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LITERATURE REVIEW

Perioperative Fetal Surgery

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ABSTRACT

Anesthetic risk is inversely proportional to age, with neonates having a higher risk of mortality and morbidity compared to adults. Understanding these differences is essential for appropriate perioperative evaluation, preparation, planning, and anesthetic management in neonatal and fetal surgery. Advances in prenatal diagnostic techniques have improved the accuracy of fetal anomaly detection, enabling timely surgical intervention when indicated. Fetal surgery includes minimally invasive procedures, open fetal surgery, and ex utero intrapartum treatment (EXIT) procedures. Surgical intervention is considered when congenital abnormalities threaten fetal survival or lead to severe postnatal morbidity.

Keywords: Fetal surgery, open surgery, perioperative

INTRODUCTION

Fetal and neonatal surgery can be categorized into minimally invasive procedures, open fetal surgery, and EXIT procedures.[2] Indications for fetal surgery during mid-gestation include twin-to-twin transfusion syndrome, congenital diaphragmatic hernia, spina bifida, and sacrococcygeal teratoma with cardiac compromise.[3,5] Surgical intervention is reserved for conditions with a clearly defined natural history that result in progressive and irreversible fetal injury if untreated.[6]

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Minimally invasive fetal procedures such as fetoscopy and percutaneous interventions are associated with lower maternal morbidity but still carry risks including premature rupture of membranes and preterm labor.[7] Open fetal surgery involves maternal laparotomy and hysterotomy with pharmacologic uterine relaxation, allowing definitive fetal correction but increasing maternal and fetal risk.[1,5] EXIT procedures maintain uteroplacental circulation during partial delivery to allow airway stabilization or critical intervention prior to neonatal separation.[8]

General anesthesia is the standard technique for open fetal and EXIT procedures, providing uterine relaxation, fetal immobility, and maternal anesthesia.[1,2] High concentrations of volatile anesthetics may be required to achieve uterine atony, often supplemented with intravenous agents such as propofol or nitroglycerin.[2] Fetal analgesia and immobilization may be achieved via transplacental drug transfer or direct intramuscular administration of opioids and neuromuscular blockers.[9] Careful maternal hemodynamic management is essential to preserve uteroplacental perfusion and fetal oxygenation.[3]

Postoperative management focuses on preventing preterm labor, providing adequate maternal analgesia, and monitoring fetal well-being.[2,10] Tocolytic therapy using magnesium sulfate, indomethacin, beta-adrenergic agonists, or calcium channel blockers may be required depending on procedural invasiveness.[2] Effective pain control reduces uterine activity and improves maternal recovery.[4] Close monitoring is required for potential complications such as infection, fetal cardiac dysfunction, intracranial hemorrhage, and premature delivery.[6]

CONCLUSION

Fetal surgery represents a highly complex intervention requiring meticulous multidisciplinary coordination.[1,3] Although associated with significant maternal and fetal risks, appropriate patient selection, optimal anesthetic management, and vigilant perioperative monitoring can improve neonatal outcomes in selected congenital anomalies.

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