Vascular Anaesthesia Society of Great Britain and Ireland

Annual Scientific Meeting

Abstracts for the Durham Meeting

10th & 11th September 2018

The Calman Learning Centre
Durham University
Stockton Road
Durham
DH1 3LE

VASCULAR ANAESTHESIA SOCIETY

Monday 10th September 2018

Session 1: Basic Science

11.15 - 11.40	**"The Role of Respiratory Biomarkers in Lung Injury"** Dr Ben Shelley, Glasgow
11.40 - 12.05	**"What do we mean by Functional Capacity"** Professor Denny Levitt, Southampton
12.05 - 12.30	"**Opioid Receptors in Vascular Disease"** Professor David Lambert, Leicester

Session 2: What do we do if it all goes wrong?

1.45 - 2.10	**"Bowel Ischaemia Following Vascular Surgery"** Mr Mark Gudgeon, London
2.10 - 2.35	**"Spinal Cord Injury following Aortic Surgery"** Dr Adam Pichel, Manchester
2.35 - 3.00	**"Problems after CEA and their Immediate Management"** Professor Jonathan Thompson, Leicester

Session 3: The Old and the New

3.45 - 4.05	**"RCoA Guidelines for the Provision of Anaesthetic Services - Standards that Matter"** Dr Jeremy Langton, Plymouth
4.05 - 4.25	**"GIRFT Implications for Future Vascular Services the Report/Process"** Professor Mike Horrocks, Bath
4.25 - 4.45	**"GIRFT and Empowering the Vascular Anaesthetist"** Dr Mike Swart, Torbay
4.45 - 5.00	**"The 21st Birthday of VASGBI"** Dr Neal Edwards, Sheffield

VASCULAR ANAESTHESIA SOCIETY

Tuesday 11th September 2018

Session 4: Lifestyle and Outcome

9.00 - 9.25	**"Alcohol and its Effects on Surgery"** Dr Chris Snowden, Newcastle
9.25 - 9.50	**"Sleep Apnoea"** Dr David Dawson, Bradford
9.50 - 10.15	**"Pre and Post-operative Sarcopenia"** Dr Simon Howell, Leeds

Session 5: Research and Audit

11.00 - 12.00	**Free Paper Session**
	Decreased mortality with local versus general anaesthesia for EVAR of ruptured abdominal aortic aneurysm in the UK National Vascular Registry *Richard Armstrong, Southmead Hospital, Bristol*
	The introduction and development of a protocol for heparin dosing for endovascular surgery based on ACT monitoring *Rebecca Thorne, Frimley Park Hospital*
	Implementation of the NICE guidance on abdominal aortic aneurysm: diagnosis and management, how might the patients attending Sheffield Teaching Hospital be affected? *Dr Mark Prince, Sheffield Teaching Hospitals*
	Sheffield Vascular Institute referrals for cardiopulmonary exercise testing prior to consideration for abdominal aortic aneurysm repair: Has a decade made a difference to the patients being referred? *Karen Kerr, Sheffield Teaching Hospitals*
	Peri-operative anaemia management and outcomes in patients undergoing elective endovascular aneurysm repair (EVAR) *Dr Joseph Wheatley, Leeds General Hospital*
12.00 – 12.45	**Case Based Discussion – "Should I pass the Ball"** Dr Derek Randles, Durham Dr Nancy Redfern, Newcastle Dr Hamish Mclure, Leeds Dr Udvitha Nandasoma, London

Session 6: How do we do it?

1.45 - 1.55	**Prize Presentations**
1.55 - 2.20	**"How to Manage a Cell Salvage Service, Intraoperative Blood Management"** Dr Mark Stoneham, Oxford
2.20 – 2.45	**"The Perioperative Management of Vascular Patients with Chronic Ischaemic Pain"** Dr Sheila Black, Leeds
2.45 – 3.10	**"Radiation Safety"** Mr Ian Birch, Durham

"Opioid Receptors and Vascular Disease (Results from VASGBI grant: Effects of opioids on angiogenesis)"

Professor David G. Lambert BSc, PhD, SFHEA, FRCA.
Professor of Anaesthetic Pharmacology, Department of Cardiovascular Sciences; Anaesthesia Critical Care and Pain Management, University of Leicester, Leicester, UK. (dgl3@le.ac.uk).

Opioids are potent and widely used analgesic agents. Opioids; both endogenous (e.g., endorphins) and exogenous (e.g., morphine) interact with opioid receptors. These receptors form a family of classical (Mu:μ or MOP; Delta:δ or DOP and Kappa:κ or KOP) and the non-classical receptor for the peptide Nociceptin/Orphanin FQ (N/OFQ) named NOP.

In addition to analgesia - perioperative opioid use has been shown to have a negative impact on outcome from cancer surgery. In terms of tumour survival increased migration/proliferation, immune suppression and angiogenesis are all predicted to worsen patient outcome. Opioid receptors have been reported on tumour cells where they increase migration; opioids are immune-depressant and there is evidence for enhanced angiogenesis. In essence perioperative opioids in cancer surgery represents 'the perfect storm'.

In this talk I will present (unpublished) data on (i) vascular endothelial and smooth muscle cell opioid receptor expression and function profiles and (ii) data from an ApoE-/- hypercholesterolaemic mouse treated with Angiotensin-II. In this model aneurysm formation occurs and this is associated with extensive angiogenesis.

In our hands there is scant evidence for classical opioid receptors on vascular tissues in vitro. In contrast functional NOP are present in vascular endothelium and smooth muscle. Our data indicate a substantial role for NOP receptor activation in vitro and in vivo.

Selected references for additional reading

Al-Hashimi M, Scott SW, Thompson JP, Lambert DG. Opioids and immune modulation: more questions than answers. Br J Anaesth. 2013;111:80-8.
Lambert DG. The nociceptin/orphanin FQ receptor: a target with broad therapeutic potential. Nat Rev Drug Discov 2008;7:694-710.
Mahbuba W, Lambert DG. Opioids and neovascularization; pro or anti? Br J Anaesth. 2015 Dec;115(6):821-4

“Colonic Ischaemia following AAA Repair”

Mr Mark Gudgeon
London

Colonic ischaemia complicating abdominal aortic aneurysm repair occurs in 1.2% of elective and 10.6% emergency repairs. It is a serious problem with a high mortality of 70%.

I shall describe the anatomical blood supply of the colon to show the area of the bowel most commonly affected by ischaemia following AAA repair.

I shall discuss the Incidence in elective, emergency, EVAR and open repair. The mechanism of the ischaemia will be considered whilst covering predisposing factors.

I will cover the recognition and diagnosis of ischaemia taking into account potential preventative measures and treatment of established ischaemic gut.

I will also address the difficulties in diagnosis and treatment plus the potential for recognition of the problem intraoperatively, and how that may reduce the mortality by avoiding delayed diagnosis.

“Spinal Cord Injury after Aortic Surgery”

Dr Adam Pichel FRCA
Consultant in Anaesthesia
Manchester Royal Infirmary, Manchester University Foundation NHS Trust

Spinal cord injury is still a significant complication following surgery on the descending thoracic and thoraco-abdominal aorta, regardless of the indication or underlying pathology. Endovascular techniques have not reduced paraplegia rates as much as many hoped for and the literature in this area of practice is very limited to extrapolation of the observations of large case series at renowned high-volume institutions and a limited number of randomised trials in open surgical repair. Indeed, one might argue that endovascular treatments may have brought an additional burden of spinal injury owing to the introduction of fenestrated techniques (e.g. 4 vessel FEVAR) used to manage juxta-renal abdominal aortic aneurysm but which often require considerably more extensive coverage (and hence occlusion) of segmental arteries critical for spinal cord perfusion.

The aetiology of spinal cord injury is not fully understood but is based on the anatomical and physiological disruption to the spinal collateral arterial network. These insults occur both at the time of intervention but also in the hours and days afterward. The impact of injury is enormous for any given individual, for society and in terms of short and longer-term survival of those affected. Despite a paucity of high grade evidence there seems to be a number of interventions that appear to assist the clinician with managing this most dreaded of complications. My talk is concerned with identifying patients at greater risk and discussing what practical measures can be taken in order to attenuate or even reverse signs of spinal cord ischaemia before it evolves into infarction. My talk describes these measures in the context of the immediate postoperative period and is not a review of all current preventative strategies, many of which can only be delivered intraoperatively.

"Problems after Carotid Endarterectomy and their Immediate Management"

Professor Jonathan Thompson
Consultant in Anaesthesia & Critical Care
University Hospitals of Leicester NHS Trust

Most complications after CEA occur within the first 4 hours after surgery. The most common specific complications are blood pressure instability, neurological dysfunction and wound haematoma. Cerebral hyperperfusion syndrome (CHS) is uncommon but potentially devastating.

Postoperative hypertension

Acute hypertension is usually transient, peaks in the first few hours after CEA and is related to baroreceptor dysfunction. Carotid atheroma per se interferes with baroreceptor reflexes and cerebrovascular reactivity. This is exacerbated by surgery, where carotid plaque removal causes disruption of baroreceptor activity leading increased arterial pressure instability for several hours or days. Predisposing factors include pre-existing hypertension, recent TIA or stroke, established autonomic neuropathy (e.g. in diabetes), bilateral carotid disease, previous contralateral CEA or radical neck surgery. It is also more common after eversion endarterectomy or when surgery is performed under general anaesthesia. Other contributory factors may include postoperative pain, urinary retention, anxiety or occasionally hypercapnia. Hypertension should be assessed and treated promptly because it predisposes to wound haematoma, myocardial ischaemia and in some cases may indicate CHS.

A systolic pressure >170 mmHg (or >30% of preoperative values) baseline should be monitored closely and treated promptly if it persists for more than 10-15 minutes. If there are any neurological symptoms (e.g. headache, visual disturbance, nausea and vomiting, seizures), any systolic pressure > 140 mmHg should be treated immediately. If hypertension persists after simple measures (sitting the patient up, analgesia, exclusion of urinary retention, further treatment depends on the patient's usual antihypertensive medication if applicable, can tolerate oral medication, or has neurological symptoms. An algorithm used in our Trust will be presented.

Cerebral hyperperfusion syndrome (CHS)

Restoration of cerebral blood flow (CBF) during CEA, carotid angioplasty with stenting or certain other cerebral vascular procedures almost always results in a 20-40% increase in CBF. This usually subsides over minutes or hours without problems. However, in some patients the increase in CBF is much larger, 100-200% of baseline, peaking at days 3-4 after surgery and resolving within 7 days, but occasionally persisting for up to 2 weeks. CHS occurs in 1-2% of patients after CEA. CHS typically occurs in patients with diminished cerebrovascular reserve, increased postoperative cerebral perfusion and postoperative hypertension lasting more than a few hours. Other predisposing factors are preoperative cerebral hypoperfusion, markedly increased cerebral perfusion (increase in MCA flow velocity or pulsatility >100% of baseline) after flow restoration, severe ipsilateral or contralateral carotid disease (occlusion or stenosis >90%) and recent ipsilateral ischaemic stroke. Clinical features of CHS are similar to hypertensive encephalopathy: severe ipsilateral migraine-like headache with transient focal neurological deficits, seizures and hypertension. It typically occurs within the first week after CEA. Some patients present with clinical features of CHS but arterial pressure and CBF are normal. Typical signs on CT scanning are diffuse white matter oedema predominantly affecting the posterior parietal or occipital lobes, ipsilateral petechial or overt haemorrhages, or mass effects. However, CT may be normal particularly in the first hours after the onset of symptoms. Management includes simple supportive measures, treatment of fits and hypertension. Blood pressure should be reduced gradually to maintain systolic BP <140 mmHg and lower if symptoms persist.

Neurological dysfunction

Early signs of neurological dysfunction may be non-specific (confusion, agitation, somnolence). Gross hemispheric neurological defects are more apparent. These symptoms may indicate carotid occlusion, atheroembolism, cerebral hypo- or hyperperfusion. If a gross neurological deficit occurs, urgent bedside carotid Doppler ultrasound should be performed to look for carotid occlusion or ongoing embolisation. If bedside scanning is unavailable or the scan reveals an occluded carotid artery urgent surgical re-exploration is mandatory. Transient neurological dysfunction of the hypoglossal, superior laryngeal, recurrent laryngeal, glossopharyngeal nerve and rarely the vagus nerve can occur.

Neck wound haematoma

Haematoma formation after CEA usually develops slowly and if unrecognised or underestimated can lead to airway obstruction, compounded by tissue oedema secondary to venous and lymphatic obstruction. Other predisposing factors include the use of antiplatelet or anticoagulant drugs, postoperative hypertension, coughing or retching Haematoma is usually caused by faulty surgical technique and can be fatal. Some surgeons employ wound drainage routinely and there is some evidence this reduces the incidence of re-exploration for haematoma.

Treatment of neck haematoma is urgent surgical evacuation, best achieved in theatre using local anaesthetic infiltration if required. Airway management for surgical re-exploration can be technically very difficult: induction of general anaesthesia can lead to catastrophic loss of the airway. After successful drainage of the haematoma, the airway should be evaluated carefully for residual oedema before tracheal extubation. In some cases postoperative ventilation in ICU may be required to allow residual oedema to subside. In all cases, close observation is required in a monitored environment for several hours after extubation.

Further reading

- Stoneham MD, Thompson JP. Arterial pressure management and carotid endarterectomy. Br J Anaesth 2009; 102: 442-52
- Howell SJ. Carotid endarterectomy. Br J Anaesth 2007; 99: 119-31
- Van Mook WN et al Cerebral hyperperfusion syndrome. Lancet Neurol 2005; 4:877-88
- Shakespeare WA Lanier WL, Perkins WJ, Pasternak JJ. Airway management in patients who develop neck hematomas after carotid endarterectomy. Anesth Analg 2010; 110: 588-93
- Munro FJ et al. Airway problems after carotid endarterectomy Br J Anaesth 1996: 76: 156-9

"RCoA Guidelines for the Provision of Anaesthetic services (GPAS) – Standards that matter"

Dr Jeremy Langton MD FRCA
Royal College of Anaesthetists GPAS Editor

In 1994 the RCoA published guidance for purchasers, in 1999 these then became GPAS with updated versions being published over the subsequent years. GPAS consists of 19 chapters covering all areas of anaesthetic practice. In 2016 a number of chapters were written using the NICE accredited process and by 2019 this will have been used for all chapters. The NICE process follows a rigorous literature review process and grading the strength of recommendations.

GPAS is used as the basis for the Anaesthesia Clinical Services Accreditation process (ACSA) setting standards across all areas of anaesthetic practice.

GPAS chapters are reviewed by expert authors annually and completely rewritten and updated every 3 years. The value of GPAS to clinicians is that it provides a series of interlinked but independent chapters, which act as guidelines, providing the foundation on which ACSA is based. It is a tool based on current evidence however it is not a prescriptive "bible" or a legal document. In addition, it is not the final authority and does not advise on specific details relating to clinical practice.

However, it does provide the environment to enable clinicians to provide safe effective and well led patient care.

ACSA is a voluntary quality improvement process facilitated through peer review. It begins with a bottom up collaborative process which brings real value to hospitals and departments through self-assessment against ACSA standards. These are based and under pinned by peer review and extensive literature searching and grading.

There now exists a two-way process between GPAS and ACSA with both processes informing the other so that standards produced and accurate and relevant to modern practice. As part of the ACSA process a department benchmarks their performance against the 145 ACSA standards. A team of ACSA reviewers are then invited to visit the department to validate their self-assessment of the organisation. When an organisation meets the standards their achievement is recognised by the RCoA.

Currently there are 23 fully accredited anaesthetic departments including major teaching hospitals and smaller district general hospitals. There are a large number of departments currently engaged at various stages along the process, and once accredited this lasts for 4 years.
Why should a department consider engaging with ACSA?

ACSA is a proactive structured process for improving services. It allows departments to self-check local guidelines against nationally agreed standards. Engagement in a QI process and service improvement from all staff in a department encourages cohesion. Departments can use ACSA to support funding and resource bids. It provides direct feedback on service delivery and provides year on year comparison with local, regional and national standards of performance. It also provides access to a network of accredited departments willing to share good practice and service improvement initiatives. This means that accredited departments will project a more attractive professional environment to potential employees and trainees. There is growing evidence that safety is closely aligned with cultural change and is human factor dependent – ACSA closely supports this agenda. The value of ACSA is increasingly being recognised by national bodies (e.g. CQC)

In future developments we will be developing a Perioperative medicine GPAS chapter incorporating current pre, intra and post-operative chapters. We are also trying to reduce duplication between chapters. With the development of enhanced RCoA electronic platforms we will aim for GPAS chapters becoming interactive live documents rather than standalone pdf documents. We have also developed a professional style guide based of the British Journal of Anaesthesia style guide which is to be applied across all RCoA professional publications, to ensure greater consistency across professional output.

References

www.rcoa.ac.uk/gpas
www.rcoa.ac.uk/acsa

"GIRFT and Empowering the Vascular Anaesthetist"

Dr Mike Swart
Consultant in Anaesthesia and Critical Care, Torbay Hospital, Devon
RCoA National Clinical Lead for Perioperative Medicine and GIRFT Clinical Lead for Anaesthesia and Perioperative Medicine (joint lead with Dr Chris Snowden)

Background

Getting it Right First Time (GIRFT) began as a pilot within orthopaedic surgery led by orthopaedic surgeon Professor Tim Briggs and hosted by the Royal National Orthopaedic Hospital NHS Trust (RNOH). Following the success of the pilot, the GIRFT methodology is being rolled out across 35 surgical and medical specialties.

A report is produced and issued to every trust being reviewed, which is then followed by a meeting at the trust with medical staff and senior trust managers. At each meeting the clinical leads review the findings with their peers, which provides more context to unwarranted variations and opens up a discussion around individual practice and any challenges the trusts face. It is also an opportunity to share best practice and any solutions that have already helped reduce variations.

After at least 40 trust reviews have been completed, the clinical lead oversees the creation of a national GIRFT report into their specialty. The report presents the original data, GIRFT's findings, examples of best practice and an action plan of proposed changes and improvements. Crucially this action plan provides detailed evidence of the benefits changes can bring and is supported by an implementation programme managed by GIRFT.

At trust level the recommendations found in each specialty are collated into a single implementation plan. Trust data is uploaded to the Model Hospital portal, which will be the gateway for accessing GIRFT information for all providers and commissioners.

GIRFT has in place a comprehensive programme to help implement the recommendations highlighted in each national report including support to individual providers to implement these recommendations locally.

Seven regional GIRFT Hubs function as centres from which clinical and project delivery leads can visit trusts, commissioners and Sustainability and Transformation Partnerships in each region on a regular basis advising on how to reflect the national recommendations into local practice and supporting efforts to deliver any trust-specific recommendations emerging from the clinical lead visits. These teams will help to disseminate best practice across the country, matching up trusts that might benefit from collaborating in selected areas of clinical practice.

http://gettingitrightfirsttime.co.uk

GIRFT Anaesthesia and Perioperative Medicine

GIRFT Anaesthesia and Perioperative Medicine looks at three major pathways of surgical patent care – Day Case, Elective and Emergency pathways. We would like to engage with our anaesthetic, critical care, perioperative medicine and surgical colleagues, both clinical and managerial to find areas of variation in pathways that are both good and also less than optimal.

We intend to identify, recognise and publicise hospitals that have warranted variation that improve patient outcomes through quality care. At the same time, we want to help and support hospitals that have variation that indicates less good patient outcomes.
The emphasis for the Perioperative stream will also involve crosscutting themes such as blood management, patient optimisation before surgery, diabetes care, evidence of failure to rescue, the use of critical beds for surgical patients and some aspects of fluid management.

To support our discussions with Trusts we have drawn together relevant data from a range of sources (e.g. Hospital episode statistic (HES) data, comparative audits from NHS Blood & Transplant service, National Hip Fracture Database, Intensive Care National Audit & Research Centre, National Emergency Laparotomy Audit etc.) in order to develop a range of metrics that provide insight into quality of care across perioperative pathways. These will help us to highlight areas for further discussion at visits.

GIRFT Anaesthesia and Perioperative Medicine and Vascular Anaesthesia

The GIRFT Anaesthesia and Perioperative Medicine review has to cover all English NHS hospitals (approximately 170). Vascular Anaesthesia takes place in around 74 hospitals. The topics that may be of interest to Vascular Anaesthesia in the future are listed below:

Perioperative Medicine Clinics

- Assessment of chance of harm or benefit from Vascular Surgery
- Shared Decision Making
- Contribution to Vascular Surgery MDT
- Optimisation of medical conditions
- Anaemia management (oral and iv iron)
- Diabetes management
- Diet, weight loss, smoking cessation, exercise
- Planning postoperative care

Perioperative Medicine Ward Rounds

- Withholding and restarting drugs
- Fluids and electrolyte management
- Diabetes management
- Analgesia
- Medical review
- Discharge planning
- Coordinating with and supporting other members of the postoperative team
- Teaching and training

Validation of long-term survival prediction for scheduled abdominal aortic aneurysm repair with an independent calculator using only pre-operative variables. Carlisle JB, Danjoux G, Kerr K, Snowden C and Swart M. Anaesthesia, 2015, Vol.70 (6), pp.654-665.
DOI: 10.1111/anae.13061

"Alcohol and Surgery"

Dr C P Snowden MD FRCA
Consultant Anaesthetist
Freeman Hospital, Newcastle upon Tyne
Joint RCOA Clinical Lead / GIRFT Lead for Perioperative Medicine

There are some incredible health statistics applied to Alcohol related illness and the effect on the NHS [1].

Perioperatively, alcohol consumption is often associated with an increased risk of postoperative complications and mortality and as a corollary it is assumed that a reduction or cessation in alcohol intake before surgery may reduce this perioperative risk. Unfortunately, not all associations are always converted to real cause–effect relationships, even when appropriate and effective interventions are introduced. Alcohol cessation or reduction before surgery is beleaguered by problems of dose dependency and clustering/interaction of lifestyle behaviours that hinder evidence interpretation.

Even so, alcohol cessation/reduction before surgery is already seen as an important consideration in our increasing perioperative "duty" to reducing public health concerns. The "Stop before your Op" mantra is being touted as the archetypal "golden, teachable moment" where lifestyle modification can be incorporated into a defined patient pathway and the importance of behavioural change is frequently being considered as an important coordinated role for the perioperative team.

However, before we take on this patient care, key questions need to be answered. Have we the correct tools to screen for problem drinking around surgery? Do we understand the correct population to target for intervention? Do we know of an effective intervention that will have most impact on care? And how do we succeed where other HCP have not?

The short presentation will aim to review the literature regarding alcohol and surgery, introduce the screening and intervention techniques that may be relevant around the time of surgery and discuss some of difficulties around changing behaviours in the surgical setting.

References

[1] Statistics on alcohol. England NHS Digital 2018 https://digital.nhs.uk/data-and-information/.../statistical/statistics-on-alcohol/2018

[2] Eliasen M, Grønkjær M, Skov-Ettrup LS, et al. Preoperative alcohol consumption and postoperative complications: a systematic review and meta-analysis. Ann Surg 2013; 258 (6): 930-942.

[3]Oppedal K, Møller AM, Pedersen B, et al. Preoperative alcohol cessation prior to elective surgery. The Cochrane Library 2012.

[4] Bradley KA, Rubinsky AD, Sun H, et al. Alcohol screening and risk of postoperative complications in male VA patients undergoing major non-cardiac surgery. J Gen Intern Med 2011; 26 (2): 162-169.

[5] Tonnesen, H., Nielsen, P. R., Lauritzen, J. B., & Moller, A. M. (2009). Smoking and alcohol intervention before surgery: evidence for best practice. British Journal of Anaesthesia, 102 (3), 297–306.

[6] Shourie S, Shourie S, Conigrave KM, et al. Pre-operative screening for excessive alcohol consumption among patients scheduled for elective surgery. Drug Alcohol Rev 2007; 26 (2): 119-125.

[7] Shourie S, Conigrave KM, Proude EM, et al. The effectiveness of a tailored intervention for excessive alcohol consumption prior to elective surgery. Alcohol Alcohol 2006; 41 (6): 643-649.

“Sleep Apnoea”

Dr David Dawson
Bradford

This presentation outlines the 3 main types of sleep apnoea but then moves on to concentrate on Obstructive Sleep Apnoea which has more than doubled in prevalence over the last 25 years as a consequence of increased obesity within the UK population. There are a number of significant medical consequences of untreated OSA which result in increased medical costs. From the anaesthetic point of view a major concern is the increased sensitivity to sedative and analgesic agents which can result in increased peri-operative morbidity and mortality.

Screening questionnaires and diagnostic devices are discussed and evidence for the benefit of diagnosing and treating OSA pre-operatively presented.

Finally, the recently elucidated glymphatic system is explained and references for further information about sleep science are provided.

“Pre and Post-operative Sarcopenia”

Dr Simon Howell
Leeds

This talk will review the prevalence and aetiology of muscle loss or sarcopenia before and after surgery, its impact on outcomes, and strategies to mitigate its impact.

Frailty is now recognised to be an important risk factor for perioperative complications. A recent narrative review reported odds ratios of between 1.1 and 31.8 for the association between frailty and adverse outcome following surgery. A key component of frailty is a loss of skeletal muscle and an associated decline in physical strength and stamina. Ultimately this may lead to an inability to undertake the activities of everyday living. It is clear that in some people a physical insult such as surgery can lead to further muscle loss and functional decline in the already frail patient. This loss of function may never be recovered. Fried and colleagues hypothesise a spiral of decline in which an insult such as an acute illness or surgery leads to acute muscle loss, this leads to a fall in resting metabolic rate, strength, functional reserve and energy utilisation. The aetiology of sarcopenia of frailty is complex. The European Working Group on Sarcopenia in Older People (EWGSOP) defines sarcopenia as a loss of muscle mass with loss of muscle function (strength or physical performance), with measurements two Standard Deviations (SDs) below the mean of a young reference population. This definition is based on the state of an individual at a given point in time and does not require longitudinal measurements. It has recently been proposed that the loss of muscle and functional capacity seen in some people following acute illness or surgery should be formally recognised as acute sarcopenia. Such acute sarcopenia may be the first step in the cycle of decline described by Fried and colleagues. The prevalence of acute muscle loss following illness or surgery is uncertain and its aetiology is incompletely understood. Both are relevant to the management of patients undergoing major surgery.

The sarcopenic response to surgery appears to be heterogeneous with some patients being much more afflicted than others. This may reflect altered immune responses and an inability to respond appropriately to an acute insult. Structural changes in skeletal muscle in sarcopenia include a shift towards type 2a muscle fibres and a reduction in satellite cell numbers. Studies of muscle loss due to immobilisation have shown increases in the mRNA levels of genes that cause muscle atrophy (atrogenes). Acute illness may be associated with increases in cortisol levels and an associated increase in protein catabolism. These acute and chronic changes produce an increased cortisol:DHEAS ratio driving protein catabolism and muscle loss. Major surgery is associated with an acute inflammatory response. Inflammatory cytokines including TNF-α and IL-6 have been proposed to contribute to muscle loss through the Nuclear Factor Kappa-light-chain-enhancer of activated B cells (NFκB).
The association between sarcopenia and outcome makes it a good candidate for inclusion in perioperative risk assessment models. Much work remains to be done on mitigating the impact of sarcopenia in the surgical patient. Prehabilitation programmes may restore some fitness but cannot reverse substantial muscle loss. Future therapies must focus not only on improving strength before surgery but also on reducing protein and muscle loss in the postoperative period.

"How to Manage a Cell Salvage Service"

Mark Stoneham
John Radcliffe Hospital, Oxford

Patient Blood Management describes the various processes by which allogeneic transfusion is avoided and includes the following:

- Optimization of RBC mass
    - Anaemia clinics, [Hb] measurement, oral Fe, IV Fe, rEPO
- Reduction of blood loss and bleeding
    - Management of anticoagulants, anaesthetic & surgical techniques, POC testing, fibrin glue, EACA & TXA, cell salvage,
- Optimization of patient's physiological tolerance toward anaemia
    - Manipulation of cardio-resp system, restrictive transfusion strategy

Cell Salvage is an important part of Patient Blood Management during surgery
Current indications for Cell Salvage:

- When anticipated blood loss is >1 L or 20% of the patient's EBV
- In patients with a low [Hb] or who are at increased risk of bleeding
- In patients with multiple antibodies or rare blood types
- In patients who are unwilling to accept allogeneic blood (e.g. JW)
- If >10% of patients undergoing the procedure will require transfusion
- If the mean transfusion requirement for the procedure exceeds 1 unit PRC

At the Oxford University Hospitals NHS Trust, there are 8 Vascular surgical consultants, 6 interventional radiology consultants and 10 vascular anaesthetic consultants + 1 or 2 dedicated vascular anaesthetic 'fellows'. Elective AAA surgery and about 60% of ruptured AAA operations are attended by one of 5 Cell Salvage practitioners. They are all ex-ODPs. They undergo a formal teaching programme, including completion of educational & competency assessment workbooks in line with UKCSAG recommendations. They also receive theoretical & practice-based education in the use of near-patient testing including TEG, ACT measurement, ABG analysis. There is Clinical Governance input from Anaesthesia and Haematology at Consultant level. There is a close working relationship between the anaesthetic nurse, cell salvage practitioner and vascular anaesthetist

Before a AAA case the following pre-op work is done

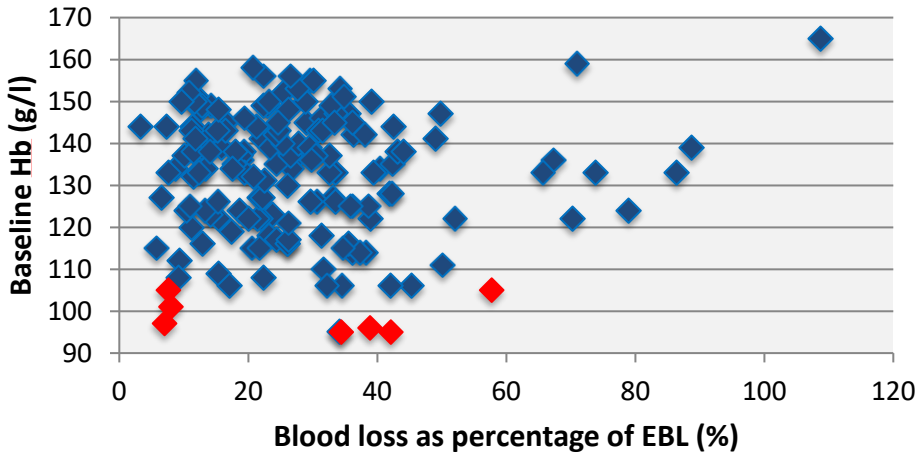
- A baseline thromboelastogram (TEG) is obtained prior to incision together with ABG analysis including Hb / Hct estimation
- ABGs are repeated at least every hour
- Nadler's formula used to determine the estimated circulating volume (ECV) to calculate appropriate doses of intraop heparin
    - Males ECV = 0.3669 * $Ht^3(m^3)$ + 0.03219 x Wt(kg) + 0.6041
    - Females ECV = 0.3561 * $Ht^3(m^3)$ + 0.03308 x Wt (kg) + 0.1833
- Transfusion trigger and ECV used to calculate theoretical blood loss before transfusion required
- $ABL\ tolerance = \frac{ECV \times [(HCT]_i - \mathbf{HCT}_f)}{HCT_i}$, HCT_i = initial HCT, HCT_f = transfusion trigger

A crucial benefit of the ICS practitioners is that, in most trusts, cell salvage is run by the anaesthetic nurse rather than by a dedicated ICS practitioner. The anaesthetic nurse has many other jobs to do during the surgery – and of course, they get very busy during periods of significant blood loss – which is exactly the time when pro- cessing and return of salvaged blood is paramount. In addition, our ICS practitioners have additional skills including the knowledge and ability to manage and interpret TEG, ACT, ABG analysis and platelet function mapping. Their ability to provide this additional information during the ongoing blood loss during a major case provides the anaesthetist with additional information whilst freeing them up to concentrate on the clinical management of the patient

We investigated what the impact of our dedicated cell salvage practitioner team was on blood loss and allogeneic transfusion in abdominal aortic aneurysm (AAA) surgery. We collected data on 171 AAA patients operated in Oxford over a 3-year period, looking at the whole Patient Blood Management processes, including: blood loss, cell salvage, near-patient testing (thrombelastography) and transfusion rates of allogeneic blood products.

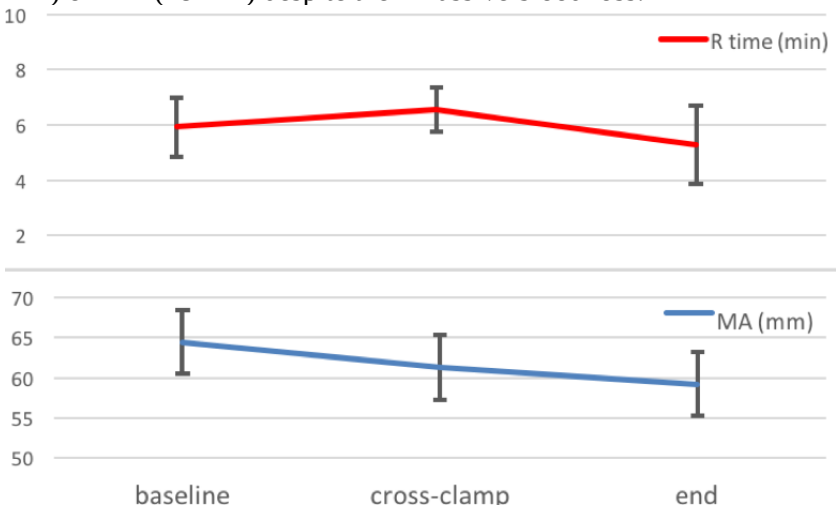
Blood loss ranged from 3–108% of estimated blood volume (EBV) (median 25% = 1500 mL). In seven patients who lost 70–110% of their EBV, none reached the thrombelastography intervention threshold for *R* time (11min) or MA (48 mm) despite such massive blood loss.

Overall, only 7/171 (4%) patients received intra-operative allogeneic blood, all of whom had a mean preoperative baseline haemoglobin concentration < 106 g L−1 (median 98, range 95–105 g L^{-1}). In terms of other blood products, only 4/171 (2·3%) received one unit of platelets each intra-operatively. None received FFP or cryoprecipitate.



Blood loss in 171 patients undergoing elective AAA expressed as % calculated blood volume related to baseline preoperative [Hb]. Data points coloured red represent patients who received allogeneic RBC

We also looked specifically at the peri-operative TEG values of the seven patients who lost between 70 and 100% of their EBV (none of whom received platelets or FFP) to assess their coagulation status. None of these seven patients at any stage reached the intervention threshold for *R* time (11 min) or MA (48 mm) despite their massive blood loss.



Mean TEG changes in 7 patients with 70-110% blood loss

In summary, dedicated ICS practitioners bring additional expertise and skills to facilitate better patient blood management during major vascular surgery. Our results havehighlighted the importance of pre-operative anaemia clinics to identify anaemic vascular patients pre-op. ICS practitioners cost-neutral and probably cost-effective once HRG coding charges introduced

References

1. Association of Anaesthetists of Great Britain and Ireland (2009) *Blood Transfusion and the Anaesthetist; Intra-Operative Cell Sal- vage*. Association of Anaesthetists of Great Britain and Ireland, London.
2. Brydon, C. (2017) *Blood Conservation Strategies*. Royal College of Anaesthetists, London. https://www.rcoa.ac.uk/system/ files/CSQ- ARB- section2.pdf
3. Desai N, Schofield N, Richards N. Perioperative Patient Blood Management to improve outcomes. *Anesth Analg* 2017 Oct 19. doi: 10.1213/ANE.0000000000002549

4. Joint United Kingdom (UK) Blood Transfusion and Tissue Transplantation Services. Professional Advisory Committee. *UK Cell Salvage Action Group*. 2017, http://www.transfusionguidelines.org/transfusion- practice/uk- cell- salvage- action- group
5. Kozek-Langenecker, S.A., Ahmed, A.B., Afshari, A. *et al.* (2017) Management of severe perioperative bleeding: guidelines from the European Society of Anaesthesiol- ogy: first update 2016. *European Journal of Anaesthesiology*, **34**, 332–395.
6. Mallett, S.V. & Armstrong, M. (2015) Point-of-care monitoring of haemostasis. *Anaesthesia*, **70** (Suppl 1), 73–77 e25–76.
7. Murphy, M.F., Waters, J.H., Wood, E.M. & Yazer, M.H. (2013) Transfusing blood safely and appropriately. *BMJ*, **347**, f4303.
8. Nadler, S.B., Hidalgo, J.H. & Bloch, T. (1962) Prediction of blood volume in normal human adults. *Surgery*, **51**, 224–232.
9. Stoneham MD, Von Kier S, Harvey L, Murphy M. Effects of a targeted blood management programme on allogeneic blood transfusion in AAA surgery. *Transfusion Medicine* 2017: 10.1111/tme.12495
10. Waters, J., Dyga, R. *et al.* (2010) *Guidelines for Blood Recovery and Reinfusion in Surgery and Trauma*. Bethesda, Maryland American Association of Blood Banks

“The perioperative management of vascular patients with chronic ischaemic pain”

Dr Sheila Black,
Consultant in Anaesthesia and Chronic Pain Management,
Leeds Teaching Hospitals NHS Trust.

Review of neurobiology of vascular pain from acute limb ischaemia (ALI), critical limb ischaemia (CLI) mesenteric ischaemia and chronic venous insufficiency. Exploration of techniques to reduce pain in perioperative setting: evidence for anti-neuropathic agents pre- and post-surgery; sympathetic and central neuroaxial blockade; pre-emptive and preventative analgesic techniques; examining the role of opiates.

Consideration of longer-term pain management techniques, including sympathetic block, spinal cord stimulation, and peripheral vagal stimulation. Review of literature and current research studies.

"Radiation Safety"

Mr Ian Birch
Radiation Protection Adviser and Medical Physics Expert
Newcastle upon Tyne Hospitals NHS Foundation Trust

Say the word "radiation" to different people and you'll probably evoke diverse reactions.

Your neighbour may fret over their child's health when reading of a proposed mobile phone mast.
Your uncle tells you how radiation was used to destroy his cancer.
Your mum is worried about the after-effects from her mammogram.
You might even recall how a blast of gamma radiation resulted in Bruce Banner becoming the Incredible Hulk.

Radiation comes in many forms and is all around us, all of the time. Sometimes it's dangerous, sometimes it's not; however, you can be almost certain that it will not make your muscles grow or turn you green.

As a member of the anaesthesia team working in or around the vascular theatre you are very likely to be exposed to x-ray radiation as part of your occupation. As the associated risks of this exposure continue to accumulate throughout your career, it is important that you are aware of these risks and have sufficient knowledge, information and training to lessen them.

This short lecture explores some of the uses of radiation in healthcare with particular emphasis on the vascular theatre environment. We'll discuss the nature and magnitude of the risks you may be subject to as well as some of the practical and procedural measures which should be in place or could be made available to you.

My aim is to arm you with sufficient knowledge and confidence for you to take a fresh look at the radiation safety measures within your workplace, to enable you to ask the appropriate questions of your safety leads and to play a part in promoting a positive radiation safety culture within your organisation.

VASCULAR ANAESTHESIA SOCIETY

Poster Presentations

Mode of anaesthesia for endovascular abdominal aortic aneurysm repair
Yolande Squire, North Bristol NHS Trust

'**My LiVES Prehab': A trainee-led prehabilitation initiative for vascular patients at the Liverpool Vascular and Endovascular Service**
James Morrison, Liverpool Royal University

An Enhanced Recovery Programme for Open Abdominal Aortic Aneurysm Repair
Victoria Male, Southmead Hospital, Bristol

Post-operative analgesia for Elective open abdominal aortic aneurysm (AAA) repair- are rectus sheath catheters an option?
Rebecca Thorne, Sioned Phillips, Frimley Park Hospital

Implications of a sub-optimal response to Clopidogrel in Vascular Surgical Patients
Vanessa Fludder, Royal Sussex Hospital

Intra-operative Spinal Cord Monitoring for Thoraco-abdominal Aortic Aneurysm Repair: a survey of the Vascular Anaesthetic Society of Great Britain and Ireland membership
Pawandeep Sarai, St Mary's Hospital

Improving Spinal Drain Safety and Management Through Education in a Regional Vascular Centre
Martin Kelly, Royal Liverpool University Hospital

Improving the provision of urgent vascular care – striving to Get It Right First Time.
Alexa Strachan, Royal Free Hospital

The feasibility of a structured, individualised exercise training programme for patients awaiting complex fenestrated endovascular aortic aneurysm repair at the Royal Free Hospital
Clare Morkane, Royal Free Hospital

Elective AAA repair: A review of practice in NHS Tayside
Amy Sadler, Ninewells Hospital

Optimising Post-operative Communication - OP VASCULAR
Tabitha Grainger, Freeman Hospital

Renal Dysfunction Following Fenestrated Endovascular Aortic Repair
Jez Fabes, Royal Free Hospital

Lower Limb Amputation – A review of post-operative pain management
Naveeta Maini, Royal Victoria Hospital, Belfast

Incidence of intestinal ischaemia with aortic surgery at Queen Elizabeth University Hospital, Glasgow
John O'Donoghue, Queen Elizabeth Hospital

Post-operative monitoring after carotid endarterectomy (CEA) - Are we doing enough?
John O'Donoghue, Queen Elizabeth Hospital

Introduction of an Aortic Aneurysm Pre-operative Assessment Clinic at the Queen Elizabeth University Hospital, Glasgow: a Quality Improvement Project.
Claire Young, Indran Raju, Queen Elizabeth Hospital

The St George's Hospital Vascular Anaesthesia Database: A Customisable Data Collection Tool
Sombith Maitra, St George's Hospital

Anti-fibrinolytic use, and intra-operative Heparin monitoring in vascular patients; a national survey
Rhiannon Jones, Norfolk & Norwich Hospital

Mode of anaesthesia for endovascular abdominal aortic aneurysm repair

Yolande Squire, North Bristol NHS Trust

INTRODUCTION

Endovascular surgery is increasingly used to treat patients with abdominal aortic aneurysms (AAA), including in the emergency setting for ruptured AAA. A lower 30 day mortality rate in patients undergoing emergency endovascular aneurysm repair (EVAR) under local anaesthesia (LA) was observed in the recent IMPROVE trial . This has sparked renewed interest in the controversy regarding the best anaesthesia choice for EVAR. We conducted a systematic review to evaluate the effect of mode of anaesthesia on outcomes after EVAR.

METHOD

This review follows the Preferred Reporting Items for Systematic Reviews and Metaanalysis (PRISMA) guidelines. We systematically searched MEDLINE, Excerpta Medica Database (EMBASE), Web of Science, and Cochrane Library databases up to March 2018. The primary outcome was in-hospital/30-day mortality. Emergency and elective EVARs were included. Study results were combined using fixed effects meta-analysis to estimate individual and pooled unadjusted relative risks (RR) of death for different modes of anaesthesia.

RESULTS

Twenty-two eligible studies with 39,744 patients were included. Reporting of results was variable and outcome measures reported were heterogeneous. Sixteen studies in 23,202 patients compared LA to General Anaesthesia (GA) and reported 30-day or in-hospital mortality. In emergency EVAR the relative risk of death was lower with LA compared to GA (RR 0.58, 95%CI 0.48 to 0.71). Trends in elective surgery and with mixed (elective and emergency) case groups were less clear with the estimated RR ranging from 0.08 and 1.53 and the confidence intervals were wide and all encompassing 1. Ten studies compared regional anaesthesia (RA) to GA (mostly in elective EVAR) and analysis showed an overall benefit of RA (RR 0.71 [95% CI 0.52-0.95]).

DISCUSSION

We have provided evidence to suggest that mode of anaesthesia may be associated with improved outcomes after EVAR, with both LA and RA showing benefit over GA when studies in the elective and emergency settings are combined. Emergency EVAR has been less extensively studied but there is evidence to suggest LA may be associated with reduced early mortality compared with GA in these patients. However, with no randomised trial data specifically comparing mode of anaesthesia, significant risk of confounding remains. The optimal mode of anaesthesia for EVAR should therefore be further investigated and the reasons why particular anaesthesia techniques are chosen for particular patients identified.

REFERENCES:

1. Powell JT, Hinchliffe RJ, Thompson MM, et al. Observations from the IMPROVE trial concerning the clinical care of patients with ruptured abdominal aortic aneurysm. Br J Surg 2014; 101:216-24.

Paper submitted to JCVA; under review

‘My LiVES Prehab’: A trainee-led prehabilitation initiative for vascular patients at the Liverpool Vascular and Endovascular Service

James Morrison, Liverpool Royal University

Prehabilitation has been defined as ‘the process of enhancing an individual's functional capacity before scheduled surgery, aimed at improving the patients tolerance to upcoming physiological stress’ [1]. It can be used as an umbrella term to encompass a number of different targets for change. Although not a new idea, the concept of prehabilitation is gaining momentum, as the evidence supporting preoperative patient optimisation grows [2]. Importantly, the vascular ‘getting-it-right-first-time’ (GIRFT) report published this year recommended improved prehabilitation for AAA, PVD and CEA [3].

It has been recognized that waiting lists provide opportunities to improve efficiency in the use of resources, and potentially improve the experience of the patient waiting for services [1]. Indeed, the need for surgery creates a ‘teachable moment’ for patients to facilitate behaviour change that they might not otherwise embark upon [4]. We recognised the potential for a trainee led QI project to implement a prehabilitation initiative at the Liverpool Vascular and Endovascular Service.
A prehabilitation patient ‘pack’ has been created (figure 1- image of pack contents). This includes an educational booklet providing an explanation of perioperative risk and prehabilitation, advice on the importance of smoking cessation, activity, diet and weight management as well as maintenance of healthy teeth and gums. In the first stage of the project, we are focusing on patients awaiting peripheral revascularisation procedures.

At pre-operative assessment clinic, an anaesthetic trainee sees the patient and baseline data is collected regarding smoking, exercise, nutrition, alcohol and dental care. This ensures patient understanding of risk, and patients are also encouraged to appreciate how they can modify that risk themselves. Patients are given an inspiratory muscle trainer and instructed on its use, and an activity tracker and diary.

This is an ongoing project that seeks to ascertain levels of patient engagement with a trainee-led prehabilitation initiative. On admission, patients will be asked about any changes to behaviours, whether they used their inspiratory muscle trainer, saw the dentist as recommended and qualitative data will be sought regarding their satisfaction with the intervention. Length of stay and data on post-operative complications will also be recorded.

Whilst we aspire to have a fully funded, consultant-led prehabilitation service, this may not be realistic given current financial pressures. However, in times of unprecedented demand on resources, our project not only complements the ambitions of perioperative medicine in addressing patient risk factors early in the perioperative journey, but also has the potential to offer a cost-effective approach to prehabilitation delivery. Furthermore, involvement in the project contributes towards trainee completion of training in perioperative medicine.

References

1. Gillis C, Chao L, Lawrence L et al. Prehabilitation versus rehabilitation.
A randomized control trial in patients undergoing colorectal resection for cancer. Anesth 2014;121:937-947.
2. Tew, G. A., et al. "Clinical guideline and recommendations on pre-operative exercise training in patients awaiting major non-cardiac surgery." Anaesthesia 73.6 (2018): 750-768.
3. GIRFT
4. Danjoux, Prehabilitation, behaviour change and collaborative working: a strategy to improve outcome? Bulletin 93 (September 2015)

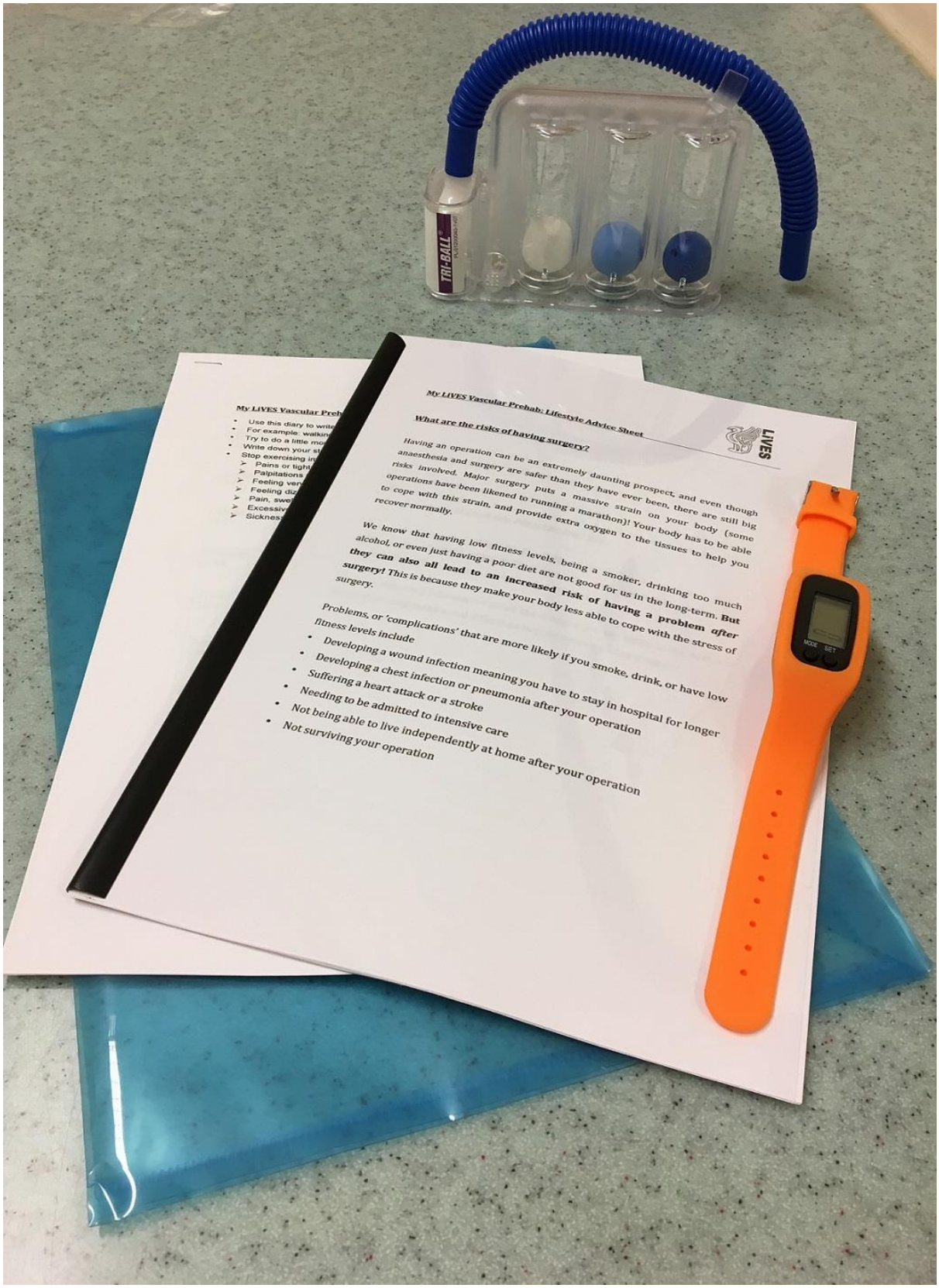


Figure 1: Contents of "My LiVES Prehab" patient pack

An Enhanced Recovery Programme for Open Abdominal Aortic Aneurysm Repair

Victoria Male, Southmead Hospital, Bristol

Enhanced Recovery Programmes (ERP), multimodal evidence-based perioperative care pathways, are well established in colorectal and orthopaedic surgery with evidence of benefit (1). Less is known about the efficacy of ERP in aortic surgery, but a recent observational study demonstrated improved outcomes (2).
Southmead hospital is a Vascular Hub for the South West of England, serving a 1.2 million population, performing 1200 procedures per year. An ERP was introduced in February 2015 for patients undergoing elective abdominal aortic aneurysm (AAA) repair. The purpose of the programme is to maintain or improve outcomes, reduce length of stay (LOS), reduce demand on resources and improve patient experience. Prior to implementation of an ERP average LOS was 10.5 days.

The aim of this study is to assess the effect of ERP on outcomes. The primary outcome is LOS, with secondary outcomes of intensive care unit (ICU) LOS, post-operative complications by system: cardiac, respiratory, renal, cerebrovascular accident, gastrointestinal and death.

This retrospective cohort study included all patients who underwent elective open AAA repair between 1st February 2015 and 31st August 2017. A list of all patients who underwent open AAA was obtained from the National Vascular Database (NVR) with ERP patients confirmed on a local database. Patients were divided into two groups, those who were on the ERP were compared with those not on the ERP (the control group). Demographics were recorded and the British Aneurysm Risk Score (BARS) was calculated. The data was statistically analysed to compare outcomes between the ERP and control group.

Ninety patients underwent open AAA repair during the study period, 65 patients on the ERP, 25 not. Three patients were excluded as they had previous aortic surgery. Patient characteristics, including the BARS, were comparable between groups There were no statistical differences in LOS (7.5 vs 8 days; p=0.35) and intensive care LOS (3 days each) between the groups. There was also no significant difference in postoperative complications between the groups. No data was collected to compare functional recovery and patient satisfaction between groups. However, generic ERP feedback was collated in 2017 across different procedures for 47 patients. 98% felt the pre-operative information was useful, 96% felt prepared for the procedure and 76% ready for discharge.

This study is the first to report on the efficacy of an ERP programme for elective open AAA surgery in a UK vascular centre. Even though ERP have been shown to improve outcome and reduced LOS in colorectal surgery, our results show that an established ERP over a two and a half year period made no difference in hospital or ICU LOS, with no significant difference in the postoperative complication rates. However, our previous study looking at LOS pre and post introduction of ERP (n= 29 patients) showed a significant reduction of LOS when ERP was initiated (7 vs 10.5 days). It is possible that the ERP has changed the philosophy of management of all patients, if they are on the ERP or not. Meaning those patients not officially on the ERP are still benefitting from its principles.

References
1. Kehlet H, Wilmore DW. Ann Surg 2008;248:189-98
2. Feo CV, Portinari M, Tsolaki E, et al. J Vasc Surg. 2016;63(4):888-94.

Post-operative Outcomes in Open AAA Repair

	ERP (n=62)	Control (n=25)
LOS days (median, IQR)	7.5, 5.25	8, 4
ICU LOS (median, IQR)	3,3	3,3
Complication (by system)		
Cardiac	3 (4.8)	3 (12)
CVA	0	1 (4)
Respiratory	9 (14.5)	4 (16)
Renal	6(9.7)	5 (20)
GI	12 (19.4)	8 (32)
Mortality	5 (8.1)	1 (4)

Table 1: Postoperative outcomes
ERP, Enhanced recovery programme; *LOS,* length of stay; *ICU,* intensive care unit; *IQR,* Interquartile range; *CVA,* cerebrovascular accident; *GI,* gastrointestinal
All data presented as numbers (%) or median (IQR)

Post-operative analgesia for Elective open abdominal aortic aneurysm (AAA) repair- are rectus sheath catheters an option?

Rebecca Thorne, Sioned Phillips, Frimley Park Hospital

Our Trust is a busy vascular centre with a dynamic regional anaesthesia service. Our standard analgesia for laparotomies is bilateral rectus sheath catheters (RSC), these are also now being used for elective AAA surgery. We evaluated our current practice with regard to type of post-operative analgesia provided, worst pain scores and the use of vasopressors over the first 48 hours post-surgery. We also looked at the length of intensive care stay for this group of patients.

We performed a retrospective analysis of 30 patients over 15 months who underwent elective AAA surgery. Data was collected from electronic records.

Twenty-one patients had epidurals, 21 had RSC (10 surgically inserted), 8 patients had morphine patient-controlled analgesia (PCA's). Some patients had a combination of analgesia over the 48 hours post-operative period that was assessed. The combination of analgesia i.e. epidural +/- PCA +/- RSC was usually because of failure of the primary mode of analgesia i.e. the epidural. The breakdown of analgesia combinations was as follows: 6 patients had epidurals only, 5 had RSC only, 3 had RSC and PCA, 11 had epidurals and RSC, 3 had epidurals and PCA, 1 had an epidural, RSC and PCA.

Thirteen out of 21 epidurals failed, 4 of these epidurals never worked, 5 failed within 24hours and a further 4 within the 48-hour data capture period. Within the 48 hours that data was captured, there were 12 epidurals that were used for some duration of the 48-hour period. Of the 13 failed epidurals, rescue RSC were used in 11 patients, these were either already inserted RSC and not used previously or inserted after confirmed epidural failure.

Table 1. summarises the average pain score, requirement for vasopressors and length of stay for the 3 main categories of analgesia.

Epidurals are popular for peri-operative analgesia but have a high failure rate in the post-operative period. Rectus sheath catheters have previously been shown to be as effective at providing analgesia when compared to epidurals with a lower incidence of hypotension (1). We have shown rectus sheath catheters provide superior pain scores to epidurals and reduced requirements for vasopressors in this high risk surgical group. This may reduce their length of stay on ICU. From our data we feel RSC can be introduced as first line post-operative analgesia for this group of patients and although the numbers are small and further multicentre prospective studies need to be performed to address the question : do we need epidurals in this group of patients?

Reference

(1) Godden AR et al. Ultrasonography guided Rectus sheath catheters versus epidural analgesia for open colorectal cancer surgery in a single centre. Ann R Coll Engl 2013; 95: 591-594

	Epidurals	RSC	RSC+ PCA
Average of worst pain scores on day 1	3.2	2	1.6
Average of worst pain scores on day 2	2.7	1.1	1.3
No of patients who required noradrenaline	5/12	1/6	1/3
No of patients who required phenylephrine	1/12	0/6	1/3
Average length of stay on intensive care (days)	2.5	2.1	2

Table 1.

Implications of a sub-optimal response to Clopidogrel in Vascular Surgical Patients

Vanessa Fludder, Royal Sussex Hospital

Since the publication of NICE TA 210 in 2010 and NICE CG 147 in 2014 a high proportion of patients with vascular disease are prescribed clopidogrel as part of the medical management of their arterial disease. Many of these patients present for urgent surgery having taken clopidogrel within the last few days. Guidelines vary, but most recommend omitting clopidogrel for a period of time prior to elective surgery (usually somewhere between 5 and 10 days). When surgery is urgent, a risk benefit analysis is required to assess the relative merits, or otherwise, of proceeding with surgery and anaesthesia given a potentially increased risk of bleeding and related complications.

Because of its association with smoking, a high proportion of patients with peripheral vascular disease also have significant cardiac and respiratory disease. Consequently, in this patient group, neuraxial anaesthesia is often the anaesthetic technique of choice. However, most anaesthetists are understandably reluctant to perform a spinal or an epidural in patients who have recently (within the last few days) taken clopidogrel for fear of causing a spinal haematoma with consequent neural compression.

At our institution part of the risk assessment involves checking the degree of platelet ADP receptor inhibition using either the Rotem Multiplate or TEG platelet mapping. We noticed that a high number of the platelet mapping tests showed a reduced response to clopidogrel (sub-optimal response defined as < 30% ADP receptor inhibition).

Reviewing our data we found 20 out of 27 (74%) of platelet mapping tests had been performed in vascular surgical patients. 14 out of 20 (70%) of these test results showed a sub-optimal response rate to clopidogrel. None of these patients had their procedures post-poned and 10 out of 14 (71%) of them had their procedure performed using a neuraxial anaesthetic technique. None of the patients had any bleeding related complications. Of the patients who did have platelet inhibition due to clopidogrel, one patient was cancelled, one received pre-operative platelets, 3 had a general anaesthetic and one had a peripheral nerve block instead of a neuraxial block.

Whilst a lack of response to clopidogrel is reassuring and perhaps fortuitous for the vascular anaesthetist, there is a bigger picture. The rate of sub-optimal response to clopidogrel in the general population is thought to be about 25-40%.(1,2) Despite the small sample size, the sub-optimal response rate in our group of vascular patients (67%) is significantly different to the widely quoted 30.(3) This begs the question: ‘Are these patients requiring surgery because clopidogrel was not working for them and thus their vascular pathology has progressed? It may be that those patients who are sub-optimal responders are more likely to go on to require surgery. If so, it may be possible to tailor anti-platelet therapy (for example choosing Aspirin, Prasugrel, Ticagrelor or a larger dose of clopidogrel, etc.) which could result in reduced complications and therefore overall cost.

1. Matetzky S., Shenkman B., Guetta V Circulation 2004;109:3171-5
2. Max-Paul Winter et al Postepy Kardiol Interwencyjnej. 2015;11:259–280
3. Horst-Neubauer et al BMC Med. 2011;9:3.

Intra-operative Spinal Cord Monitoring for Thoraco-abdominal Aortic Aneurysm Repair: a survey of the Vascular Anaesthetic Society of Great Britain and Ireland membership

Pawandeep Sarai, St Mary's Hospital

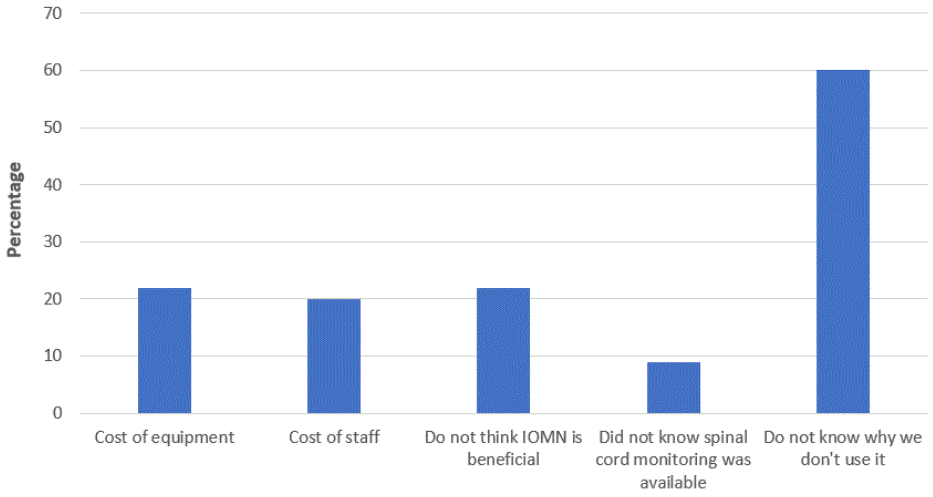
Spinal cord injury (SCI) following thoraco-abdominal aortic aneurysms (TAAA) repair affects as many as 24% and 22% of patients following open and endovascular repair, respectively (1). Interventions such as the use of a cerebrospinal fluid (spinal) drain have demonstrated reduced rates of injury and they are widely adopted in to SCI management protocols (2, 3). ¬Intra-operative neuromonitoring (IONM) of the spinal cord has similarly demonstrated a reduction in SCI incidence and is equally advocated for routine use (2). However, it is currently unknown how many vascular centres performing TAAA repair in the United Kingdom use IONM to detect and prevent spinal cord injury. The aim of this survey of the membership of the Vascular Anaesthetic Society of Great Britain and Ireland (VASGBI) was to determine the uptake of IONM, its perceived role and the barriers to its utilisation.

VASGBI members were emailed via the society's automated mailing system, following approval by the Research and Audit committee. Sixty-six responses were received from the membership, reflecting a response rate of approximately 10% and representing 35 unique vascular centres. 48% of respondents had personally cared for a case of SCI, whilst only 14% of centres routinely used IONM. Where it was employed, a combination of motor and somatosensory evoked potentials was predominantly used (55%). When asked why IONM was not employed, 60% of respondents did not know the reasons; where they did, they believed the reasons for this were multi-factorial: the cost of appropriately trained staff (20%), cost of equipment (22%) and 22% felt IONM did not affect SCI outcome. 9% did not know spinal cord monitoring was available (Figure 1). 69% of centres had a spinal cord injury management protocol. Of these, 96% incorporated the use of a spinal drain, 50% included hypertensing the patient and an altered surgical approach was advocated in 42%. Spinal cord monitoring however, featured in only 8% of protocols.
This survey, the first of its kind in the UK to our knowledge, demonstrates there is widespread lack of intra-operative neuromonitoring of spinal cord function despite increasing evidence of its usefulness in preventing spinal cord injury following TAAA repair (4). Cost is most likely the greatest barrier to its use. Greater resources should be made available to facilitate the use of IOMN of the spinal cord, especially as the incidence of vascular disease is likely to increase with an ageing population. In addition, further research needs to be conducted to develop more reliable and accessible forms of spinal cord monitoring, since there is a perceived doubt surrounding the usefulness of current forms of spinal cord monitoring.

We would like to thank the Vascular Anaesthetic Society of Great Britain and Ireland for their support and assistance in conducting this survey.

References
1 Etz DC, Luehr M, Aspern KV, et al. J Cardiovasc Surg (Torino) 2014; 55: 159-68
2 Hiratzka LF, Bakris GL, Beckman JA, et al. Circulation 2010; 121: e266-369
3 Coselli JS, LeMaire SA, Koksoy C, et al. J Vasc Surg 2002; 35: 631-9
4 Banga PV, Oderich GS, Reis de Souza L, et al. J Endovasc Ther 2016; 23: 139-49

Figure 1: Why do you not use Intra-operative Neuromonitoring (IONM) of the Spinal Cord?



Improving Spinal Drain Safety and Management Through Education in a Regional Vascular Centre

Martin Kelly, Royal Liverpool University Hospital

KELLY M.E, HILL A.J, SAFAR M.

Spinal drains are used in complex open and endovascular aortic surgery to help decrease the risk of peri-operative spinal cord ischaemia; resultant paraplegia has an incidence 4 to 9%. A recent meta-analysis reports that the incidence of major complications such as intracranial haemorrhage, epidural haematoma, meningitis and drain related neurological deficit is 2.5%(1). A solid understanding of the basic principles of spinal drains is crucial to prevent cord ischaemia, and, to enable detection and effective management of possible complications. Our Regional Vascular Centre inserts 15-20 spinal drains per year; hence, the experience of anaesthetic trainees, nursing staff and even non-vascular consultant anaesthetists in spinal drain management can be variable. Anaesthetic trainees are often the first port of call for troubleshooting spinal drain problems, particularly out of hours. We embarked on a quality improvement project with the aim of educating both trainees and nursing staff in the management of spinal drains. Aims were to increase knowledge and confidence when managing spinal drains with a view to decreasing complications.

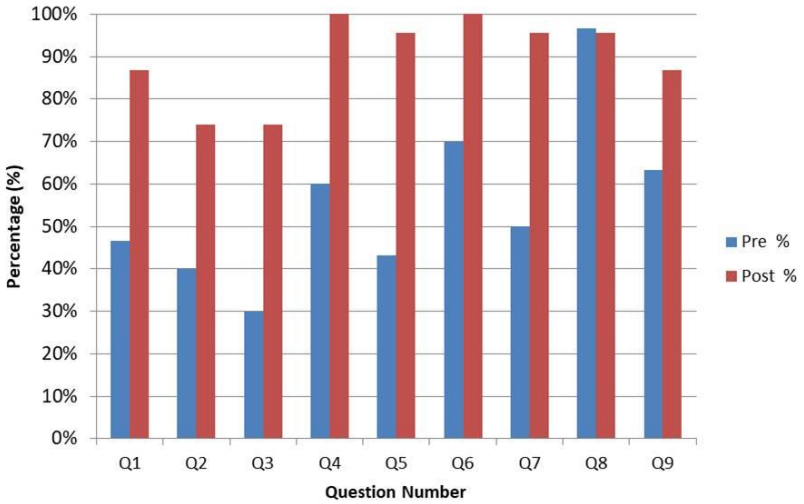
A questionnaire concerning the management of spinal drains and their complications was created using 'Survey Monkey.' Anaesthetic trainees completed this survey, both before and after a fifteen minute teaching session. In order to determine if understanding had improved after the educational intervention, a paired two way t-test was applied. A user friendly observations chart was created to assist critical care staff with what must be monitored together with a simple yet comprehensive troubleshooting algorithm.

30 anaesthetics trainees were educated. We then compared the percentage of trainees answering the questions correctly before and after the educational intervention. Before education the mean mark was 56% (standard deviation 20%). Following education the mean score was 90% (standard deviation 10%). This was statistically significant p=0.0003. All staff educated verbally reported this exercise had improved their understanding and confidence.

Taking the time to educate staff in the management and theory behind spinal drains drastically improves knowledge and understanding of both spinal cord physiology and the need to act quickly when various symptoms occur. We hope that this will improve safety and decrease the complication rate attributed to this intervention. We have since implemented a quality improvement process to increase awareness of spinal drain management and complications, and plan to ensure this education continues by rolling the spinal drain teaching as a formal part of the induction process for anaesthesia trainees. This is an iterative process with teaching ever improving based on feedback.

References

1. L.Q. Rong, M.K. Kamel, M. Rahouma, et al. Cerebrospinal-fluid drain-related complications in patients undergoing open and endovascular repairs of thoracic and thoraco-abdominal aortic pathologies: a systematic review and meta-analysis. British Journal of Anaesthesia 2018; 120 (5): 904-913.



Improving the provision of urgent vascular care – striving to Get It Right First Time

Alexa Strachan, Royal Free Hospital

The Getting It Right Frist Time (GIRFT) vascular surgical report, published this year, highlights common issues with the provision of vascular surgery seen across the UK and made 17 recommendations to tackle the reported unwarranted variations in clinical care and improve surgical outcomes in vascular patients (1).
A key component of the report outlined long waits for urgent care, with a lack of available facilities identified as a significant contributing factor. Non-clinical delays to surgery risk further deterioration and need for repeated or more extensive surgery, increased morbidity and pain.

At the Royal Free Hospital, a central London vascular hub, 6 all day elective vascular lists run each week, with the majority of urgent vascular operations performed on a general CEPOD list. Adapting the model of specialist emergency lists used successfully in trauma (2), an additional consultant-led vascular emergency list was introduced in April 2018. This weekly half-day list, staffed by a dedicated vascular anaesthetist, has been trialled on Fridays, in order to accommodate both emergency vascular presentations and expedited elective cases and to reduce reliance on acute out of hours services.

We sought to evaluate the utility of the new vascular emergency theatre list to assess the need for permanent implementation and to inform future resource planning. We collected retrospective audit data from the first 6 weeks since inception to assess list utilisation and efficiency, as well as the type and urgency of cases.

Over the 6-week period, a total of 7 patients had surgery on the four hour operating list. Our data revealed excellent list utilisation with 92% of available time used (mean no. of minutes 212 [range 178-306]). Exclusive emergency presentations accounted for 46% of all time available with urgent expedited care accounting for the reminder of utilised time.

Our experience suggests that a dedicated weekly emergency vascular operating list can be well utilised and matches the high demand for vascular services at the Royal Free Hospital. This list enables a higher turnover of surgical patients, by catering for expedited urgent cases, and provides a rapid and reliable service for those patients in need of emergency surgery. The implementation of an emergency list can help meet GIRFT recommendations in improving access to surgery to optimise outcomes for vascular patients. While not possible with our small data set, future work will focus on assessing impact on length of pre-operative wait and outcomes.

References:

1. Horrocks M. Vascular Surgery GIRFT Programme National Specialty Report. Available from http://gettingitrightfirsttime.co.uk/wpcontent/uploads/2018/02/GIRFT_Vascular_Surgery_Report-March_2018.pdf (accessed 10 June 2018)

2. Bhattacharyya T, Vrahas MS, Morrison SM, et al. The value of the dedicated orthopaedic trauma operating room. J. Trauma. 2006; 60: 1336-40

The feasibility of a structured, individualised exercise training programme for patients awaiting complex fenestrated endovascular aortic aneurysm repair at the Royal Free Hospital

Clare Morkane, Royal Free Hospital

Introduction:
Physical fitness has benefits in almost every context of health and disease, and there is mounting evidence confirming the relationship between physical fitness and improved perioperative outcomes. Aneurysm repair, both open and endovascular, carries a high risk in patients with complex aortic aneurysms who may have poor exercise capacity due to deconditioning and comorbidity. We assessed the feasibility and effectiveness of a six week exercise training programme in patients awaiting complex fenestrated endovascular aneurysm repair (FEVAR) at the Royal Free Hospital.

Methods:
Patients awaiting FEVAR were recruited to take part in a 6 week, hospital based exercise training programme, over a period of 18 months from June 2016. The intervention arm consisted of 3x 40min sessions per week of individualised, interval training formulated from baseline CPET (CardioPulmonary Exercise Testing) data, on a static bike. CPET outputs at baseline and at 6 weeks, were compared to a group of matched patients also awaiting aneurysm surgery, who had not undergone the exercise intervention.
All patients were given a pedometer to track their daily step count/activity.
Ethical approval was granted for this study.

Results:
23 patients were recruited (11 to the exercise and 12 to the control arm), 91% male (n=21) with no significant differences in demographics between groups. All patients completed the study; a 97% compliance with training sessions in the intervention arm was demonstrated. The mean age (SD) in the exercise group was 74.5 (6.8) versus 74.3 (6.8) in the control group. Median (IQR[range]) AAA score in the exercise group was 1.1 (0.6[0.7-3.0]) versus 1.0 (0.86[0.3-2.2]). Self-reported Duke activity status index (DASI) was also equal between groups. The mean (SD) DASI score in the exercise group was 37.65 (12.9), METS 7.37 (1.58). In the control group the DASI was 39 (11.1), METS 7.54 (2.1).
CPET data revealed an improvement in VO2 peak in the exercise group with a median (IQR[range]) of 13.7 ml/kg/min (4[11.4-22.7]) at baseline rising to 16 ml/kg/min (4.8[11.7-27.8]) at week 6 (p=0.07). There was no difference in VO2 peak from weeks 1 to 6 in the control group.
The median (IQR[range]) anaerobic threshold (AT) was 10.5 ml/kg/min (1.8[9.7-14.2]) at baseline, rising to 11.6 ml/kg/min (2.6[8.2-16.9]) after 6 weeks of exercise training (p=0.14). In the control group, median AT at baseline was 10.6 ml/kg/min (1.8[9.7-14.2]) and 11 ml/kg/min (2.1[6.3-13.1]) at week 6 (p=0.42).
Table 1 demonstrates an increase in step count between weeks 1 to 6 in the exercise group and a decrease in activity in the control group.
No complications were encountered in patients undergoing exercise training.

Conclusions:
We have demonstrated excellent patient compliance and safety of a hospital based exercise training programme for patients awaiting FEVAR. We have shown an improvement in physiological fitness alongside an increase in day-to-day activity over the course of the 6 week study period in the exercise group. These results are consistent with the existing prehabilitation literature, however given the economic implications of a high intensity programme, we are now integrating pre-operative exercise advice as a standard of care by utilising a smart phone application and structured guidance.

Group	Week 1 (steps/day)	Week 6 (steps/day)	Change, (% change)	P value
Exercise (n=11) Median (IQR)	6016 (3762)	6556 (4515)	+ 540 (9)	0.03
Usual care (n=12) Median (IQR)	4779 (2899)	4347 (4430)	- 432 (-10)	1.0

Table 1: daily step count at week 1 versus week 6 in both study groups.

Elective AAA repair: A review of practice in NHS Tayside

Amy Sadler, Ninewells Hospital

Introduction

Activated Clotting Time (ACT) monitoring has been shown to be a simple and inexpensive test which correlates with both serum heparin concentration and partial thromboplastin time (1). ACT is more effective than partial thromboplastin time for monitoring the level of intraoperative anticoagulation (2). Therapeutic ACT values are established for cardiac surgery but there is no clear consensus in endovascular surgery. Following the reconfiguration of local vascular services in 2014, complex endovascular aneurysm repair was introduced at our Trust. With increased complexity and prolonged duration of surgery we questioned the effectiveness of the standard heparin dose (5000 IU). We wished to introduce ACT monitoring for the endovascular cases and set a target ACT of twice the patients' baseline, approximating to an ACT of around 250 seconds (3). Following collection and analysis of heparin dose, patient weight and ACT results we have implemented a protocol for initial heparin dosing based on patients' weight. This abstract describes our ACT outcomes for both standard dosing and the weight adjusted heparin regimens.

Method

From 2014 we maintained a prospectively recorded database of vascular cases following the introduction of ACT monitoring. We recorded pre and post-administration ACT values using the standard administration of 5000IU of heparin. After 1 year we reviewed the data comparing the absolute dose (IU) and dose/weight (IU/kg) against ACT values. After consideration of these results a protocol for heparin bolus administration of 100IU/kg was introduced targeting an ACT of greater than 250 seconds and a rise in ACT to 200% that of baseline. We have collected a further 2 years of data to assess the effectiveness of this protocol and the results are presented.

Results

In the initial data series, 67 patients received 5000 international units (IU) of heparin. The mean patient weight was 78.4kg(range 42-140), mean dose was 66IU/kg(35.4-119) and mean post-heparin ACT was 221secs(142 – 326) with a mean percentage change of 161%(104 – 206). 14(20.9%) patients met the set target of an ACT post-heparin of 250secs. Following the protocol introduction data on 38 patients have been collected. Mean patient weight was 77.6kg(51-118). Average dose given was 6873IU(4500–10000) and mean dose/kg was 89.4(50-103). Median post heparin ACT was 267secs(149 – 397) with mean percentage change of 182%(108–269). Twenty-four (63%) patients met the set target ACT post-heparin administration.

Conclusions

The data from our initial collection did not point to a definitive dose of heparin calculated on a weight basis to achieve ACT targets. In view of this the protocol adopted was in line with other national units and has led to an improvement in the percentage of patients achieving target ACT's. Further work is needed to assess whether other demographic data such as BMI may provide a more reliable way to calculate heparin doses and the incidence of adverse events associated with higher heparin dosage.

References

1) Simko RJ, Tsung FFW, Stanek EJ. Activated clotting time versus activated partial thromboplastin time for therapeutic monitoring of heparin. Ann Pharmacother 1995 Oct;29:1015–1021.
2) Alexander Poisik, M.D., Eric J. Heyer Safety and Efficacy of Fixed-dose Heparin in Carotid Endarterectomy. Neurosurgery. 1999 Sep; 45(3): 434–442
3) ATOTW. Anaesthesia for Endovascular Aortic Aneurysm Repair (EVAR) G Atwal, S Wylie, 2014

Optimising Post-operative Communication - OP VASCULAR

Tabitha Grainger, Freeman Hospital

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Introduction:
Communication is the cornerstone of effective patient management. The documentation of clear, reasoned post-operative instructions can facilitate and empower the multi-disciplinary team (MDT) to continue the often-complex care of a vascular surgical patient. At present, there are no clear recommendations on content. This quality improvement project was devised to conceive, develop and implement succinct instructions that align with both national and local trust policies to better the care of the post-surgical vascular patient.

Methods:
An expert MDT focus group (including surgeons, anaesthetists, specialist nurses, pharmacists, PACU and ICU nurses) were consulted to develop a preliminary post-operative instruction 'idea' content list. A modified Delphi consensus was then used to develop these areas into a defined list of parameters by consulting the wider MDT involved in the post-operative care. These were retrospectively compared to the last 25 operative notes. Thereafter the aide-memoire 'OP-VASCULAR' contents guide was conceived and subsequently circulated within the MDT. Through posters, presentations and email it was advertised within the key areas.
Weekly reviews of practice were then conducted to audit uptake, compliance, issues with implementation and sustainability.

Results:
Baseline audit results were poor. There were notable deficiencies in antimicrobial stewardship, anticoagulation, wound care and diabetes related instructions.
Following implementation of OP-VASCULAR checklist there was 50% improvement identified in all of the weak areas including drain related instructions, VTE prophylaxis, anticoagulation, observation parameters and medications. Subsequent weekly review demonstrated a sustained improvement in outcomes. Feedback from those completing op-note checklist has been positive.

Conclusion:
The implementation of a 10-point memorable checklist (OP-VASCULAR) has led to sustained improvements in the quality of post-operative instructions. This has generalizable safety and patient related implications that empower the wider MDT to make safe decisions in relation to the patients operative procedure.

Renal Dysfunction Following Fenestrated Endovascular Aortic Repair

Jez Fabes, Royal Free Hospital

Post-operative renal dysfunction following complex endovascular aortic repair is common regardless of the intervention modality. There is a significant dataset describing the incidence of kidney injury after open and non-fenestrated endovascular repair approaches. However, there is limited data available to describe the natural history of renal function decline following fenestrated endovascular aortic repair (FEVAR) with case series describing incidences of around 15-30% [1]. FEVAR recipients are at increased risk of organ dysfunction due to the greater surgical complexity, case duration, higher contrast burden and potential for fenestration and branch occlusion. While risk factors for acute kidney injury following open and non-fenestrated endovascular approaches have been described2, there are no studies outlining these risk factors in FEVAR recipients. This study aims to describe the natural history of renal dysfunction and identify independent risk factors for acute kidney injury and prolonged length of stay following FEVAR.

Retrospective data collection was performed for one hundred and twenty-two patients who underwent elective FEVAR for aortic aneurysm repair between 2014 and 2017. Standard definitions of renal dysfunction were used based on the glomerular filtration rate and Acute Kidney Injury Network (AKIN) criteria. Data were analysed using Spearman correlation and multivariate logistic regression.

Pre-operative chronic kidney disease (CKD) was common with 37.7% of patients presenting with CKD2 and 30.3% with CKD3. The incidence and severity of renal injury increased over time with an 11.8% incidence of acute kidney injury (AKI) within the first three post-operative days, of which 4.8% were AKIN grade 2. The contrast dose and aneurysm diameter correlated with post-operative renal dysfunction but not with AKIN criteria. The presence of an AKI and the severity of that AKI correlated with the length of hospital stay and post-operative mortality. However, post-operative increases in creatinine that did not reach criteria for AKI did not correlate with worse outcomes.

Independent risk factors for post-operative AKI were chronic diuretic use (odds ratio, OR 45), being a current or ever smoker (OR 16), pre-operative CKD class (all risk isolated to CKD4 group, OR 151), more complex devices or interventions (OR 8.8) and contrast dose (OR 37 above 48ml). Mean length of stay was 6.1 ± 5 days. Independent risk factors for prolonged length of stay (seven days or longer) were a larger aneurysm (OR 5 or greater above 56mm) and the presence of any post-operative AKI (OR 6.23).

This retrospective analysis identifies a relatively low incidence of AKI following FEVAR in this high-volume centre. Despite this, the development of a post-operative AKI is a strong risk factor for prolonged length of stay. The identification of risk factors for renal dysfunction will permit quantitative risk stratification and interventions to ameliorate reversible risk factors.

References

1. Tran K, Fajardo A, Ullery BW, Goltz C, Lee JT. Renal function changes after fenestrated endovascular aneurysm repair. Journal of vascular surgery 2016;64:273-280.
2. Statius van Eps RG, Nemeth B, Mairuhu RTA, et al. Determinants of Acute Kidney Injury and Renal Function Decline After Endovascular Abdominal Aortic Aneurysm Repair. European journal of vascular and endovascular surgery : the official journal of the European Society for Vascular Surgery 2017;54:712-720.

Lower Limb Amputation – A review of post-operative pain management

Naveeta Maini, Royal Victoria Hospital, Belfast

Lower limb amputation (LLA) is a procedure which carries significant morbidity and mortality as these patients may be frail with multiple comorbidities. Pain management can be challenging due to severe pre-operative pain and polypharmacy including the use of oral anticoagulants. Poor peri-operative pain management is associated with development of chronic pain and phantom limb pain, increasing the healthcare burden. The 2014 NCEPOD report highlighted peri-operative pain management for LLA as part of the Quality Improvement Framework [1]. This audit aimed to record the post-operative management of pain in patients undergoing LLA in our centre.

All patients who underwent LLA in the Royal Victoria Hospital Belfast from April 2017 to March 2018 and were reviewed by the Acute Pain Team were included. Information was obtained retrospectively using the electronic Acute Pain Team database.

71 patients undergoing LLA were reviewed by the Pain Team post-operatively. 63 patients (88.7%) received continuous wound infiltration via nerve catheter (CWI) with local anaesthetic, either by sciatic or femoral route. The CWI remained in situ for an average of 2.3 days with 30% becoming dislodged. Other analgesic techniques used included sciatic nerve block only (1.4%), intrathecal opioid (7%), epidural (1.4%) and morphine PCA (1.4%). The use of adjuvant therapies are described in Table 1. Pain scores (range 0-10) collected on day 1 showed the pain score was 0-3 in 61% of patients, 4-6 in 28% and 7-10 in 11%. Pain scores on day 2 were recorded in 60 patients as 11 patients had had their CWI catheters removed. The results show 88% of patients had a pain score of 0-3, 8% had a score of 4-6 and 4% had scores of 7-10. Pain scores were not recorded by the Team beyond day 2. 10 patients (14.1%) developed confusion post op, and 2 patients (2.8%) were excessively sedated.

It is evident that LLA remains a frequently performed procedure in our centre. Reassuringly a large number of patients received CWI or an intra-operative nerve block. Prolonged perineural blockade has been shown to reduce chronic stump pain [2], whilst this may not be practical, there is some suggestion that continuing a perineural infusion for a minimum of 72 hours can reduce nociceptive and neuropathic pain [3]. The data also shows that there is a significant number of patients experiencing severe pain. The use of adjuvant therapy remains low, with only a quarter of patients receiving gabapentinoids. These drugs have an opioid sparing effect with the potential to reduce post op confusion and sedation, potentially allowing quicker rehabilitation and return to function. The Acute Pain Service has recently updated its data collection programme. This will allow the team to record more detailed data such as different types of pain e.g. neuropathic pain, re-auditing this data may be useful. Furthermore encouraging the use of adjuvant therapies peri-operatively via the development of a pain management protocol may be the next step.

References

1. National Confidential Enquiry into Patient Outcomes and Death. Lower Limb Amputation: Working Together. November 2014
2. Borghi, B, D'Addabbo, M, White, P et al. The Use of Prolonged Peripheral Neural Blockade After Lower Extremity Amputation: The Effect on Symptoms Associated with Phantom Limb Syndrome. Anesth Analges. 2010; 111: 1308-1315.
3. Neil, MJE. Pain after amputation. BJA Education. Volume 16, Issue 3 , 107 - 112

Table 1

Adjuvant therapy	Percentage of patients receiving therapy (%)
Amitriptylline	2.8
Gabapentinoids	25.4
Fentanyl patch	4.2
Buprenorphine patch	4.2
Salmon calcitonin	1.4

Incidence of intestinal ischaemia with aortic surgery at Queen Elizabeth University Hospital, Glasgow

John O'Donoghue, Queen Elizabeth Hospital

Intestinal ischaemia has an estimated incidence of 16 cases per 100,000 person-years, which is increasing over time.(1) A decrease in blood flow to a degree that is insufficient for the delivery of oxygen and nutrients required for cellular metabolism, ultimately leads to cell and tissue death.(2) It is associated with acute arterial occlusion (embolic, thrombotic), venous thrombosis, or hypoperfusion of the mesenteric vasculature causing nonocclusive ischemia. Vascular patients have altered diseased vasculature which can lead to an increased risk of all the above.

Ultee et al published a study in 2016 of 7312 patients undergoing AAA repair in New England. It confirmed that the risks of bowel ischemia differ according to the indication of the AAA repair (intact vs. ruptured), and the operative approach (open repair vs. EVAR).(3)

The primary aim of this study was to assess the incidence of postoperative bowel ischemia following aortic surgery in our centre.

We did a retrospective review of the case notes of all our patients who underwent AAA repair in 2017. Some of our patients were managed conservatively and our centre rarely uses colonoscopy for diagnosis, thus patients were considered to have intestinal ischaemia if they met 1 of our 3 criteria:-
1-clinical suspicion/evidence documented in the case notes
2-radiological evidence
3-required further surgical intervention
Patients who died intraoperatively or died in recovery were excluded.

100 patients were included in our analysis and our results when compared to Ultee et al and previous studies are presented in the table.

As can be seen from the results for open repair our centres' incidence is slightly lower than previously documented incidence and our ruptured EVAR is considerably lower. However, our ruptured EVAR incidence could be explained by this not being a 24 hour 365 day service and is dependant on interventional radiologist availability. Our Elective EVAR incidence is in line with previously documented incidence. A great limitation of this study is the comparatively low numbers overall which hopefully explain our overall incidence being so high at 12%.

When looking at individual operative technique and indication for surgery our centre is in line with what is the suggested occurrence of this potentially devasting complication, five our patients (~42%) who suffered this complication subsequently died. The rarity of postoperative intestinal ischemia has prevented extensive risk factor analysis, especially among EVAR patients.(3) several risk factors have been implicated including age, renal insufficiency, operative time, (micro) embolizations in supplying vessels, and proximal clamp location during open repair.(3) However the limited evidence, of these and other factors have been widely disputed. In the future we should continue to monitor our incidence and increase our study population whilst considering any trends in risk factors that could potentially be pre-operatively optimised.

References

1. Yadav S, Dave M, Edakkanambeth Varayil J, et al. Clin Gastroenterol Hepatol 2015; 13:731.
2. Brandt LJ, Feuerstadt P, Longstreth GF, et al. Am J Gastroenterol 2015; 110:18.
3. Ultee K, Zettervall S, Soden P, et al. J Vasc Surg. 2016 Nov; 64(5): 1384–1391

100 patients were included in our analysis and our results when compared to Ultee et al and previous studies are presented in the following table.

Method Repair	Ultee et al Incidence (3)	Incidence from previous studies(3)	QEUH Incidence
Open repair (elective)	3.6%	1-3%	3%
Open repair of ruptured AAA	19.3%	7-36%	6%
EVAR (elective)	0.6%	0.5-3%	1%
Ruptured EVAR	6.4%	4-23%	2%
Overall	2.8%	2.9%	12%

Post-operative monitoring after carotid endarterectomy (CEA) - Are we doing enough?

John O'Donoghue, Queen Elizabeth Hospital

Post-operative hypertension affects up to 66% of patients undergoing CEA.(1) The European carotid surgery trial showed that systolic BP mmHg (>120 = 3.4%; 121-159 = 6.5%; 160-180 = 7.7%; >180 =13%, p = 0.4) increased risk of perioperative stroke after CEA.(2) As well as postoperative TIA/Stroke poorly managed post-CEA hypertension is linked to neck haematoma formation, cerebral hyperperfusion syndrome (CHS) and intracranial haemorrhage.(1)

The European society for vascular surgery (ESVS) published a guideline in Jan 2018, it gave class I C evidence that recommended that intra-arterial blood pressure (IABP) monitoring be continued for the first 3-6 hours after CEA, followed by hourly non-invasive blood pressure monitoring for the first 24 hours.(1) Patients also benefit from 3-6 hours neurological monitoring (Neuro Obs) in the recovery area and hourly on the ward for the first 24 hours.(1) Neuro Obs and BP monitoring should then be carried out 4 hourly till discharge.(1)

The primary aim of this study was to assess the monitoring patients had received after CEA in our centre. The secondary aim - to determine the rate of complications associated with poor BP control. We did a retrospective casenote review of all patients undergoing CEA in 2017 (n=94). 11 patients had 3-4 hours of IABP and Neuro Obs in recovery before being discharged to the ward, however 5 of them had either neurological or BP complications in recovery. The least time spent in recovery was 1 hour 15 minutes (n=1) and the mode stay was 2 hours (n=62).

7 patients were transferred to the high dependency unit (HDU) and thus all these patients had extended IABP monitoring. However 3 of these patients did not have Neuro Obs hourly for the first 24 hours and 2 did not have BP recorded hourly. 87 patients were discharged from recovery to the ward with 1 patient having to return to theatre from due to development of a neck haematoma and subsequently was admitted to HDU postop. 6 (7%) of the remaining 86 had there BP checked hourly for the first 24 hours and 34 (39.5%) patients had BP checked 4 hourly till discharge. 4 ward patients had Neuro Obs recorded for 24 hours or more with the mode Neuro Obs recorded being 18 hours (n=17).

For this study we defined hypertension as recorded incidence of systolic BP>160mmHg. 30 patients were hypertensive post op 14 of these were medically treated per our hospital protocol. 7 of the 30 patients went on to have complications that could be attributed to hypertension. 2 patients had no documented hypertensive episodes, they had insufficient BP and neurological monitoring as per the guidelines but went on to have complications associated with hypertension including CHS.

It is clear prior to publication of the ESVS guideline our hospital was not providing the standard of post op monitoring that class I C evidence suggest we should. Furthermore 9.5% of our patients are having complications that could be directly attributable to periods of hypertension. We should aim to meet these new monitoring targets, but in an NHS hospital with understaffing and limited resources, achieving this goal is likely to be problematic. The use of a checklist (dedicated observations recording for CEA patients) and education for medical/nursing staff should be implemented and outcomes reviewed.

References

1. Naylor A, Ricco J, de Borst G et al. Eur J Vasc Endovasc Surg (2018) 55, 3-81
2. Bond R, Narayan S, Rothwell P et al. Eur J Vasc Endovasc Surg (2002) 23, 108-116

Introduction of an Aortic Aneurysm Pre-operative Assessment Clinic at the Queen Elizabeth University Hospital, Glasgow: a Quality Improvement Project.

Claire Young, Indran Raju, Queen Elizabeth Hospital

Multiple documents over recent years have strongly advocated the safety and outcome benefits of a vascular pre-operative assessment service. The Queen Elizabeth University Hospital was established in 2015 and is home to the regional vascular service. In the 18 months to May 2018, the unit performed 140 aortic operations. In spite of the large number of patients, there wasn't a dedicated vascular pre-operative clinic. This was in part due to efficiency savings and the lack of understanding of the longer-term benefits of a pre-assessment clinic to the service.

In March 2018, using the 'model for improvement' methodology, we started a consultative process to engage the various stakeholders to gain support for a pre-operative clinic together with a process mapping exercise. The latter showed variability in pre-operative process, which was very much anaesthetist and surgeon dependent. The majority of patients had their investigations from a surgical clinic, a 'virtual anaesthetic assessment' using the electronic patient records and the consultation happening on the night before or on the day of surgery. In June 2017, we introduced a pre-operative assessment clinic for patients scheduled for aortic surgery. We gave ourselves 12 months to trial the clinic and to show it's utility. Patients attending the clinic are seen by a vascular anaesthetist and two vascular nurse specialists. The aim of the clinic was to standardize the surgical pathway for aortic surgery and to provide a safe and effective clinical service. To allow for this, all patient must be adequately 'worked-up' for aortic surgery and be assessed by a vascular anaesthetist. 39 patients attended the clinic between June 2017 – June 2018. The numbers represent just <50% of all patients presenting for aortic surgery. This was due to the lack of resources to run the clinic more frequently to attain 100% capture. To assess the utility of the clinic, the operational definition for our measurement was '% of patients from the clinic admitted on the day of surgery' and '% of patients cancelled on the day of surgery'. The target was 80% for same day admission and 0% for same day cancellation. Our baseline measure from pre-June 2017 for same day admission was 23% (out of 39 consecutive patients). We could not ascertain % of same day cancellation. The same day admission rate for patients after the introduction of the clinic was 67% and no patients were cancelled on the day of surgery. Four patients from the clinic either had an intervention or surgery postponed for optimization. We can only speculate but this probably contributed to patients' surgery not being cancelled on the day of admission.

Although the clinic hasn't achieved the target of 80% for same day admission, it has proven it's utility by increasing the same day admission rate by 44% (3-fold increase) and avoiding same day cancellations. By applying QI methodology, we have shown significant improvement in the efficiency of the service, utility of a clinic and an opportunity for the entire clinical team to engage with the patient prior to surgery. The clinic also provides an opportunity for patients to discuss their care and vascular training opportunities for anaesthetic trainees. The next step of the 'PDSA cycle' is to get to the 80% target for same day admission and to get more investment into the clinic in the form of consultant clinical sessions to be able to capture all patients scheduled for aortic surgery.

The St George's Hospital Vascular Anaesthesia Database: A Customisable Data Collection Tool

Sombith Maitra, St George's Hospital

Continuous quality improvement is an integral aspect of safe and effective clinical care, and an important part of anaesthetic practice. Audit is an important component of this.

Audit can be a labour intensive and difficult process. Problems include variations in data quality, information governance issues from collecting patient notes, limitations in the range of data available, and the requirement for accessing multiple systems (both online and paper) to obtain patient information. This can lead to poor quality audit and limitations to effective quality improvement.

St George's Hospital is a tertiary referral centre for vascular surgery and the leading establishment for endovascular aneurysm surgery. The case mix includes approximately 250 EVAR/TEVARs, 50-60 carotid endarterectomies, and 50-60 lower limb revascularisation procedures. There is no current standardised customisable method to collect comprehensive data for vascular anaesthesia.

FileMaker is a cross-platform relational database application. a subsidiary of Apple Inc. It is software, familiar to anaesthetists for the Royal College of Anaesthetist's logbook. This application provides a user-friendly interface to develop databases for a multitude of uses.

We have used FileMaker to develop the first Vascular Anaesthesia Database, at St George's Hospital, London. Relevant peri-operative information has been included though consensus within the vascular anaesthesia group at St George's.

Data include pre-operative assessment, risk scoring via the ACS NSQIP risk calculator and vPOSSUM (with an in-built web portal), revised cardiac risk index, intraoperative data, and post operative information. There is also a table for regional anaesthesia. The database is both easy and quick to use, with minimal time required for training. Information governance approval has been obtained.

The database is password protected, with both administrator and data-entry modes. The administrator is able to create and control accounts for data entry, as well as export information to Microsoft Excel.

Data fields can be easily added or removed to reflect the interests of the vascular anaesthesia group. The particularly important component of this database is in its 'Find' function. Data can be interrogated to select very specific groups of patients if required. For example, one would be able to find all the patients who had elective EVARs, ischaemic heart disease, uncontrolled diabetes and general anaesthesia, if required. We hope to be able to cross reference our data with the National Vascular Registry, in order to look at longer term outcomes.

Options for expansion with this database include data entry via multiple devices including secure iPads. This may allow follow up of patients in recovery or on wards. In addition, this system can be developed to facilitate direct patient care- for example, collating information and generating letters for pre-operative assessment clinics.

Our aim is to have a system to collect standardised, secure patient data to facilitate future high quality analysis, thereby having an impact on vascular anaesthesia services.

Finally, our database system has effectively created a template for data collection, which can be applied to numerous anaesthetic sub-specialties.

Anti-fibrinolytic use, and intra-operative Heparin monitoring in vascular patients; a national survey

Rhiannon Jones, Norfolk & Norwich Hospital

Vascular surgery often provides a challenging balance between minimising blood loss while providing optimal surgical conditions. The sharp increase in the use of tranexamic acid (TXA) in trauma and obstetric patients is well documented[1,2]. Multiple studies have shown that its use in these patient groups significantly reduces mortality with no evidence reporting risk of ischaemic events. Currently, there are limited studies looking at the use of TXA in patients undergoing vascular procedures.

Conversely, intra-operative effect of heparin is traditionally monitored by activated clotting time (ACT) or platelet function via thromboelastography (TEG) while activated factor Xa, which is available, often proves prohibitively expensive[3]. As no national standard exists for intra-operative heparin monitoring our survey aimed to understand the availability of testing machines and practices of monitoring.

Within the UK and Ireland 93 trusts provide vascular services of which 79 (85%) provide abdominal aortic aneurysm (AAA) surgery[4]. We created a Google survey and sent it to consultant members of VASGBI. Two main outcomes were evaluated; use of TXA during vascular procedures and, intra-operative Heparin monitoring techniques. Sub analyses of indications for, and reasons to avoid TXA were assessed while availability, use of point-of-care (POC) testing machines and time taken to achieve results were also examined.

86 responses from 43 different trusts across the UK secured a 54% response rate by Trust. Five responses were unidentified but were otherwise complete and thus included in the analyses.
Regarding TXA, only five responses from four trusts (5.8%) report provision of guidelines for its use in vascular cases. TXA was most routinely used in cases of ruptured open AAA, with responders otherwise using it only in 'selected cases'. Offers to administer TXA were declined by the surgeon in 44.2% of cases with most common reasons including 'concern/ risk of clot'.
Although administration of intra-operative Heparin is standard, only 48.2% of responses monitor its effect with ACT the most commonly measured. For the 97% of those who do monitor the effect of heparin and use an ACT POC machine, 100% of them are able to achieve a value within 10 minutes. This contrasts with TEG where only 50% of the 17 responders achieve a result within 10 minutes. Use of protamine to reverse the effects of Heparin was reported by 85.9% of responders with 32% using some form of measurement to assess clinical effect either pre- and/or post- dose of protamine.

With new NICE guidelines favouring open repair of AAA the likelihood of cases with greater blood loss may prompt increased use of TXA. However, hesitancy exists among surgical colleagues and thus caution should be exercised extrapolating data from other patient cohorts to support its use.

The intra-operative measurement of Heparin effect can be useful to evaluate individual drug handling and optimise surgical outcomes. Analysis can also help to prevent overdosing of Heparin and guide doses of protamine when indicated. Ease of measurement is heavily reliant on the presence of a POC testing machine with newer machines providing timely and accurate results.

References:
1. Shakur H, Roberts I, Bautista R, et al. Lancet. 2010; 376: 23–32
2. Woman Trial Collaborators. Lancet. 2017; 389: 2105-16
3. Tremey B, Szekely B, Schlumberger S. Br J Anaesth. 2006; 97: 453-9
4. National Vascular Registry. 2017; Appx 2

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Decreased mortality with local versus general anaesthesia for EVAR of ruptured abdominal aortic aneurysm in the UK National Vascular Registry

Richard Armstrong, Southmead Hospital, Bristol

Previous case series and a post-hoc sub-group analysis of a large randomized trial have suggested a potential benefit in treating ruptured abdominal aortic aneurysms (rAAA) using endovascular repair (EVAR) with local anaesthesia (LA) rather than general anaesthesia (GA) (1,2). However, the uptake and outcomes of LA in widespread clinical practice remain unknown.

The UK National Vascular Registry (NVR) was interrogated for patients presenting with rAAA managed with EVAR under different modes of anaesthesia between 1st January 2014 and 31st December 2016. The primary outcome was in-hospital mortality. Secondary outcomes included the number of centres performing EVAR under LA and proportion of patients receiving this technique, length of hospital stay and postoperative complications.

Some 3,101 patients with rAAA were treated in 72 hospitals during the study period (2,306 open procedures and 795 EVAR; 319 with LA, 435 GA and 41 regional anaesthesia). Overall, 56/72 hospitals (78%) offered LA for EVAR of rAAA. Baseline characteristics and morphology were similar across the three EVAR sub-groups. Patients who had surgery under LA had a lower in-hospital mortality rate compared to patients who received GA (59/319, 18.5% versus 22/435, 28.0%) and this was unchanged after adjustment for factors known to influence survival (adjusted hazard ratio 0.62, 95%CI 0.45 to 0.85, p=0.003) (Figure 1). Median hospital stay and postoperative morbidity through other complications were similar.

This is the first contemporary report of the widespread adoption of LA for emergency EVAR in the UK. Furthermore, LA for endovascular repair of rAAA appears to be associated with reduced in-hospital mortality compared to GA. This study provides further evidence of the benefit of LA for patients undergoing emergency EVAR for rAAA.

References
1. Lachat ML, Pfammatter T, Witzke HJ, et al. Eur J Vasc Endovasc Surg. 2002;23:528-36
2. IMPROVE trial investigators. Br J Surg. 2014;101:216-24
This study was supported through an infrastructure grant from the David Telling Charitable Trust.

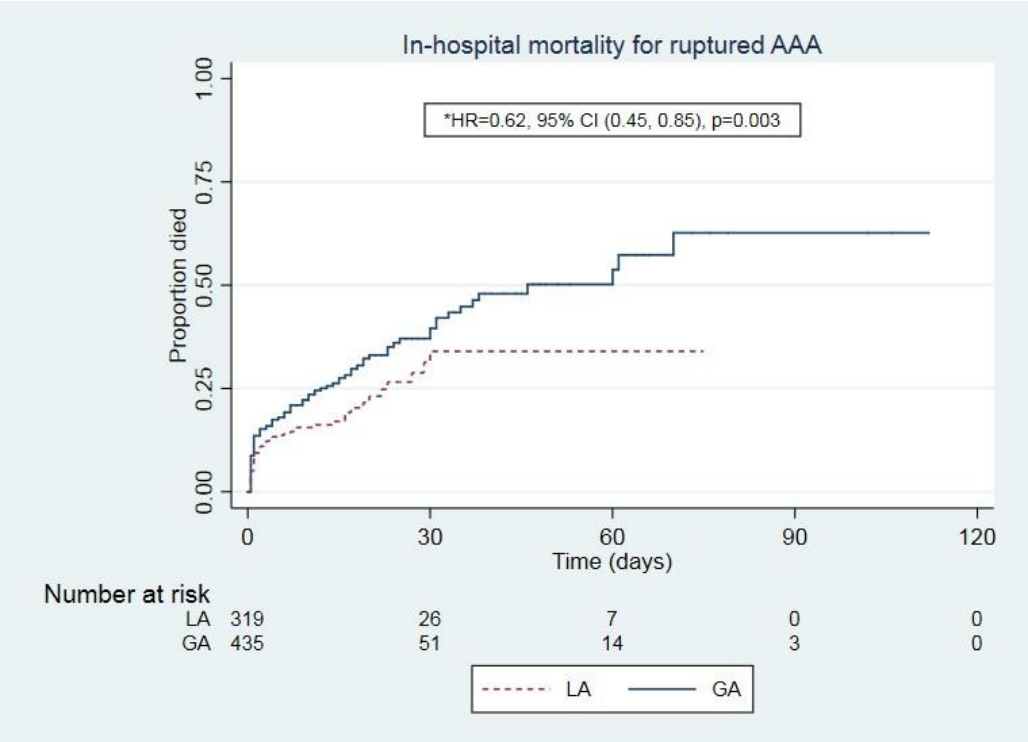

Figure 1: In-hospital mortality after emergency EVAR by mode of anaesthesia. *Hazard ratio from a cox regression model adjusting for modified Hardman score, ASA, maximum AAA diameter, gender and hospital.

The introduction and development of a protocol for heparin dosing for endovascular surgery based on ACT monitoring

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Introduction

Activated Clotting Time (ACT) monitoring has been shown to be a simple and inexpensive test which correlates with both serum heparin concentration and partial thromboplastin time (1). ACT is more effective than partial thromboplastin time for monitoring the level of intraoperative anticoagulation (2). Therapeutic ACT values are established for cardiac surgery but there is no clear consensus in endovascular surgery. Following the reconfiguration of local vascular services in 2014, complex endovascular aneurysm repair was introduced at our Trust. With increased complexity and prolonged duration of surgery we questioned the effectiveness of the standard heparin dose (5000 IU). We wished to introduce ACT monitoring for the endovascular cases and set a target ACT of twice the patients' baseline, approximating to an ACT of around 250 seconds (3). Following collection and analysis of heparin dose, patient weight and ACT results we have implemented a protocol for initial heparin dosing based on patients' weight. This abstract describes our ACT outcomes for both standard dosing and the weight adjusted heparin regimens.

Method

From 2014 we maintained a prospectively recorded database of vascular cases following the introduction of ACT monitoring. We recorded pre and post-administration ACT values using the standard administration of 5000IU of heparin. After 1 year we reviewed the data comparing the absolute dose (IU) and dose/weight (IU/kg) against ACT values. After consideration of these results a protocol for heparin bolus administration of 100IU/kg was introduced targeting an ACT of greater than 250 seconds and a rise in ACT to 200% that of baseline. We have collected a further 2 years of data to assess the effectiveness of this protocol and the results are presented.

Results

In the initial data series, 67 patients received 5000 international units (IU) of heparin. The mean patient weight was 78.4kg(range 42-140), mean dose was 66IU/kg(35.4-119) and mean post-heparin ACT was 221secs(142 – 326) with a mean percentage change of 161%(104 – 206). 14(20.9%) patients met the set target of an ACT post-heparin of 250secs. Following the protocol introduction data on 38 patients have been collected. Mean patient weight was 77.6kg(51-118). Average dose given was 6873IU(4500–10000) and mean dose/kg was 89.4(50-103). Median post heparin ACT was 267secs(149 – 397) with mean percentage change of 182%(108–269). Twenty-four (63%) patients met the set target ACT post-heparin administration.

Conclusions

The data from our initial collection did not point to a definitive dose of heparin calculated on a weight basis to achieve ACT targets. In view of this the protocol adopted was in line with other national units and has led to an improvement in the percentage of patients achieving target ACT's. Further work is needed to assess whether other demographic data such as BMI may provide a more reliable way to calculate heparin doses and the incidence of adverse events associated with higher heparin dosage.

References

1) Simko RJ, Tsung FFW, Stanek EJ. Activated clotting time versus activated partial thromboplastin time for therapeutic monitoring of heparin. Ann Pharmacother 1995 Oct;29:1015–1021.

2) Alexander Poisik, M.D., Eric J. Heyer Safety and Efficacy of Fixed-dose Heparin in Carotid Endarterectomy. Neurosurgery. 1999 Sep; 45(3): 434–442

3) ATOTW. Anaesthesia for Endovascular Aortic Aneurysm Repair (EVAR) G Atwal, S Wylie, 2014

Implementation of the NICE guidance on abdominal aortic aneurysm: diagnosis and management, how might the patients attending Sheffield Teaching Hospital be affected?

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The National Institute for Health and Care Excellence (NICE) published a draft guidance consultation document on 'Abdominal Aortic Aneurysm: diagnosis and management' (1). Released by NICE for review between 16/05/18 and 29/6/18 this guidance document suggests that abdominal aortic aneurysm (AAA) repairs should be done routinely as open surgical procedures, with endovascular aneurysm repair (EVAR) reserved only for a selected few high risk patients.

Using data collected prospectively as part of our trust registered cardiopulmonary exercise testing (CPET) service evaluation we investigated how these guidelines may have affected our patients if they had been implemented in the 18 months from January 1st 2016.

During that 18-month period 106 elective AAA repairs were undertaken at the Northern General Hospital (NGH), Sheffield. Just under half, 45% were EVAR. This EVAR group had a mean total hospital length of stay of 4.1 days compared to a 7.7 day mean hospital length of stay for the open group. Focusing on length of stay upon critical care, the EVAR group had a mean stay of 0.75 days and the open repair group 3.4 days.

Interrogating the database for information on patient fitness as recorded at the time of CPET we found that the mean anaerobic threshold (AT) for EVAR and open were 9.95 and 11.62 respectively, with the mean peak oxygen consumption (VO2) 14.33 and 17.63 for EVAR and open during this 18 month period.

The aforementioned NICE guidance document suggests that scoring systems should not be used to inform on wither interventions for AAA should occur. So if looking to offer intervention based on an objective fitness assessment we, for the purpose of this analysis, considered this EVAR group suitable to have undergone elective open repair.

Undertaking all the EVAR repairs during this 18 months as open could have resulted in total length of stay increasing by 3.6 days per patient, an additional 172.8 hospital bed days in total for these 48 patients. Analysing the critical care length of stay data and it's an additional 127.6 bed days in the high dependency unit (HDU). Given that our 12 bedded HDU offers 4380 bed days this 127.6 increase equates to 2.9% of the available occupancy. This is a 2.9% increase is additional need as our HDU operates at >100% capacity.

If we delve deeper into individual patient fitness and risk stratify as Hartley and colleagues did in their 2012 fitness predicts early mortality validation paper (2) and consider our 'at higher risk' EVARs to have a similar length of stay as our 'at higher risk' open repairs had the intervention undertaken been an open surgical repair and not EVAR the need for additional resources escalates further. It would add 5.2 extra hospital bed days to length of stay per patient and result in 1 extra unplanned admission to intensive care for every 3 cases done.

The NICE publication was a consultation document. If the eventual guidance is that diagnosis and management should lead patients down the path of open surgical repair Sheffield would struggle to accommodate them without an increase in our critical care capacity. The alternative approach may be to allow time within the patient's pathway for patients to improve their fitness.

Analysis of the cardiorespiratory fitness (CRF) of this 'at higher risk' group, as determined by a maximal CPET test, reports a mean peakVO2 in this group to be 13.33 ml/kg/min. This 'at higher risk' group would require an improvement of only 1.6

Sheffield Vascular Institute referrals for cardiopulmonary exercise testing prior to consideration for abdominal aortic aneurysm repair: Has a decade made a difference to the patients being referred?

Karen Kerr, Sheffield Teaching Hospitals

Abdominal Aortic Aneurysms (AAA) account for 3% of deaths in men aged 65-85 years in developed countries (1). Once diagnosed the treatment options include surgical open repair, endovascular repair (EVAR) and observation. The treatment option is decided upon the shape and size of the aneurysm, the interventional expertise at the treatment centre and the fitness and wishes of the patient.
The gold standard for assessing cardiorespiratory fitness (CRF) is cardiopulmonary exercise testing (CPET) (2) which uses a ramped exercise protocol on an electronically braked ergometer. CPET provides an objective assessment of an individual's CRF that can be used to risk stratify the individual in relation to predicted short term AAA intervention outcome (3).
The population is aging, comorbidities are increasing. There is concern that the perceived accompanying decreased fitness will have implications for future treatment success.
The primary aim of this CPET service evaluation was to compare the objectively measured CRF of AAA patients being referred to Sheffield during the 18 months from January 1st 2006 (group 1, 125 individuals) with those patients referred in the 18 months from January 1st 2016 (group 2, 169 individuals) to determine if fitness had declined over the decade.
Comparison of the groups was undertaken using SPSS software in order to identify differences in demographics and CPET variables.
Demographic analysis revealed the two groups were similar with respect to age, gender, BMI and AAA size. Comparison of CPET variables showed statistically significant differences between the groups with respect to the indices of fitness (Aerobic Threshold – $p=0.047$, Maximum VO_2 – $p= 0.015$, Ve/VCO_2 – $p=0.012$) . Although statistically significant it could be argued that the difference was not clinically significant as the lower values recorded for group 2 would still place over 50% of individuals on the 'fit' side of the fit/unfit demarcation line validated by Hartley and colleagues.
Also noted is a large increase in the percentage of patients undergoing EVAR compared to an open procedure in group 2 (13.9% vs. 39.6% $p =<0.001$), as well as a decrease in the numbers of critical care bed days and a decrease in the total length of hospital stay (Median stay 8 days vs 5 days, $P=<0.001$).
We have identified statistically significant differences between the groups with respect to CPET variables, and if this trend were to continue the reduction in cardiovascular fitness could have consequences on the future management of this patient group. Our findings suggest that future audits will be required to monitor ongoing population changes. We observed that over the decade under review practice at STH shifted to increase the proportion of elective patients undergoing EVAR. With this shift the number of in-patient bed days occupied by AAA patients has fallen.
The recent draft NICE guidance document; Abdominal Aortic Aneurysm: diagnosis and management (4) is a cause for some angst as it suggests that open surgical repair is the approach of preference for all but a few particularly high risk elective infra-renal AAA >5.5cm.

1. Skalihasan N, Lancet 2005; 365: 1577-1589
2. Moran J, Br J Anaesth 2016; 116 : 177-91
3. Hartley RA, Br J Surg 2012; 99:1539-46
4. https://www.nice.org.uk/guidance/indevelopment/gid-cgwave0769 accessed July 2018

Pre-operative anaemia management in patients undergoing elective endovascular aneurysm repair (EVAR)

Joseph Wheatley, Manik Chandra, Leeds General Hospital

Pre-operative iron deficiency anaemia is common in elective surgical patients(1). In elective endovascular aneurysm repair (EVAR) pre-operative anaemia is associated with increased blood transfusions, length of stay and risk of post-operative complications(2,3). Both national and international guidelines provide a strategy to manage anaemia in patients scheduled for elective surgery predicted to involve moderate to high blood loss (>500ml)(4,5). Whilst minimal blood loss is expected during uncomplicated infra-renal EVARs, complications or prolonged complex procedures can result in >500ml blood loss. We audited elective patients undergoing EVAR to assess whether this guidance is being followed and the possible effects of anaemia peri-operatively.

Elective EVAR patients in 2017 were identified from interventional radiology records. Data, including age, pre and post procedure blood tests, length of stay and post-operative complications, was then collected using our Trust's electronic patient record and result server. Anaemia was defined as haemoglobin <130g/L(4). Length of stay was further analysed to give an independent samples T-test using SPSS.

85 patients with pre and post procedure haemoglobin results were identified. Median age was 77 years (IQR 70-82 years). Pre-operative haemoglobin ranged from 93-174g/L (median 133g/L, IQR 122-142g/L). 39 patients (45.9%) were found to be anaemic pre-operatively. Of all patients only 5 (5.8%) had haematinics checked and no patients had surgery delayed to investigate or correct anaemia. Of the anaemic patients, 5 (12.8%) required peri-operative transfusion of red blood cells, compared to 3 (6.5%) in the non-anaemic group. With regards to post-operative complications 9 (21.4%) of the anaemic group encountered complications compared with 6 (12.5%) of the non-anaemic group. Mean length of stay in the anaemic patients was 4.1 days (SD 4.42) compared to 1.9 days (SD 1.77) in the normal haemoglobin cohort (p=0.011).

The prevalence of anaemia in this patient group is high and associated with an increase in morbidity, rate of transfusion and a statistically significant increase in length of stay. We are working closely with other disciplines, including primary care, to improve outcomes by introducing a pre-operative anaemia pathway to meet current recommendations. Our aim is to investigate and then initiate medical management (intravenous iron or, if time allows, oral iron therapy) as early as possible in the pathway for patients with iron deficiency anaemia undergoing an elective EVAR.

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References

1. Goodnough LT, Shander A, Spivak JL, et al. Detection, evaluation, and management of anaemia in the elective surgical patient. Anesth Analg, 2005; 101:1858-61
2. Aridi HD, Nejim B, Paracha N, Alshwaily W, Locham S, Malas M. Anemia and postoperative outcomes after elective abdominal aneurysm repair. J Vasc Surg, 2018; 67: e17-18
3. Diehm N, Benenati JF, Becker GJ, et al. Anemia is associated with abdominal aortic aneurysm (AAA) size and decreased long-term survival after endovascular AAA repair. J Vasc Surg. 2007; 46: 676–681
4. Muñoz M, Acheson A, Auerbach M, et al. International consensus statement on the peri-operative management of anaemia and iron deficiency. Anaesthesia, 2017; 72:233–247
5. National Institute for Health and Care Excellence. Blood Transfusion (NICE Guideline 24). Available at: nice.org.uk/guidance/ng24 [Accessed 10/07/18]

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