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CLINICAL INFORMATION

Anesthesia for ex utero intrapartum treatment: renewed insight on a rare procedure

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Abstract The ex utero intrapartum treatment is a rare surgical procedure performed in cases of expected postpartum fetal airway obstruction. The technique lies on a safe establishment of a patent airway during labor in anticipation of a critical respiratory event, without interrupting maternal–fetal circulation.

Anesthetic management is substantially different from that regarding standard cesarean delivery and its main goals include uterine relaxation, fetal anesthesia and preservation of placental blood flow.

We present the case of an ex utero intrapartum treatment procedure performed on a fetus with a large cervical lymphangioma and prenatal evidence of airway compromise. Modifications to the classic ex utero intrapartum treatment management strategies were successfully adopted and will be discussed in the following report.

PALAVRAS-CHAVE
Vias aéreas – obstrução;
Anestesia – fetal;
Anestesia – obstétrica;
Linfangioma cervical;
EXIT

Anestesia para tratamento ex-útero intraparto: visão renovada sobre um procedimento raro

Resumo O tratamento ex-útero intraparto é um procedimento cirúrgico feito em casos raros de obstrução esperada das vias aéreas fetais no pós-parto. A técnica tem como base o estabelecimento seguro de vias aéreas permeáveis durante o trabalho de parto em antecipação a um evento respiratório crítico, sem interromper a circulação materno-fetal.

O manejo anestésico é substancialmente diferente daquele destinado à cesariana padrão e tem como principais objetivos o relaxamento uterino, a anestesia fetal e a preservação do fluxo sanguíneo placentário.

Apresentamos o caso de um procedimento para tratamento ex-útero intraparto feito em feto com um grande linfangioma cervical e evidência pré-natal de comprometimento das vias

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aéreas. As modificações das estratégias adotadas no tratamento ex-útero intraparto clássico foram feitas com sucesso e serão discutidas no relato a seguir.

Introduction

The ex utero intrapartum treatment (EXIT) is a rare surgical procedure performed to ensure fetal airway patency during labor in situations of expected severe, potentially life-threatening respiratory failure secondary to airway obstruction.

Also known as operation on placental support[1] (OOPS) and airway management on placental support[2] (AMPS), EXIT surgery was first described in the late 1980s by Norris and colleagues[3] and was initially performed in tracheal occlusion reversion protocols for fetuses with congenital diaphragmatic hernia.[4,5] The indisputable usefulness of this technique later extended its applicability to a variety of obstetric clinical scenarios,[6–8] including fetal head and neck tumor surgical approaches.[9]

The procedure consists of a partial cesarean section with simultaneous maintenance of placental circulation as a way to preserve fetal gas exchanges during the establishment of a definitive airway through direct laryngoscopy, bronchoscopy, or tracheostomy.

The anesthetic approach is significantly different from a conventional cesarean section and involves a deep volatile anesthesia with maximum uterine relaxation, preservation of uteroplacental blood flow and fetal anesthesia.

The success of an EXIT depends on a rigorous strategic planning with involvement of a multidisciplinary team where the anesthesiologist often takes the leadership role.

In our report we describe the anesthetic management of a parturient scheduled for EXIT surgery after prenatal diagnosis of cervical lymphangioma with mediastinal involvement, highlighting both fetal and maternal singularities in the light of current clinical practice.

Case report

A healthy 25-year-old woman, gravida 1, para 0, was scheduled for elective EXIT at 38 weeks of gestation due to a prenatal ultrasound diagnosis of fetal cervical lymphangioma with tracheal deviation and risk of postdelivery airway compromise.

Preparation for the procedure involved a multidisciplinary team of anesthesiologists, obstetricians, neonatologists, pediatric surgeons, otolaryngologists and pulmonologists. Several preliminary meetings were held and every stakeholder's role and positioning in the operatory room were clearly defined.

Anesthesia material, room temperature, blood grouping, hemoderivatives availability and both neonatology and postanesthetic care unit vacancies were all preoperatively confirmed.

Additional pharmacological preparation included tocolytic support with intravenous nitroglycerin solution at a concentration of 50 mg mL^{-1} and drugs for supplementary intramuscular fetal anesthesia: fentanyl 10 $\mu g\,kg^{-1}$, vecuronium 0.2 mg kg^{-1} and atropine 100 μg, with a total volume of 2 mL.

Standard monitoring was applied with the parturient in supine and left lateral tilt position under manual uterine displacement. Two intravenous 16G lines were placed and urinary catheterization was performed.

Balanced general anesthesia was initiated after premedication with fentanyl 2 $\mu g\,kg^{-1}$. Rapid sequence induction was performed with propofol 2 mg kg^{-1} and rocuronium 1.2 mg kg^{-1}, followed by endotracheal intubation and mechanical ventilation in volume-controlled mode. A radial artery catheter was placed for invasive blood pressure monitoring. Anesthesia was maintained with low-dose desflurane and nitrous oxide in oxygen mixture. Goal-directed fluid therapy was managed with crystalloids.

Surgery began with a low segmental abdominal incision and hysterotomy followed by fetal cephalic extraction up to the nipple line. Warm Hartmann's solution amnioinfusion was further initiated. The fetus' airway was exposed and evaluated by the neonatologist and tracheal intubation successfully achieved after a single attempt.

After full extraction the newborn was stabilized and transported in a neonatal incubator under mechanical ventilation to the neonatology unit. Total placental bypass time was 4 min and 46 s. Amnioinfusion was discontinued and uterine hypotonicity effectively reversed with oxytocin and volatile concentration reduction.

The parturient remained hemodynamically stable throughout the procedure with MAP > 70 mm Hg, equivalent to preoperative records. Anesthesia emergence progressed uneventfully. Intravenous analgesia was performed with paracetamol, ketorolac and tramadol and nausea and vomiting prophylaxis with droperidol.

Discussion

The ideal constitution of a multidisciplinary team intervening in an EXIT surgery is not consensual[6,10,11] and depends on the nature and purpose of the surgery: EXIT-to-airway, EXIT-to-ECMO or EXIT-to-ressection.[11]

In this case six medical teams were involved. Anesthesiology, obstetrics and neonatology were directly involved in the procedure. Additional participation of pulmonology, otolaryngology and pediatric surgery teams was justified by their assistance in the event of a difficult laryngoscopic approach to execute a bronchoscopic intubation,