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Anaesthetic Consideration in Oesophageal Replacement Surgery: A Case Report

Parul Jindal[1], Deepti Mehta[1], S. Sreyasri[1], Gurjeet Khurana[1], Santosh Kumar Singh[2]

Abstract

Patient posted for oesophageal replacement surgery presents with incredible challenges to the anaesthesiologist in the perioperative period. Improving the blood supply of the oesophageal anastomosis, methods to reduce the incidence of pulmonary complications and optimizing fluid management in these patients are areas in which anaesthetic care may contribute. We discuss case report of child posted for oesophageal replacement surgery, highlighting successful management in perioperative period.

Keywords: Oesophageal atresia, Oesophageal replacement, Epidural analgesia

Introduction

Incidence of oesophageal atresia is 1 in every 3000-5000 births. It is associated with VACTERAL anomalies (vertebral defects, anal atresia, trachea-oesophageal fistula with oesophageal atresia, cardiac defects, and renal and limb) in 30-50% patients. Cardiac lesion in 17%, anal defect in 12%, renal in 16%, limb defect in 10% [1]. Oesophageal replacement is long duration surgery that poses several challenges to anaesthesiologists. It is associated with extensive tissue dissection complications like hypoglycaemia, hypothermia, fluid shifts, excessive blood loss, cardiac rhythm disturbances, and pulmonary complications in the perioperative period. All above complications can be avoided or successfully managed by close monitoring, adequate analgesia and postoperative care. Epidural analgesia, temperature conservation and goal-directed fluid therapy are mainstays in the anaesthetic management [2].

We are reporting this case as the incidence of mortality from oesophageal atresia is decreasing and we intend to decrease the morbidity. as the incidence is 1:3000 the chances to see these cases in a life time are less.

Case Report

19-month-old female (weight: 8 kg) with oesophageal atresia had undergone cervical oesophagostomy and feeding gastrostomy on 2nd day of life, Now was planned for oesophageal replacement.

In preanaesthetic evaluation, detailed history was taken from parents and previous medical records. Physical examination revealed no associated congenital or systemic abnormality. Child was planned for surgery under general anaesthesia and lumbar epidural for intraoperative and post-operative pain management. Investigation was advised and within acceptable limit. All the potential risks related to anaesthesia and surgery explained to attendants and written informed consent was taken.

Patient taken in operating room after confirming NPO status, monitors were attached. Monitoring include ECG, ABP, SpO_2, $etCO_2$, Temperature, urine output and RBS. Two I.V line secured with 24G and 22G cannula. Premedication 20 mcg of fentanyl given. Child was induced with 30 mg of propofol and 7 mg of atracurium and intubated with uncuffed endotracheal tube of size 5.0 fix at 12 cm.

After induction, arterial line was secured with 22G I.V. cannula for arterial blood pressure monitoring. After induction epidural catheter was inserted with Vygon Paediatric Epidural Kit (19G touhys needle 50 mm length and 22G catheter of 400 mm length) at L1-L2 space via midline approach in right lateral position. Lignocaine with Adrenaline 2 ml was given as test dose. Bupivacaine (0.125%) 4 ml was given as bolus dose and then infusion containing 24.5 ml of 0.125% bupivacaine and 0.5 ml of fentanyl (25 mcg) was started at the rate of 1.5 ml/hr.

Limbs were covered with cotton, fluid warmer and blanket was used and OT temperature maintained between 26-28°C to prevent hypothermia to child. Intraoperatively during gastric pull up patient develop sudden hypotension and bradycardia which was managed successfully. Surgery last for 7 hrs and was uneventful.

Total amount of blood loss was 380 ml, urine output 335 ml and total fluid given 900 ml and 2 part of packed red blood cells given during surgery. After surgery patient was shifted to ICU intubated for elective ventilation and was kept on atracurium infusion 2.5 mg/hr.

Epidural infusion continued at the rate of 1.5 ml/hr containing 24.5 ml of 0.125% bupivacaine and 25 mcg fentanyl. Epidural catheter was removed after 48 hrs.

In ICU patient was reintubated on post op day 2 due to tube blockage

[1]Department of Anesthesiology, Himalayan Institute of Medical Sciences, Swami Rama Himalayan University, Dehradun, Uttarakhand, India.
[2]Department of Paediatric Surgery, Himalayan Institute of Medical Sciences, Swami Rama Himalayan University, Dehradun, Uttarakhand, India.

Address of Correspondence
Dr. Parul Jindal,
Professor, Department of Anesthesiology, Himalayan Institute of Medical Sciences, Swami Rama Himalayan University, Dehradun, Uttarakhand, India.
E-mail: parulpjindal@yahoo.co.in

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and desaturation and extubated successfully on 6th day and discharge on 21st day and doing well in follow up.

Discussion

First oesophageal construction was done in late 19th century with subcutaneous tube remained unsuccessful. Gavriliu from Romania did first successful oesophageal replacement with greater curvature of stomach as conduit [3]. Most of the children with the oesophageal anomalies have associated anomalies included in the VACTRL group. Common investigations in the preoperative period should also be supplemented with additional investigations to rule out associated anomalies. These include 2DECHO, USG of kidney and urinary bladder. History pertaining to the symptoms suggesting cardio-renal abnormalities should be meticulously taken. Position in this procedure is usually lateral decubitus which renders child prone to hypoxia due to highly compliant rib cage, compression of the dependent lung decreases functional residual capacity, airway closure, increase oxygen consumption in children [1]. In our case with the conventional ventilatory settings there were no problems of hypoxia and hypercarbia. OLV was not instituted as the thoracoscopy was not in plan Most of the children undergoing elective procedures at least have a single chest radiograph. The role of PFT in our case was negligible.

The procedures involving thoracotomy usually involve meddling with the great vessels and hence a large blood loss should be anticipated. in our case, 2 wide bore cannula were secured and preoperatively blood was arranged and used as per the blood loss.

During surgery when surgeon pull up stomach there can be hypotension and arrythmias due to vagal stimulation, reduced cardiac filling during the blind dissection in posterior mediastinum. The incidence of arrythmias was reported to be as high as 50% [7] bradycardia occurrence was seen in our case and managed with injection atropine . 6 mg IV, and by increasing $Fi0_2$ momentarily [2].

Opioids ae usually used as a part of balanced anaesthesia in the adult thoracotomies. pain coverage either through neuraxial blockade or a regional catheter is essential also to achieve adequate anaesthetic depth other techniques by which these needs can be addressed are by TIVA either with dexmedetomidine or remifentanil this was taken care of by epidural catheter in our case. It also helped in reducing intraoperative anaesthetic agent requirement and prolonged exposure to inhalational agent which could have predisposed patient to additional risk and complications.

Epidural analgesia also helped in reducing postoperative opioid complications, requirement and enable postoperative recovery fast and decrease occurrence of anastomotic leakage [2].

Longer duration surgery posed risk of high blood loss, fluid shifts, hypothermia, hypoglycaemia. We incorporated goal directed fluid therapy to cope up the major fluid shifts [4]. Urine output was monitored hourly to assess the efficacy of fluid assessment.

Children are more prone for hypoglycaemia intraoperatively this was also challenged by the prolonged surgical time thus random blood sugar monitoring every second hourly was helpful as in our case we gave infusion of 5% dextrose at the rate of 10 ml/hr,

Hypothermia is a common complication in the paediatric population the chance of hypothermia was even more due to the open thoracotomy. in our case a constant temperature monitoring was done, and mild hypothermia was corrected by promptly warming the patient.

The clinical assessment is a better judge when considering the postoperative mechanical ventilatory support [6]. Additional factors like presence of lung pathology and congenital heart disease, postoperative development of the pneumothorax, anastomotic leak (as a common complication will add up to the need. In our case child did not have any congenital cardiac issues and the chest radiograph was normal. post op elective ventilation in our case also helped in improving gastric graft perfusion and decreases postoperative pulmonary complications [4, 5].

Conclusion

Thus, proper preoperative evaluation, watchful intraoperative monitoring adequate analgesia and fluid, postoperative elective ventilation decreases complications and lead to successful outcome.

Key learning points

Preoperative	Intraoperative	Postoperative
Rule out associated VACTRL anomalies by necessary investigations	Ventilatory management	Pain control
Assess the preoperative lung status eg: chest X-ray, spo2	Addressing intraoperative complications eg: hypoxia, hypercarbia, arrythmias, blood loss, hypothermia, hypoglycaemia	Elective mechanical ventilation
Anticipate Blood loss	Meticulous fluid management	Postoperative complications Eg: anastomotic leak, stricture, dysphagia, regurgitation
	Pain control	
	Adequate anaesthetic depth	

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his/her identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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