Case Report

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Thoracic Segmental Spinal Anesthesia In Pediatric Patient With Esophageal Atresia With Ventricular Septal Defect And Mild Pulmonary Hypertension Posted For Esophagostomy And Gastrostomy.

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Abstract

Introduction Esophageal atresia (EA) is congenital anomaly commonly found with trachea-esophageal fistula of neonate in 1st week of life. This anomaly can cause several complications including aspiration, reduction in respiration, and complication from concomitant congenital anomalies, mostly from cardiac origin. Thoracic segmental spinal is typically used for patient undergoing surgery with major medical problems which improved patient's safety, reduced post anesthesia care stays and better postoperative pain relief.

Case Report A case of 2 days old male,2.2 kg weight, presented at UNM children hospital with chief complaint of inability of pass Nasogastric tube beyond 8-10 cm after birth with drooling of saliva. Preoperatively anesthetic checkup was done which revealed moderate ventricular septal defect with mild Pulmonary hypertension on 2d echo. We proposed thoracic segmental spinal anesthesia with small dose of isobaric levobupivacaine.

Patient was given premedication of Inj. Ketamine (1mg/kg) and Inj. Dexmedetomidine (0.4 microgram/kg). Under aseptic precaution thoracis segmental spinal anesthesia was given with inj isobaric levobupivacaine in the dose of 0.02 mg/kg. Intraoperatively Injection Dextrose 1% in Inj. Ringer lactate given. O2 was given via facemask and patient was hemodynamically stable throughout the surgery and postoperatively.

Conclusion: Neonate with EA and TEF can cause problems and challenges for Anesthesiologist. By using thoracic segmental spinal anesthesia proves a better modality for such a syndromic child which avoid unnecessary intubation, postoperative complication related to general anesthesia, avoid postoperative ventilation and provide post-operative better analgesia.

Keywords: Thoracic segmental spinal anesthesia, Esophageal atresia, Tracheo-esophageal fistula, gastrostomy, esophagostomy

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INTRODUCTION

Oesophageal atresia (EA) represents a significant congenital anomaly associated with tracheoesophageal fistula in neonates. It usually presents immediately after birth with vomiting, frothing and aspiration. This anomaly is characterized by a discontinuity of the oesophageal lumen and the definite management of this condition is surgical. In many cases EA is associated with associated congenital anomalies which can significantly influence both the surgical approach as well as anaesthetic management.[1]

Oesophageal atresia is clinically significant due to the severe complications it can precipitate. These complications include aspiration pneumonia, respiratory distress and feeding difficulties. All these clinical features and associated complications necessitate prompt surgical intervention. The standard treatment for EA involves surgical correction, which is often complicated by the neonate's fragile physiological state and the presence of concomitant anomalies. [2]

Anaesthetic management in these cases is particularly challenging. The traditional approach often involves general anaesthesia which is effective however carries its own set of complications. In neonates with compromised respiratory function and those with associated cardiac anomalies general anaesthesia may pose an unacceptable high risk. In this context, thoracic segmental spinal anaesthesia emerges as a viable alternative offering several advantages over general anaesthesia in carefully selected cases. [3]

Thoracic segmental spinal anaesthesia has been increasingly recognized for its utility in pediatric patients undergoing thoracic and upper abdominal surgeries. This technique provides effective intraoperative anaesthesia and postoperative analgesia, while minimizing the risks associated with general anaesthesia. The benefits of thoracic segmental spinal anaesthesia are particularly pronounced in neonates with EA, where respiratory compromise and the risk of aspiration is significantly high. [4]

The use of thoracic segmental spinal anaesthesia in pediatric patients with EA offers several advantages. It avoids airway manipulation thereby reducing the risk of exacerbating tracheoesophageal fistula-related complications. It also provides a stable intraoperative hemodynamic profile which is crucial in patients with associated cardiac anomalies. segmental spinal anaesthesia also contributes to reduced postoperative respiratory complications. It is also associated with a shorter stay in the post-anaesthesia care unit and enhanced postoperative pain management. [5]

The application of thoracic segmental spinal anaesthesia in neonates and neonates requires meticulous planning and execution. It demands a thorough understanding of the pediatric spinal anatomy and appropriate dosing of local anaesthetics. Moreover, careful monitoring for potential complications such as hypotension and urinary retention is essential. In some cases, conversion to general anaesthesia may also be required.[6]

We here report a case of congenital oesophageal atresia with ventricular septal defect and mild pulmonary hypertension. Given the associated congenital heart disease we decided to use segmental spinal anaesthesia with levobupivacaine. Surgery was uneventful and neonate remained hemodynamically stable throughout the surgery and in postoperative period.

CASE REPORT

A 2-day-old male neonate, weighing 2.2 kg, was admitted to UNM Children's Hospital with the primary complaint of an inability to pass a nasogastric tube beyond 8-10 cm after birth, accompanied by drooling of saliva. She was delivered by a full term normal vaginal delivery and cried immediately after birth. APGAR score at 1 minute was 9. On routine examination after birth the attending Pediatrician noticed that the nasogastric tube was not passing beyond 8-10 cms and hence a chest X Ray with nasogastric tube in situ was done which showed blind looping and turning back at the thoracic part of the oesophagus. This confirmed the diagnosis of oesophageal atresia.

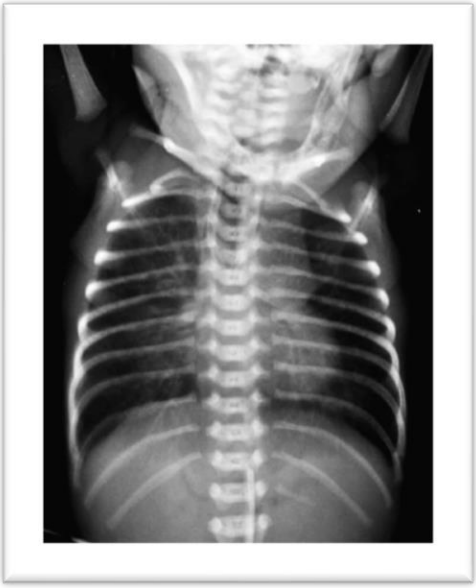

Figure 1:- chest X Ray with nasogastric tube in situ showing blind looping at the thoracic part of the oesophagus

A definitive surgery in the was planned in the form of primary anastomosis. A preoperative evaluation was done in the form of complete blood count, blood grouping, Rh typing, bleeding and clotting times. All these parameters were within normal limits. A through clinical examination was done. A pan systolic murmur was heard over on auscultation and hence a 2D Echo was advised. 2 D Echo confirmed presence of congenital heart disease in the form of ventricular septal defect and mild pulmonary hypertension.

In view of oesophageal atresia along with ventricular septal defect and mild pulmonary hypertension surgery was decided to be done under thoracic segmental spinal

anesthesia, using a small dose of isobaric levobupivacaine (0.02 mg/kg). This choice reflects a growing trend in neonatal surgery, favouring regional anesthesia for its safety profile, especially in patients with complex comorbidities. Neonate was Premedication with Inj. Ketamine (1mg/kg) and Inj. Dexmedetomidine (0.4 microgram/kg), administered under strict aseptic precautions.

During the procedure, the neonate received Inj. Dextrose 1% in Inj. Ringer lactate for maintenance of fluid balance and O2 was supplied via facemask. The neonate remained hemodynamically stable throughout the surgery, a notable outcome considering the challenges posed by the underlying cardiac conditions.

Postoperatively, the neonate's recovery was uneventful. The use of segmental spinal anesthesia in this neonate with oesophageal atresia and concurrent cardiac anomalies demonstrates its viability as a safe and effective anesthetic technique in complex pediatric surgeries.

DISCUSSION

The management of oesophageal atresia (EA) in neonates, especially those with concurrent congenital anomalies such as ventricular septal defect (VSD) and pulmonary hypertension, presents a unique challenge to pediatric surgeons and anaesthesiologists. Present case highlights several critical aspects of pediatric anesthesia and surgery. EA, a significant congenital anomaly, necessitates surgical intervention shortly after birth. The standard approach involves general anaesthesia, which, while effective, carries risks, particularly in neonates with respiratory and cardiac complications. Thoracic segmental spinal anaesthesia emerges as a viable alternative, offering several advantages in this delicate patient population. [7]

In neonates with EA and tracheoesophageal fistula, airway manipulation during general anaesthesia can exacerbate complications. Thoracic segmental spinal anaesthesia minimizes this risk by avoiding endotracheal intubation. Neonates with cardiac anomalies like VSD and pulmonary hypertension require a stable intraoperative hemodynamic environment. Thoracic segmental spinal anaesthesia provides this stability, reducing the risk of perioperative cardiac complications. [8]

Moreover, thoracic segmental anesthesia contributes to reduced respiratory complications postoperatively and facilitates a shorter stay in the post-anaesthesia care unit. Enhanced pain management is also a notable benefit, crucial in the early postoperative period for neonates. The choice of levobupivacaine for spinal anaesthesia in this case is noteworthy. Levobupivacaine, a long-acting local anesthetic, is preferred in pediatric patients due to its safety profile and effectiveness in providing intraoperative and postoperative analgesia. The use of isobaric levobupivacaine in a carefully calculated dose, considering the neonate's weight and physiological status, is critical for ensuring adequate anesthesia while minimizing potential side effects. [9]

Despite its advantages, thoracic segmental spinal anaesthesia in neonates requires meticulous planning and execution. Understanding pediatric spinal anatomy and appropriate dosing is paramount. Continuous monitoring for potential complications, such as hypotension and urinary retention, is essential. In some cases, the need for conversion to general anaesthesia may arise, necessitating preparedness for a rapid change in the anesthetic plan.

This case underscores the growing trend towards regional anesthesia in neonatal surgery, especially in patients with complex comorbidities. It highlights the need for a thorough understanding of both the benefits and limitations of different anesthetic techniques in this vulnerable patient population. The successful use of thoracic segmental spinal anaesthesia in this case adds to the growing body of evidence supporting its use in complex pediatric surgeries. [10]

CONCLUSION

The management of a neonate with EA and associated cardiac anomalies using thoracic segmental spinal anaesthesia is associated with reduced complications and represents a significant advancement in pediatric anesthesia. This case demonstrates the feasibility as well as safety of this approach. Future research and clinical experiences will further define the role of regional anesthesia in pediatric surgery.

Conflict of interest

None

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