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CASE REPORT

A Case of Congenital Diaphragmatic Hernia Posted For Repair: Anaesthesia Management

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ABSTRACT

Congenital diaphragmatic hernia (CDH) can be associated with herniation of abdominal viscera into the thoracic cavity, leading to pulmonary hypoplasia and severe respiratory compromise. A 3-day-old neonate diagnosed with left-sided congenital diaphragmatic hernia exhibited severe respiratory distress requiring preoperative mechanical ventilation and stabilization.

After preoxygenation,anaesthesia was induced with intravenous fentanyl and ketamine , Muscle relaxation with atracurium , intubated with a 3.0 mm uncuffed endotracheal tube. Anaesthesia was maintained with oxygen, air, and sevoflurane along with intermittent atracurium and fentanyl. Pressure-controlled ventilation was used with low peak inspiratory pressures (<25 cm H_2O), low tidal volumes, and permissive hypercapnia to avoid barotrauma , Nitrous oxide was avoided to prevent bowel distension and worsening pulmonary hypertension, the neonate was electively ventilated and shifted to NICU. Successful anaesthetic management of congenital diaphragmatic hernia in neonates requires meticulous perioperative planning and gentle ventilation strategies.

KEYWORDS:

• Congenital Diaphragmatic Hernia • Anaesthesia • Neonate

INTRODUCTION

Congenital diaphragmatic hernia (CDH) can be a life-threatening neonatal anomaly associated with herniation of abdominal viscera into the thoracic cavity, leading to pulmonary hypoplasia and severe respiratory

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compromise.[1] Anaesthetic management of CDH repair is associated with significant challenges due to the physiology of neonates with risk of pulmonary hypertension and the need to balance ventilation with hemodynamic stability.

CASE REPORT

We present a 3-day-old neonate diagnosed with left-sided congenital diaphragmatic hernia, scheduled for open surgical repair. The infant exhibited severe respiratory distress requiring preoperative mechanical ventilation and stabilization

Anaesthetic Management: A 3-day-old female neonate weighing 2 kg was admitted with respiratory distress, tachypnoea, subcostal retractions, and cyanosis since birth. The baby was born via caesarean section. Oxygen saturation on room air was 82-85%. On examination, breath sounds were markedly reduced over the left hemithorax, and heart sounds were shifted to the right side. Abdomen appeared scaphoid. Baby was intubated immediately. Chest radiograph revealed bowel loops occupying the left thoracic cavity with mediastinal shift suggestive of left-sided congenital diaphragmatic hernia[1] (figure 1). Arterial blood gas analysis showed respiratory acidosis with hypoxemia. The neonate was shifted to neonatal intensive care unit and stabilized with oxygen supplementation, nasogastric tube decompression, intravenous fluids, and mechanical ventilation. Baby was intubated immediately after birth and managed on mechanical ventilation for 3 days and shifted to preoperative room on day 3. The baby was shifted to the operating room under warm conditions with standard monitoring including ECG, pulse oximetry, non-invasive blood pressure, temperature, and capnography. There was a need for change of endotracheal tube, so it was removed and preoxygenation was done, anaesthesia was induced with intravenous fentanyl 2 µg/kg and ketamine 1 mg/kg. Muscle relaxation was achieved with atracurium 0.5 mg/kg. The baby was intubated with a 3.0 mm uncuffed endotracheal tube. Low Selective right endobronchial intubation was performed gently to achieve one-lung ventilation and partial collapse of the left lung to facilitate surgical exposure. Correct placement was confirmed by auscultation and capnography.

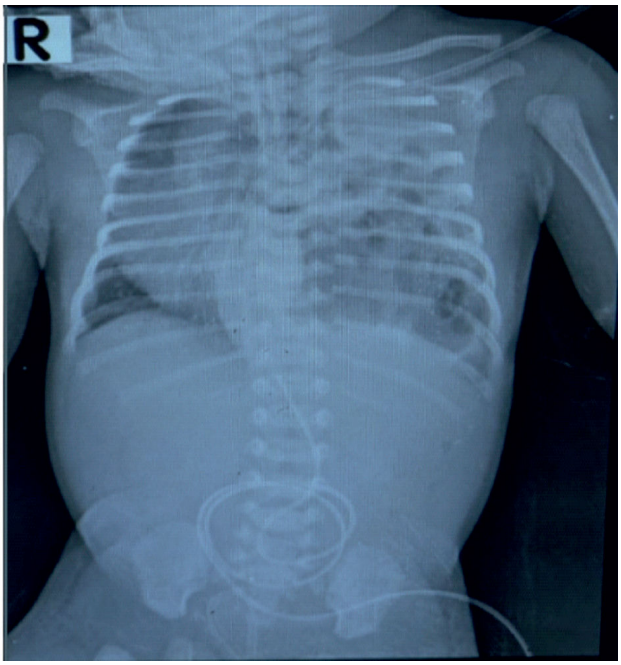


Figure 1: Chest X-ray showing Cardia pushed to RT because of abdominal contents due to CDH

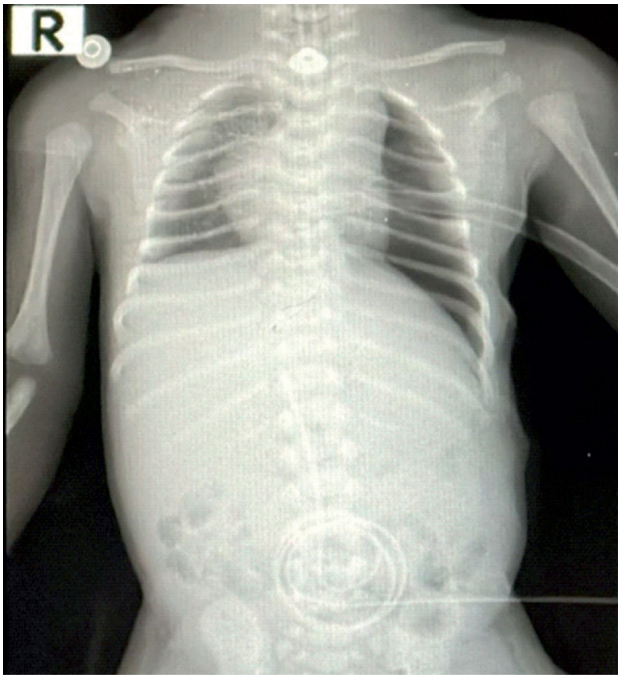


Figure 2: Chest X-ray showing Clear lung Fields after correction of CDH

Anaesthesia was maintained with oxygen, air, and sevoflurane along with intermittent atracurium and fentanyl5. Pressure-controlled ventilation was used with low peak inspiratory pressures (<25 cm H_2O), low tidal volumes, and permissive hypercapnia to avoid barotrauma, Nitrous oxide was avoided to prevent bowel distension and worsening pulmonary hypertension. Intraoperatively, herniated stomach, bowel loops, and spleen

were reduced into the abdominal cavity and the diaphragmatic defect was repaired. Haemodynamics remained stable throughout the procedure. At the end of surgery, the endotracheal tube was withdrawn back into the trachea for bilateral lung ventilation (figure 2). Due to concerns regarding pulmonary hypertension and postoperative respiratory insufficiency, the neonate was electively ventilated and shifted to NICU.

DISCUSSION

Anaesthetic management of CDH focuses on gentle ventilation, prevention of pulmonary hypertension, optimization of oxygenation, and avoidance of barotrauma. Bag-mask ventilation should be avoided because it can insufflate the stomach and worsen lung compression.

One-lung ventilation in neonates is difficult due to lack of appropriately sized double-lumen tubes and bronchial blockers. Therefore, selective endobronchial intubation remains the most practical technique. Challenges include hypoxia, hypercarbia, tube displacement, and haemodynamic instability.

In one case report, they have treated a 5 day old neonate with left sided CDH with Thoracoscopic repair. The patient had respiratory acidosis and Pulmonary artery hypertension treated with High frequency oscillatory ventilation and Inj Milrinone and Inj Vasopressin. Induction with Inj Ketamine and Inj Midazolam and Inj Fentanyl intermittently supplemented with Erector Spinae block.[2]

Sonal *Et al* report a 4 day old neonate with CDH, maintained on SIMV preoperatively, use of Milrinone, Sildenafil and Dobuatmine; Induced and maintained with Sevoflurane and Atracurium and Postoperatively Caudal epidural was given.[3]

Ventilation strategies include: Low airway pressures, Pressure-controlled ventilation, Permissive hypercapnia , Avoidance of nitrous oxide, Adequate sedation and analgesia. Persistent pulmonary hypertension is a major cause of perioperative mortality in CDH. Factors increasing pulmonary vascular resistance such as hypoxia, hypercapnia, acidosis, hypothermia, and pain should be avoided.[4]

Surgical repair is preferred after initial medical management for the first 24-48 hours of life, since later repair is associated with delayed oral feeding, increased need for tube feeds, and increased post-repair ventilation requirement and supplemental oxygen at discharge[5.]

One team used combined high-frequency oscillatory ventilation (HFOV) and inhaled nitric oxide (iNO), combination was an effective alternative for the anesthetic management of CDH cases as it provided better gas exchange and less volutrauma[6]

CONCLUSION

Successful anaesthetic management of congenital diaphragmatic hernia in neonates requires meticulous perioperative planning and gentle ventilation strategies. Selective endobronchial intubation can provide effective one-lung ventilation when conventional lung isolation devices are not feasible in neonates. Early stabilization, careful intraoperative monitoring, and postoperative ventilatory support are essential for favourable outcomes.

Conflict of Interest: Nil

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