Surgical open repair of the thoracoabdominal aortic aneurysm (TAAA) is a challenging and complex procedure that is associated with significant morbidity and mortality, which mandates close communication and “teamwork” among health care providers. Organ protection is a critical part in ensuring successful results after TAAA surgery. The complex nature of organ injury mandates a multimodal approach to protection. Several aortic centres have designed various strategies for organ protection, but all are in pursuit of one common goal, improving patient outcomes by reducing ischaemic complications. Additionally, recent laboratory studies and clinical observations suggest that a robust collateral vessel network must exist to provide preservation of spinal cord perfusion in the event that segmental vessels are interrupted.

Preoperative assessment

The anaesthetic approach to the patient with a TAAA must take into account nearly every organ system. Thorough knowledge of the extent, location and size of the aneurysm, the functional status of the heart, and the coronary artery anatomy are mandatory. Respiratory complications are the most common problems associated with these procedures, and a preoperative pulmonary work-up is crucial. Coagulopathy represents another frequent surgical complication, and preoperative assurance of haemostatic competence is important. Neurological deficits play an important role during and after surgery: pre-existing deficits in the nervous system must be identified. Dental evaluation may help prevent infection, especially when foreign material will be used. Enhancement of close communication among all health care providers (surgeons, anaesthesiologists, cardiologists, internists, intensivists, dentists, pulmonolo-
gists, haematologists, neurologists, perfusionists, nurses, etc.) may reduce surprises in the operating room, delays, cancellations, morbidity, and mortality.

Aortic surveillance programme

Early diagnosis of aortic aneurysms is of paramount importance. Elective surgery in specialized institutions has the best results. Patients who experience aortic dilatation are at risk of an immediate aortic event (dissection or rupture). Hence, the decision confronting both patient and physician upon the discovery of an aneurysm is whether or not surgery should be performed. If immediate surgery is not required, patients are entered into an automated programme for serial follow-up. The Aortic Aneurysm Surveillance Program reviews all imaging studies. An elective aortic intervention (surgical or endovascular) is recommended when the risk of aortic rupture outweighs the risk of surgery. Most of the patients undergoing elective surgical procedures are admitted to the hospital on the morning of surgery. All patient information is electronically sent to surgeons, anaesthesiologists, perfusionists, the blood bank, OR nurses, intensivists, pain service, neuro-technicians and other providers prior to surgery.

Panel 1: Routine haemodynamic and neurological monitoring in patient undergoing thoracoabdominal aortic aneurysm repair. MEPs – motor evoked potentials; SSEPs – somatosensory evoked potentials; TEE – transoesophageal echocardiography. Reproduced by permission (1).

Preoperative antibiotic prophylaxis is administered 90 minutes prior to skin incision. It is important to note that the use of certain anaesthetic agents is contraindicated, as to
allow proper neurological monitoring throughout the surgery.

In addition to the usual anaesthetic management for any open heart procedure, the anaesthetic management for TAAA also requires strategies for protecting the integrity of the spinal cord, mesenteric organs, and lower extremities from ischaemia - a possible consequence of temporary interruption of the blood supply. The incidence of spinal cord injury (SCI) following repair of TAAA has been reported to be between 4 – 10%. Factors associated with postoperative SCI include aortic cross-clamp time, the extent of the aneurysm, acute aortic event (dissection or rupture), previous aortic surgery, and comorbidities of other organ subsystems. During the last decade, a number of methods have been introduced to reduce SCI, including cerebrospinal fluid drainage, regional hypothermic protection of the spinal cord by epidural cooling or technique of deep hypothermic circulatory arrest, reimplantation of patent intercostal arteries, and use of distal aortic perfusion. Continuous peri-operative monitoring (see panel 1) and updates in post-operative care may improve outcomes.

Alternative approaches for the repair of TAAA (e.g., the use of endovascular surgery or hybrid repair of thoracoabdominal aneurysm) continue to be evaluated.

References

3. Pronovost PJ, Freischlag JA. Improving Teamwork to Reduce Surgical Mortality JAMA 2010; 304: 1721-1722