Maternal Anesthesia for Fetal Surgery

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KEYWORDS

• Fetal surgery • Obstetric anesthesia • Fetal anesthesia • EXIT procedure

KEY POINTS

- Fetal surgery is increasingly becoming a beneficial intervention for many fetal anomalies diagnosed in utero.
- Physiologic and anatomic changes related to pregnancy may require adaptations of surgical and anesthetic techniques.
- Open fetal procedures and ex utero intrapartum therapy (EXIT) procedures typically are performed under general anesthesia, whereas minimally invasive procedures are routinely performed under neuraxial or local anesthesia.
- Maternal complications associated with fetal surgery include difficulties in airway management, hemorrhage, infection, preterm labor, premature membrane separation, thromboembolism, and pulmonary edema.
- Anesthesiologists must consider the anesthetic requirements of the fetus, including immobility and analgesia.
- A multidisciplinary approach with input and communication between nursing, obstetrics, pediatrics, surgery, maternal-fetal medicine, and anesthesiology optimizes coordinated care of both mother and fetus.

INTRODUCTION

Fetal surgery (**Box 1**) has evolved into a mainstream mode of therapy, giving many fetuses with significant anomalies an increased chance of survival.[1] Improvements in diagnostic and therapeutic technology, along with advances in understanding fetal pathophysiology and the natural history of many of these conditions, have opened the

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Box 1
Fetal surgery overview

Techniques

1. Open fetal surgery
2. Minimally invasive fetal surgery
3. EXIT procedure: distinct fetal surgical technique, which includes a fetal procedure at the time of cesarean delivery

Goals

1. Correct or improve a fetal anomaly
2. Minimize the risks posed to the mother

door for prenatal surgical interventions to prevent irreversible organ damage or fetal demise.

It is estimated that approximately 1000 fetal surgeries were performed in 2012 in the United Sates, and this number likely will rise substantially in the near future.[2] Currently, only certain fetal anomalies are amenable to in utero intervention during pregnancy whereas other conditions are better managed at or after delivery. Fetal surgery is a reasonable option if several specific conditions are met (**Box 2**).

Providing anesthesia for fetal surgery presents a unique challenge, because more than one patient needs to be considered. The parturient has been referred to as an "innocent bystander," who is exposed to surgical and postpartum risk but receives no health benefits.[3] The mother should always be protected from undue risks.[4,5]

MATERNAL ANESTHETIC ASPECTS OF FETAL SURGERY

An understanding of maternal physiologic and anatomic changes during pregnancy helps anesthesiologists safely care for the mother. Although these changes are usually well tolerated, even subtle disturbances can have an impact on management. There are several changes that occur during pregnancy that can influence anesthetic management (**Table 1**).

Inhalational anesthetics have a long history of successful outcomes in pregnancy. Local and regional anesthetic techniques are often used, however, in pregnant patients for the following reasons[6]:

Box 2
Conditions that must be met for fetal surgery to be a reasonable option

- Informed consent obtained from parent(s)
- Correct diagnosis of a significant isolated fetal anomaly
- Accurate assessment of fetal anomaly, both in severity and prognosis
- Maternal risks of surgery and anesthesia acceptably low
- Reason to believe that neonatal outcome would be improved more by in utero intervention than by postnatal surgery
- Multidisciplinary team in agreement regarding the treatment plan
- Patients with access to high-level medical, bioethical, and psychosocial care