Successful isolated small bowel transplantation in short bowel syndrome: Anaesthetic considerations

Sir,

A 34-year-old lady, a known case of lupus anticoagulant, underwent extensive small bowel resection for a superior mesenteric artery (SMA) thrombosis. Owing to short bowel syndrome, she was maintained on total parenteral nutrition (TPN) and listed for an isolated small bowel transplant (SBT) in view of catheter-related sepsis.[1]

At the time of her allotment to a group-matched donor one and half years later, she weighed 29 kg, haemoglobin 12.2 g/dL, platelets 267 × 10^3//mcL, fibrinogen 363 mg/dL, and glycosylated haemoglobin of 5.1 while on enoxaparin 0.6 ml subcutaneous (s.c) and insulin on account of lupus anticoagulant and coexisting diabetes mellitus.

Sub-cutaneous dose of 15 mg alemtuzumab (Campath-1H) was administered 1 h prior to surgery. Modified rapid sequence induction with intravenous (IV) midazolam 2 mg, fentanyl 100 μg, lidocaine 40 mg and propofol 60 mg, intubation at 1 min after 30 mg rocuronium with application of cricoid pressure was performed and maintenance with isoflurane at 0.7-1.0 minimum alveolar concentration (MAC) in a 50% air oxygen mixture. Cis-atracurium was used for neuromuscular blockade subsequently. Femoral arterial and right internal jugular accesses were obtained with ultrasound guidance. Antibiotic prophylaxis of injection doripenem 500mg, teicoplanin 400mg and fluconazole 400 mg were provided. The graft SMA was anastomosed to the recipient infrarenal aorta and SMV (vein) to the inferior vena cava. The patient received 3.0 L crystalloid (Kabilyte, Fresenius-Kabi), 1 unit packed red cells (PRBC) and 25% albumin (100 ml) during the 5 h surgery with unfractionated heparin (UFH) 2500 IU, methylprednisolone 500 mg IV and 75 mg of aspirin through the Ryle’s tube at arterial anastomosis. Noradrenaline at 0.04 μg/kg/min and prostaglandin E1 at 0.25 μg/kg/h started at reperfusion. Infusion of 20% albumin was started to avoid bowel oedema following reperfusion. Additional methylprednisolone 500 mg and UFH 2500 units were administered at vascular anastomosis of the new graft [Figure 1]. The surgery was completed with jejunoojejunal anastomosis, end ascending graft colostomy and venting gastrostomy. She was extubated 12 h later after confirmation of normal Doppler parameters.

Her postoperative course was complicated by gram negative sepsis, intermittent stomal dysfunction, a chyle leak and peripancreatic collection that were managed per guidelines. She had gained weight (42 kg) and was on supervised oral nutrition at the time of her discharge 48 days later.

Short bowel syndrome following massive surgical resection is the commonest indication for SBT and is emerging as a viable option in adults.[2] The anaesthetic concerns for the recipient were background prothrombotic state, scarcity of peripheral and central venous access sites following repeated cannulation, the risk for aspiration and nutritional deficiencies [Table 1]. Ultrasound-guided vascular access and modified rapid sequence induction was performed in this patient. Acetated crystalloid solution was used to avoid confounding effects on serum lactate.[3] Our patient was haemodynamically stable and did not require advanced cardiac monitoring[4] but transoesophageal echocardiography (TEE) may be useful if haemodynamic instability occurs during surgery.[5] Two arterial lines, one in the radial and the other femoral should be...
available if a complete aortic cross clamp is needed, however we experienced technical difficulty and had femoral access only. An infusion of prostaglandin E1 at 0.25 \( \mu g/kg/h \) was started as it can improve microcirculation and enhance immunosuppression. The postoperative management centred on scrupulous asepsis in care, maintenance of haemodynamics, nutritional replacement and management of infections. Parenteral nutrition was continued postoperatively until the chyle leak had settled and the patient able to tolerate oral feeds.

We believe that this is the first recount of anaesthesia for SBT in India and wish to highlight the anaesthetic implications for the management of isolated small bowel transplantation in this patient.

**Declaration of patient consent**
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Financial support and sponsorship**
Nil.

**Conflicts of interest**
There are no conflicts of interest.

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**Table 1: Anaesthetic considerations in small bowel transplant**

| Stage of surgery | Concerns | Implications and tests |
|------------------|----------|------------------------|
| Donor evaluation | Ideal donor\(^6\) (Deceased brain-dead donor) | HLA matched, No abdominal trauma, Age<50 years and size matched to recipient (75% of recipient weight), Na<155 mmol/L, ICU stay<1 week, No ongoing transfusion, Initiation of early enteral nutrition |
| Preoperative evaluation | Indication for SBT Hypercoagulable states. Central and peripheral access evaluation. Cardiovascular evaluation Standard tests Micronutrient deficiencies | Prior surgery-adhesions Anticoagulation Doppler/venography assessment Noninvasive stress testing/Invasive if indicated. CBC, metabolic panel Mg, Zn, Cu, Se, vitamins, Albumin, transferrin |
| Prior to shifting to OR | Immunosuppression Anticoagulation | OT asepsis. Limited personnel. Gowns/gloves |
| During surgery | Dissection phase Anastomotic phase Bowel reconstruction | Blood losses. Non-lactate containing crystalloid. Immunosuppression Reperfusion syndrome Anticoagulation added Maintenance of blood pressures Albumin for bowel oedema Avoidance of excessive vasopressors to avoid vasospasm |
| Postoperative | Extubation when stable Vascular integrity Infections Chyle leak Nutrition Rejection | Lactate levels Enteroscopy Meticulous asepsis TPN, low fat diet TPN until tolerating orally (2-6 weeks) Immunosuppression |

SBT=Small bowel transplant, CBC=Complete blood count, Mg=Magnesium, Zn=Zinc, Cu=Copper, Se=Selenium, TPN=Total parenteral nutrition, OT=Operation theatre, ICU=Intensive care unit, HLA=Human leukocyte antigens, 6: reference 6
Sir,

Duchenne Muscular Dystrophy (DMD) is an X-linked recessive disorder caused by mutation in the dystrophin gene located on chromosome Xp21. Proximal muscle weakness is observed in early childhood with progression to respiratory distress and cardiomyopathy. Female genetic carriers though mostly asymptomatic often present with high plasma creatine kinase levels, variable degree of muscle weakness and rarely cardiac involvement like severe heart failure, left ventricular dilatation and cardiomyopathy. Volatile anaesthetics or neuromuscular blocking agents (depolarising) can trigger extreme hyperthermia, rhabdomyolysis, hyperkalemic cardiac arrests. [1]

Breast cancer being the most common cancer in India, accounts for 27.8% between the 25 and 49 age group. [2] The choice of anaesthesia in modified radical mastectomy (MRM) is most often general anaesthesia with or without regional blocks or the use of pre-emptive analgesics. The pain of breast surgery is often underreported or undertreated. [3]

A 34 year old, 76 kg female, a case of carcinoma left breast was scheduled to undergo MRM. The pre-anaesthetic check revealed the patient was a DMD gene carrier, diagnosed on family screening (as her brother was suffering from DMD). Past history was uneventful with a full-term normal delivery. The serum creatine kinase level was 1500U/L (N-22 to 198U/L). We planned a thoracic epidural anaesthesia (TEA) with ultrasound guided modified pectoral nerve (PEC type I and II) block with standard monitoring. The thoracic epidural catheter was inserted in sitting position in the T5-6 interspace. A total 10 ml of a titrated dose of 2% lignocaine with adrenaline (1:2,00,000) was injected over 10 minutes. The patient was made to lie down supine with hand abducted 90°, ultrasound guided scan was done using the linear high frequency probe in the parasagittal and para-median plane to identify the coracoid process and then identify the superficial pectoralis major and deeper pectoralis minor muscles [Figure 1]. The modified PEC block was administered between pectoralis major and pectoralis minor muscle (12.5 ml) to anaesthetise medial and lateral pectoral nerve in the vicinity of the pectoral branch of the thoracoacromial artery and subsequently 20 ml between pectoralis minor and serratus anterior muscle to anaesthetise the long thoracic nerve and intercostal nerve with 0.375% of Inj.ropivacaine and Inj. dexamethasone 4 mg. A sensory blockade T1- T7 was achieved within 15 min which we confirmed on a pin prick sensation. Inj.paracetamol 1 gm i.v. was given as a part of multimodal analgesia. 100% oxygen at rate of 4 L/min was administered via nasal cannula. Surgery lasted...