

Anesthesia for thoracoscopic repair of congenital diaphragmatic hernia in neonates

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Introduction: In spite of considerable improvement in survival of neonates with congenital diaphragmatic hernias (CDH), perioperative management of these patients continues to be challenging. With recent advances in minimally invasive surgery, thoracoscopic repair of CDH is now a considered surgical approach to these potentially critical patients. We report our initial experience with anesthesia for thoracoscopic repair of CDH in neonates.

Methods: After Institutional Review Board approval, we reviewed the charts and anesthesia records of neonates who had undergone thoracoscopic surgery for a preoperative diagnosis of congenital diaphragmatic hernia. Patient demographics, preoperative patient status, intraoperative ventilation parameters, intra- and postoperative management and course were evaluated as available.

Results

Preop data Five patients underwent thoracoscopic surgery with a preoperative diagnosis of CDH. Four patients were intubated prior to coming to the operating room. All patients had adequate pre-operative pulmonary function, as defined by oxygen saturations greater than 95% and by low peak inspiratory pressures (less than 24 mm Hg). None of the patients had evidence of significant pulmonary hypertension or congenital heart defects on pre-operative echocardiograms.

Anesthesia management Patients were monitored with standard ASA monitors and invasive arterial blood pressure monitoring. All patients were intubated endotracheally without attempts at lung separation. General balanced anesthesia without regional analgesia was used.

Surgical management The patients were placed in a near right lateral decubitus position. For better surgical exposure, carbon dioxide was insufflated into the left chest, starting at pressures of 5 mm Hg and flows of 0.5 L/min. Intraoperative diagnosis was CDH in four patients and paraesophageal hernia in one. A primary repair of the diaphragmatic defect was performed in all patients and all procedures were completed thoracoscopically. Operative times ranged from 119 to 212 minutes.

Intraop anesthesia course No intraoperative complications occurred. However, technical access to the patient, intraoperative hypercarbia and compliance changes due to surgical factors were problematic. Immediate (and immediately reversible) decrease in tidal volumes, increase in CO₂, and eventually desaturation were noted with surgical manipulations and increased insufflation pressures above 6-7 mm Hg. No hemodynamic instability was noted with insufflation pressures as high as 8 mm Hg.

Postoperative course The patients were extubated between 0 to 7 days postoperatively and were discharged from 5 to 32 days after admission. There were no noted perioperative complications.

Conclusions: In our case review, thoracoscopic repair of CDH is possible and safe in neonates. The subset of suitable patients remains to be defined more precisely (adequate pre-operative pulmonary function, absence of pulmonary hypertension). All neonates in this group tolerated intrathoracic insufflation up to 6 mm Hg of carbon dioxide and at times significant hypercarbia well. The degree of acceptable hypercarbia in neonates with CDH is unknown and may increase the risk of pulmonary hypertensive crisis. The intraoperative use of ventilators which allow to immediately monitor changes in lung compliance is recommended.

References

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