

CARDIOVASCULAR

Abdominal aortic aneurysm repair in the United Kingdom: an exemplar for the role of anaesthetists in perioperative medicine

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Abstract

The past two decades have seen an increasing recognition that the delivery of safe surgery with low complication rates and good long-term outcomes is a team endeavour embracing the whole patient care pathway. The key role of the anaesthetist in managing the patient through the surgical process is widely understood and has driven the emergence of perioperative medicine. In parallel with these developments there has been a sea change in the organisation of the care of patients presenting for elective abdominal aortic aneurysm (AAA) repair. Data from the 2008 report of the VASCUNET vascular registry suggested that the UK had the highest mortality for elective open AAA repair in Europe (7.9%). In response, a national quality improvement programme (AAAQIP) spanning the disciplines of surgery, anaesthesia, radiology and nursing was put in place. This led to significant changes in all aspects of AAA repair including the role of the anaesthetist. Preoperative assessment by an anaesthetist with a vascular practice was mandated and the role of the anaesthetist in the vascular multidisciplinary team meeting (MDT) established. Anaesthetic data were included in the national data collection system for vascular surgery, the National Vascular Registry. These changes paralleled and in some cases led the wider evolution of the role of the anaesthetist in perioperative medicine. The mortality from infrarenal AAA repair in the UK decreased to 2.4% by 2012. This improvement reflects changes in perioperative care supported and in some cases led by anaesthetists.

Key words: Abdominal aortic aneurysm; quality improvement

'I have always looked upon extensive disease of the heart as a contra-indication, to a certain extent, of inhalation, and have expressed opinions to that effect.'

John Snow 1848

John Snow, as one of the founding fathers of anaesthesia, recognised the impact of co-existing disease on surgical outcome.¹ In the century and a half since Snow wrote on cardiac disease the role of the anaesthetist has been transformed and is now understood to be integral to the delivery of high-quality safe surgical care. The development of anaesthesia has seen the expansion of the work of the anaesthetist beyond the confines of the operating theatre to the pre-assessment clinic, the ward

and the critical care unit. This change has accelerated in the past 15 yr with the advent of Enhanced Recovery After Surgery (ERAS) programmes and the recognition of the discipline of perioperative medicine.

In many ways the evolution of perioperative care in non-cardiac surgery has been led by changes in the care of patients undergoing cardiac surgery, where the Fast Track approach of bundling perioperative treatments produced significant differences in postoperative intensive care unit length of stay.² Effective quality improvement rests on the systematic implementation of change and the measurement of effect of this change. A bundle is a set of evidence-based practices

(usually three to five) that are implemented together to support systematic rather than haphazard change in care.³ This strategy was applied to colorectal surgery and found to reduce postoperative morbidity and length of stay.^{2 4 5} The success of these initial studies led to the development of ERAS programmes.

An integrated approach to perioperative care lies at the core of ERAS. It is a package of care that begins before admission and encompasses preoperative, intraoperative and postoperative care. There is evidence to support 24 elements of ERAS.⁵ Many of these fall into the sphere of anaesthetic care including preoperative assessment and optimisation, preoperative fasting and nutrition, perioperative fluid management, and multimodal pain control.

Whilst enhanced recovery has ushered in the delivery of standardized evidence based perioperative care there remains much work to be done on the implementation of ERAS. Uptake is variable and has to be tailored to individual systems and settings.⁶ Nevertheless, the next logical steps in the evolution of perioperative care are being taken. Standardized care improves outcomes so long as it is recognised that people are individuals and may vary in their needs. Surgical care systems should be able to deliver management that eliminates inappropriate variation whilst at the same time modifying care where necessary. This may involve prehospital interventions to address comorbidities and frailty, modifications to the surgical and anaesthetic plans to manage comorbidity (e.g. use of carbon dioxide rather than contrast angiography in renal impairment), modifying the planned level of postoperative care in higher risk patients, and early discharge planning for frail or vulnerable patients.^{7 8}

Anaesthetists are uniquely equipped to coordinate the delivery of sophisticated individualised care. It is essential for patients that the specialty of anaesthesia evolves to embrace the whole surgical care pathway. In 2012 Grocott and Pearce⁹ made a strong case for formal recognition of the role of anaesthesia in preoperative and postoperative care both for the good of the specialty and, most importantly, for the good of patients.⁹ They emphasised the importance of integrated care across the whole surgical episode and the role of the anaesthetist in delivering it stating:

'The aim of perioperative medicine is to deliver the best possible pre-, intra- and postoperative care to meet the needs of patients undergoing major surgery.^{1 2} This will be achieved through refining existing care pathways and by developing new pathways where current approaches are not fit for purpose.'

In 2015 the Royal College of Anaesthetists launched its Perioperative Medicine Programme. Again this focuses on the delivery of integrated care across the journey taken by the surgical patient. It recognizes the key role of the anaesthetist in improving perioperative care.¹⁰

The concept of the Perioperative Surgical Home (PSH) has brought a similar focus on the whole surgical episode to practice in the USA. As with the model of care promulgated by the Royal College of Anaesthetists, the PSH model reaches beyond enhanced recovery and emphasises co-ordination of care from the decision to operate until 30 days after discharge.¹¹

The challenge of mortality in abdominal aortic aneurysm repair

Elective abdominal aortic aneurysm (AAA) repair is a prophylactic operation performed to prevent death from aneurysm rupture and catastrophic haemorrhage. Because of the risks of operating on the aorta and the burden of comorbidity in this

group, patients with AAA are at particular risk of intraoperative and postoperative complications. Options for AAA repair include open surgery and endovascular aortic stenting (EVAR). Open repair is associated with a significant immediate risk of death and major complications. EVAR carries a lesser but still significant risk of complications and may not achieve definitive aneurysm repair, with a significant proportion of patients developing a leak around the aortic stent (endoleak).^{12 13} The risk of aortic rupture increases with increasing aortic diameter and the decision to offer aneurysm repair is informed by the risk benefit balance of intervention vs conservative management.¹⁴

Ten years ago most United Kingdom (UK) doctors working in vascular surgery believed that the care provided in the UK for AAA patients was as good as any in the world. Ljungquist and colleagues⁵ suggest that health care professionals tend to believe that their outcomes are better than is really the case. There is no doubt that in a low volume high risk service it can be difficult to recognise fluctuations in the quality of care.¹⁵ In 2008 a report prompted questions regarding the quality of care of AAA patients across the UK.¹⁶ After an initial response of shock and disbelief the response to this report was a model of quality improvement in healthcare. One of pillars of this was a systematic approach supporting changes in the patient pathway from referral to discharge in individual vascular units that is an exemplar of the application of the principles of perioperative medicine.

In 2008, VASCUNET, the international audit run by the European Society for Vascular Surgery, reported outcomes from vascular surgery across eight European Countries, Australia and New Zealand. This showed mortality from open aortic aneurysm repair in the UK in the period 1994 to 2006 to be the highest in Europe at 7.9% as against an international average of 3.5%.¹⁶ These data were supported by a number of studies including the Vascular Anaesthesia Society of Great Britain and Ireland (VASGBI) audit of outcome from elective abdominal aortic aneurysm repair in the UK and Ireland. This reported an overall mortality of 7.3% in a population of 933 patients drawn from 177 hospitals over three months.¹⁷ A subsequent analysis of VASCUNET data for nine countries for the period 2005–2009 demonstrates the differences between nations in more detail. Table 1 details differences in mortality rates between countries for intact and ruptured AAA.¹⁸ During the period studied, which differed from that of the VASCUNET report, the overall mortality across all countries for elective repair of AAA (intact AAA) was 2.8% (95% CI 2.6–3.0%) as compared with 4.0 (3.6–4.4%) in the UK. This analysis also identified an increase in the use of EVAR over the period studied. The overall rate of EVAR across all countries increased from 27.5% (25.9–29.1%) in 2005 to 53.4% (52.3–54.6%) in 2009. A similar trend was seen in the UK with an increase from 20.2% (16.6–24.4%) to 48.5% (46.7–50.3%). Perioperative mortality rates (30 day mortality in some countries and in-hospital mortality in others) were lower with EVAR than open repair with sex differences in outcome for both modalities of repair. In the full dataset for all countries mortality after EVAR was 1.3% (1.1–1.5%) for men and 2.4% (1.7–3.3%) for women. For open repair the mortality for the same period was 3.4% (3.1–3.7%) for men and 4.5% (3.8–5.4%) for women. This analysis also presents comparative data for outcome from ruptured AAA. Overall there was a statistically significant decrease in mortality from ruptured AAA over time from 32.8% (30.0–35.7%) in 2005 to 28.6% (26.4–30.9%) in 2009. The data for the UK were encouraging, with a decrease in mortality from 42.5% (34.9–50.4%) in 2005 to 28.6% (25.2–32.0%) in 2009. It is suggested that this improvement in mortality reflects the increased

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