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ANAESTHETIC MANAGEMENT OF CONGENITAL DIAPHRAGMATIC HERNIA IN A TERTIARY CARE HOSPITAL

Anaesthesiology

Dr Chirag Oriya*	Second Year Resident , Department Of Anaesthesiology , Gujarat Adani Institute Of Medical Sciences – Bhuj *Corresponding Author
Dr J Risheta Awasthi	Second Year Resident , Department Of Anaesthesiology , Gujarat Adani Institute Of Medical Sciences – Bhuj
Dr Shweta Jayantilal Jivani	First Year Resident , Department Of Anaesthesiology , Gujarat Adani Institute Of Medical Sciences – Bhuj
Dr Jaldeep Patel	Professor , Department Of Anaesthesiology , Gujarat Adani Institute Of Medical Sciences – Bhuj

ABSTRACT

Congenital diaphragmatic hernia (CDH) is a birth defect characterized by an abnormal opening in the diaphragm, allowing abdominal organs to move into the chest cavity. This condition typically affects lung development, leading to respiratory distress at birth. The underlying causes of CDH can be multifactorial, including genetic and environmental factors. Diagnosis is often made prenatally via ultrasound, and management involves a multidisciplinary approach, including surgical repair and supportive care for respiratory function

KEYWORDS

Congenital Diaphragmatic Hernia (CDH), Respiratory Distress , Ventilation Strategies , Emergency Preparedness

INTRODUCTION

Congenital diaphragmatic hernia (CDH) is a critical condition that occurs when there is an abnormal opening in the diaphragm, allowing abdominal organs to migrate into the thoracic cavity. Infants with CDH face heightened risks during surgical repair, including hemodynamic instability and potential respiratory failure postoperatively

Case Report:

A 25-day-old male infant was admitted to the neonatal intensive care unit (NICU) due to severe and persistent cyanosis accompanied by shortness of breath. Born at full term via cesarean delivery, he weighed 3200 g at birth and cried vigorously immediately after delivery; however, despite a slight increase to 3900 g, he continued to face significant respiratory challenges.

Upon examination, the infant was in evident respiratory distress, with a heart rate fluctuating between 140 and 160 beats per minute and oxygen saturation levels measured at 80% in room air, further exacerbated by mild cyanosis and noticeable retraction of the chest wall.

Physical assessment revealed bowel sounds in the left lung suggesting a significant diaphragmatic issue. The abdomen was soft and mildly scaphoid, with the liver and spleen non palpable, raising concerns about underlying complications. A chest X-ray was done which confirmed left-sided congenital diaphragmatic hernia (CDH), leading to a scheduled surgical intervention. (FIG 1)

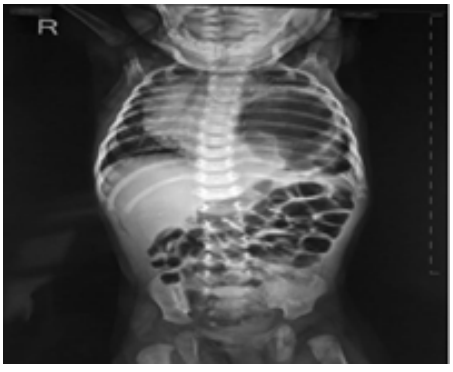

Fig 1: chest x-ray showing gas bubble in left hemi thorax and right mediastinal shift.

The patient's relatives were thoroughly informed and sensitized about the surgical procedure. After obtaining proper consent, the patient was taken to the operating room for surgery. In the operating theatre, standard monitoring equipment was set up, including SpO2, ECG, and a pediatric BP cuff, to ensure constant surveillance of vital signs. To alleviate compression of the lungs and heart, gastric contents were aspirated, and a 24 guage intravenous line was secured. Preoperative medications included ondansetron, glycopyrrolate, and midazolam, followed by a preoxygenation period with 100% oxygen to enhance his respiratory function. Induction of anesthesia was performed with propofol and succinylcholine, and a 3.5 mm cuffed endotracheal tube was successfully placed, with ventilation managed using a Jackson–Rees circuit.

The surgical procedure lasted approximately two hours, during which the infant's heart rate remained stable between 130 and 150 beats per minute, and oxygen saturation improved significantly, ranging from 96% to 99%. 20 ml intraoperative blood loss was recorded, and Ringer's lactate was administered to maintain hydration and circulation.

After the surgery, the infant was transferred to the ICU, intubated and sedated for close monitoring. On post-operative day 1, peak inspiratory pressure (PIP) was carefully maintained between 25 and 30 cm H2O, with analgesia provided through a continuous fentanyl infusion and regular doses of paracetamol every six hours. By day 2, the infant transitioned to synchronized intermittent mandatory ventilation (SIMV) with a reduction in FiO2 to 40%. An extubation trial was scheduled, and the patient was successfully extubated on day 4. He maintained an oxygen saturation of 96%–98% on a face mask, with a heart rate of 160 beats per minute and a respiratory rate of 30 breaths per minute. Post-operative chest x-ray showed improved compliance of the left lung, the left lung had expanded and recoiled to the normal state. No intestinal sounds were heard on chest auscultation. The baby was discharged on the 12th postoperative day, indicating a successful recovery

DISCUSSION:

During congenital diaphragmatic hernia (CDH) repair, patients frequently present with significant respiratory compromise due to impaired lung development and function. This condition carries a heightened risk of barotrauma, coupled with the continuous need for effective ventilation. To address these challenges, anesthesiologists often utilize specialized ventilation techniques, such as low tidal volume ventilation or high-frequency oscillatory ventilation, which require advanced knowledge and skill.

Managing hemodynamic instability is another major challenge, as infants with CDH are particularly sensitive to rapid changes in blood pressure and oxygen saturation during surgery. Continuous monitoring of vital signs is crucial, demanding immediate responses to any fluctuations.

Selecting safe induction agents for neonates while ensuring a smooth induction can be complex, as some agents may adversely affect respiratory function. Additionally, airway management is complicated by anatomical variations, requiring anesthesiologists to be skilled in various techniques for successful intubation.

Postoperative care is critical, as infants are at increased risk of respiratory failure after extubation. Collaboration with a multidisciplinary team is essential for optimal patient outcomes, ensuring effective communication among surgeons, neonatologists, and nursing staff. Swift action is necessary in response to unexpected changes in oxygen saturation or airway obstruction, making it vital that all emergency equipment is readily available and functional to ensure patient safety.

CONCLUSION:

In conclusion, the anesthetic management of congenital diaphragmatic hernia in a tertiary care hospital requires a multidisciplinary approach to address the complex respiratory and hemodynamic challenges these patients present. By prioritizing collaboration among healthcare teams and preparedness for potential emergencies, optimal patient outcomes can be achieved in this vulnerable population.

If you need any further adjustments or additional information, let me know!

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