aneurysm diameter 65 mm (IQR 60,75)] with JRAAA (n=244) and TAAA (n=274; 148 extent I-III, 126 extent IV) underwent FEVAR (n=418) or BEVAR (n=100) with a proximal supracoeliac (SC) sealing zone (zone 5 and above) in 361 (69.7%) patients and infracoeliac (IC) sealing zone (zone 6 and below) in 157. A total of 1932 vessels (mean 3.7/pt) were targeted for preservation. The 30-day mortality was 1.9% (n=10). Estimated 1- and 3-year survival for the entire cohort was 93% and 80%, respectively. There was no difference in 3-year survival for SC compared with IC sealing zones: 78% vs. 84% (p=0.84). Patients treated with proximal SC sealing zones and ≥ 4 target vessels (n=285) had better 3-year survival than those with ≤ 3 target vessels (n=76): 81.1% vs. 69.8% (p=0.019).

Conclusions

Elective FEVAR-BEVAR for JRAAA and TAAA is associated with low peri-operative mortality and good medium-term survival. In patients treated with SC sealing zones, a lower number of target vessels was associated with inferior medium-term survival. This group of patients may have more advanced atherosclerosis and could benefit from more intensive pre-operative assessment and risk factor modification.