

Anesthetic implications in esophageal replacement surgery: a report of two cases

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Keypoints

Esophageal replacement surgery possess unique challenges in the form of extensive tissue dissection causing significant fluid shifts, arrhythmias and high incidence of postoperative complications. Positive outcome can be achieved by adequate analgesia, vigilant monitoring and elective postoperative ventilation.

Abstract

Introduction

To highlight intraoperative and postoperative challenges in patient with esophageal atresia or stricture undergoing esophageal replacement surgery. We report two such cases and important considerations in its management.

Case report

First case. 4 year old child, weighing 16 kgs, with history of corrosive ingestion 1 year back, which lead to development of stricture. He was planned for jejunal transposition surgery.

Second case. 18 months old infant, weighing 10 kgs. He had esophageal atresia and esophagostomy and gastrostomy was done on 2nd day of life. Gastric pullup surgery was planned for the patient.

In preanesthetic examination no associated congenital anomaly was present. We planned for general anesthesia along with lumbar epidural for intraoperative and postoperative analgesia. Proper oropharyngeal suction was done. After premedication with midazolam and glycopyrrolate, fentanyl 2µg/kg was given. Thiopentone and succinylcholine were used for induction. After endotracheal intubation, lumbar epidural was given in L3-L4

intervertebral space and epidural catheter was inserted followed by 0.2% ropivacaine 0.5 ml/kg bolus. Intraoperatively hypotension occurred in first case but managed successfully with blood transfusion and vasopressors.

Postoperatively both patients were shifted intubated to ICU for elective ventilation and kept sedated with midazolam 2µg/kg/min. Analgesia was maintained with epidural 0.2% ropivacaine combined with 0.5µg/kg dexmedetomidine 6 hourly. Both were extubated on 2nd and 3rd postoperative day.

Conclusion

Esophageal replacement surgery is challenging case for anesthesiologists in various perspectives including risk for major blood loss, requirement for adequate intraoperative and postoperative analgesia, pediatric patient and need for postoperative elective ventilation and adequate sedation. Cautious management is required in all these aspects for a favourable patient outcome.

Keywords: esophagus, esophageal atresia, analgesia, epidural.

Introduction

The usual indications for esophageal replacement in childhood are intractable corrosive strictures and long-

gap esophageal atresia¹. Anastomotic and cardiopulmonary complications contribute the majority of perioperative morbidity and mortality. Improvement in outcome may be achieved by appropriate risk assessment and patient selection, choice of anesthetic techniques and their execution, and optimizing perioperative and postoperative care.²

Case report

First case. 4 year old child, weighing 16 kgs presented with history of corrosive ingestion 1 year back, which lead to development of esophageal stricture. Multiple attempts at esophageal dilatation under general anesthesia were unsuccessful. He was planned for esophagectomy followed by jejunal transposition.

Second case. 18 month old child, weighing 10 kgs. He had congenital isolated esophageal atresia and cervical esophagostomy and feeding gastrostomy was done on 2nd day of life. Now, gastric pullup surgery was planned as definitive procedure.

Preanesthetic examination revealed a normal developmental history and no associated congenital anomaly was present. Routine preoperative investigations were unremarkable. We planned for general anesthesia along with lumbar epidural block for intraoperative and postoperative analgesia.

After taking the patient on operation table, routine monitors were attached (ECG, NIBP, SpO₂, Temperature probe). Two well functioning I.V. lines secured. Proper oropharyngeal suction was done. After premedication with 0.04mg/kg midazolam and 0.004mg/kg glycopyrrolate, 2µg/kg fentanyl was given. Thiopentone 5mg/kg and succinylcholine 2mg/kg were used for induction and endotracheal intubation with appropriate sized tube was done. After intubation, lumbar epidural block was given in L3-L4 intervertebral space and epidural catheter was inserted followed by 0.2% ropivacaine 0.5 ml/kg bolus. Limbs of patient were covered with cotton and fluid warmers were used to prevent hypothermia. Anesthesia was maintained with sevoflurane, fentanyl and atracurium. Careful intraoperative monitor-

ing was done during tunneling in posterior mediastinum as there is increased risk of cardiac arrhythmias and hypotension (due to vagal stimulation and surgical manipulation which interferes with cardiac filling). Airway pressures and tidal volume were also monitored vigilantly.

Intraoperatively hypotension occurred in first case but was managed successfully with colloids, blood transfusion and vasopressors.

At the end of surgery, intercostal chest drain was placed due to the risk of pneumothorax. Nasogastric tube was properly secured to allow free drainage to prevent acute gastric dilatation in early postoperative period.

Postoperatively both patients were shifted intubated to ICU for elective ventilation (due to airway edema resulting from soft tissue dissection) and kept sedated with midazolam 2µg/kg/min. Analgesia was maintained with epidural 0.2% ropivacaine combined with 0.5µg/kg dexmedetomidine 6 hourly. Epidural catheter was removed after 48 hrs. Proper weaning from ventilator was done and both were extubated on 2nd and 3rd postoperative day.

Discussion

With the decline in mortality from esophageal replacement surgery over the last few years, focus may now be on decreasing the morbidity. Improving the blood supply of the esophageal anastomosis, methods to reduce the incidence of cardiopulmonary complications and optimizing fluid management in these patients are areas in which anesthetic care may contribute.²

As the procedure is lengthy and involves considerable blood loss and fluid shifts, multiple large bore iv access should be present. Adequate fluid and blood replenishment should be done to maintain perfusion of vital organs. Kita et al found that a positive perioperative fluid balance was associated with adverse surgical outcomes in patients with transthoracic esophagectomy.³ Thus goal directed fluid therapy should be given and excessive fluid administration should be avoided. Hence, the task of balancing perfusion pressure and oxygen deliv-

ry to vital organs and the gut mucosa, and the prevention of excessive fluid accumulation that may delay recovery of gastrointestinal function, impair wound and/or anastomotic healing, coagulation, cardiac and respiratory function is challenging.

The operative procedure for gastric pull up involves blunt dissection with fingers in the retrosternal region, blindly, to create a tunnel for gastric interposition (Figure 1). This blind dissection in posterior mediastinum interferes with cardiac filling and may cause marked vagal stimulation leading to hypotension and cardiac arrhythmias. Careful intraoperative monitoring is required and surgeons should be immediately notified about the event so as to temporarily stop the dissection.

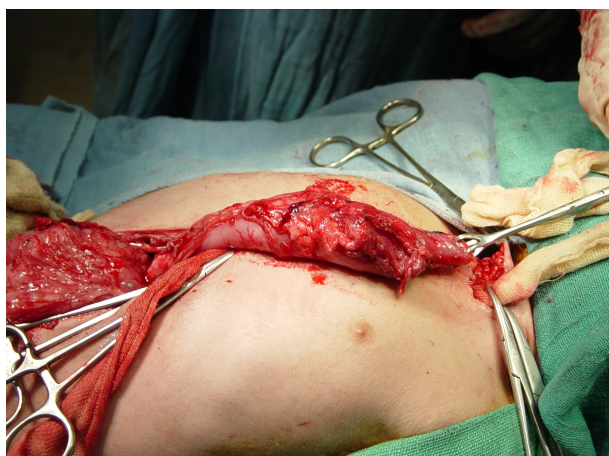


Figure 1. Intraoperative picture showing stomach pulled up to cervical region for anastomosis with cervical esophagus.

Pleural tears leading to pneumothorax, pleural effusion and atelectasis are known complications following transhiatal gastric pull up surgery. Extensive airway edema may occur due to cervical dissection. Tension pneumothorax and upper airway obstruction are potentially life threatening complications which can occur in immediate postoperative period in gastric pull up surgery in children. So routine placement of bilateral chest drains is done to prevent this sequel. Postoperative elective ventilation reduces the risk of respiratory problems. Epidural analgesia decreases the requirement of intraoperative anesthetic agents, ablate the surgical stress response, decrease postoperative analgesic requirements,

and improve the postoperative course enabling fast and smooth recovery.⁴ Ju-Mei Ng (2011) suggested that thoracic epidural analgesia is also associated with a decreased occurrence of anastomotic leakage, improved microcirculation of the distal gastric tube in an experimental model and microvascular perfusion of the gastric conduit in the anastomotic area after esophagectomy². But hypotension should be avoided by using more dilute concentration of local anesthetics, avoiding hypovolemia and use of vasopressors, whenever required. Following esophageal replacement surgery, patients are prone for reflux of gastric contents as the lower esophageal sphincter is excised and other mechanisms preventing regurgitation are also disrupted.⁵ This can be practically understood by looking at the postoperative barium swallow showing the new location of stomach in posterior mediastinum (Figure 2). Hence routine postoperative nasogastric decompression is required to prevent aspiration and to decrease the risk of anastomotic leak.



Figure 2. Postoperative Barium swallow showing position of stomach in posterior mediastinum.

Based on our experience in these cases, we suggest that proper preoperative preparation, vigilant intraoperative monitoring, replenishment of blood and fluid loss, adequate analgesia and postoperative elective ventilation and sedation are essential for a positive outcome.

Conclusion

The incorporation of epidural analgesia, goal-directed fluid management therapy, elective postoperative ventilation and strategies to improve perfusion of the gastric graft are some aspects on which anesthetic care may have an impact.

References

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