

Anesthetic considerations of EXIT procedure: A case report

ABSTRACT

The ex-utero intrapartum treatment (EXIT) is a rare surgical procedure performed in cases of expected postpartum fetal airway obstruction. This procedure technique lies in a safe establishment of a patent airway during labor in anticipation of a critical respiratory event, without the interruption of maternal-fetal circulation. Anesthetic management in the EXIT procedure is substantially different from that of the standard cesarean delivery and its main goals include uterine relaxation, fetal anesthesia, and placental blood flow preservation. We report the first case of an EXIT procedure performed on a fetus with a prenatal diagnosis of multiple oral masses at King Khalid University Hospital, Riyadh, Saudi Arabia.

Key words: EXIT procedure, fetal airway obstruction, obstetric anesthesia, oral mass

Introduction

The ex-utero intrapartum treatment (EXIT) procedure is a highly specialized surgical intervention at the crossroads of maternal-fetal medicine and anesthesiology. Primarily aimed at managing life-threatening fetal conditions during a cesarean section, EXIT demands an intricate understanding of both maternal and fetal physiology to ensure optimal outcomes.^[1,2] This case report from a Saudi Arabian hospital contributes to the evolving discourse on the anesthetic considerations vital for the success of these procedures.^[3]

Saudi Arabia has witnessed a surge in the application of EXIT for treating various fetal anomalies, thanks to advancements in imaging technology and surgical expertise.^[3]

Initially conceived for fetal airway obstructions, the scope of EXIT has expanded, echoing developments in fetal surgery.^[3,4] The literature, including studies by Pattaravit *et al.* and Bandyopadhyay *et al.*, explores different anesthesia techniques and the necessity for uterine relaxation and placental blood flow maintenance.^[1,2,5,6]

Anesthetic adaptability is crucial, as highlighted by Braden, Maani, and Nagy, especially given the unpredictable physiological variables involved.^[3] Manrique *et al.* and Ospina *et al.* stress that beyond securing the fetal airway, a deep grasp of fetal hemodynamics and potential maternal complications is required.^[4,5] Finally, global experiences like those shared by Lee *et al.*^[7] in Korea emphasize the importance of a tailored anesthetic approach.

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Case Report

A 36-year-old female with a gravidity of 4 and parity of 3 + 0 was referred to our hospital following a 24-week ultrasound revealing multiple oral masses in the fetus, confirmed as congenital epulis through an MRI. For management, an EXIT procedure was scheduled for the 36th gestational week. Preanesthesia evaluation was done according to the American Society of Anesthesiologists (ASA) score guidelines. Preoperative laboratory tests such as CBC, coagulation profile, blood typing, and cross-matching were performed.

Balanced general anesthesia was initiated after obtaining informed consent. Roles and positions were established in a multidisciplinary team session. Preoperative medications included sodium citrate 30 mL of PO and ranitidine 50 mg of IV within 30–60 min before surgery. Standard anesthesia monitoring was employed, and rapid sequence induction was achieved using lidocaine 100 mg, fentanyl 100 µg, propofol 150 mg, and succinylcholine 100 mg.

For anesthesia maintenance, inhaled sevoflurane was titrated to 1–1.5 MAC. A nitroglycerin infusion of 0.5–1 mcg/kg/min and a bolus of 20 mcg were administered preincision. Uteroplacental circulation was maintained using warm ringer lactate and albumin, and vasopressors were guided by the Pleth Variability Index (PVi). Maternal systolic blood pressure was maintained between 100 and 120 mmHg through intravenous phenylephrine (50 µg), followed by an infusion at 0.05–0.1 µg/kg/min.

Surgical proceedings included a low segmental abdominal incision, hysterotomy, and partial fetal delivery. A pediatric anesthesiologist ensured fetal airway patency and conducted successful intubation with a 3.0-cm endotracheal tube. A tracheostomy size 3 was performed after further fetal extraction. Fetal parameters such as skin color, pulse oximetry, SpO₂, and heart rate were monitored and remained within normal limits.

Postdelivery, anesthesia administration was adjusted, and obstetrical procedures were completed, including a right ovarian cystectomy. Estimated blood loss was 1000 ml, and 2000 liters of lactated Ringer's solution, 500 ml of albumin, and two units of packed red blood cells were administered. The patient was extubated postoperatively and transferred to the post anesthesia care unit with patient controlled analgesia morphine for pain control.

Discussion

The EXIT procedure necessitates meticulous anesthetic planning for the safety of both the mother and fetus.^[3] This case involves a 36-year-old healthy female undergoing an

elective EXIT procedure due to fetal anomalies. Balanced general anesthesia was employed, optimizing maternal hemodynamics and airway management while facilitating the neonatologist's work on the fetal airway.^[3]

Figure 1 encapsulates the key anesthetic elements of the EXIT procedure, underscoring the importance of deep uterine relaxation for surgical access, utero-placental circulation for continuous fetal oxygenation, and fetal anesthesia for effective airway and surgical management.^[3]

The anesthetic protocol integrated ASA score guidelines for preoperative risk assessment.^[2] Standard laboratory tests were performed, and prophylactic medications including antiemetics, sodium citrate, and ranitidine were administered.^[2] The patient was positioned in a left uterine displacement supine position to mitigate aortocaval compression.^[6]

Comprehensive anesthesia monitoring included noninvasive blood pressure, pulse oximetry, and end-tidal CO₂, among others.^[6] Induction employed a rapid sequence technique with lidocaine, fentanyl, propofol, and succinylcholine.^[5,6] Nitroglycerin and intermittent fentanyl boluses were utilized to sustain uteroplacental circulation, monitored through invasive arterial cannulation and PVi.^[5,6]

Collaboration between a pediatric anesthesiologist and an ENT surgeon ensured effective assessment and securement of the fetal airway.^[8,9] Acknowledge the challenges posed by the unique maternal and fetal physiology and reviews the role of anesthesiologists in these scenarios play important role in successful fetal surgeries, including the EXIT procedure.^[10]

Conclusion

The EXIT procedure holds promise for newborns with airway obstruction. EXIT anesthesia can be performed in different ways,

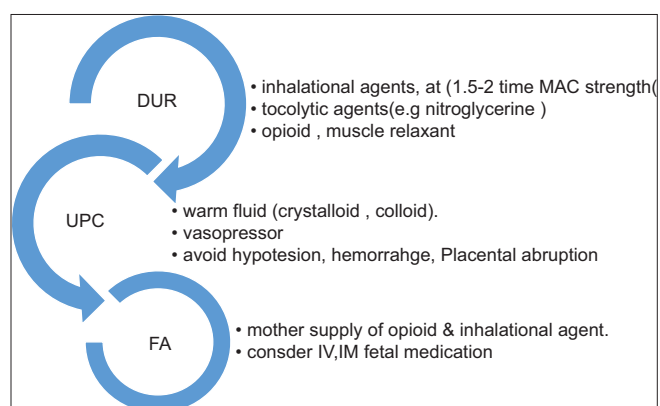


Figure 1: DUR: Deep uterine relaxation, UPC: uteroplacental circulation (UPC), and FA: fetal anesthesia

as long as uterine relaxation and uteroplacental circulation are maintained until fetal airway is secured. Preoperative planning and communication in regards to anesthesia are the most important factors for success. Our balanced approach to the anesthetic management of our case addressed all the aforementioned points and enabled us to avoid potentially detrimental effects of depending on one anesthetic agent. In this case report, we have described a successful EXIT with a successful outcome.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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