EXIT Procedure: Case Review
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Disclosure Information

- The presenters have no disclosures to report.

Objectives

- Understand the rationale for performing an ex utero intrapartum treatment procedure
- Understand the surgical preparation for an ex utero intrapartum treatment procedures
- Demonstrate knowledge of methods to ensure patient safety during an ex utero intrapartum treatment procedures
What is an EXIT Procedure?

Ex Utero Intrapartum Treatment - designed to allow for a controlled neonatal procedure while establishing airway control and maintaining placental bypass.

Fetus is partially delivered via hysterotomy while relaxing the uterus for cardiopulmonary stability of the neonate while intervention performed.

Performed since 1990; neonatal interventions include endotracheal intubation, tracheostomy, mass excision.

Indications for an EXIT procedure

<table>
<thead>
<tr>
<th>Type</th>
<th>Surgical Indication</th>
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<tbody>
<tr>
<td>EXIT to Airway</td>
<td>Congenital High Airway Obstruction Syndrome, Obstructing oropharyngeal masses, Tracheal balloon</td>
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<tr>
<td>EXIT to Resection</td>
<td>Head, neck, thoracic or mediastinal mass</td>
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<tr>
<td>EXIT to ECMO</td>
<td>Cardiothoracic anomaly or severe CHD</td>
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<td>EXIT to Separation</td>
<td>Conjoined twins</td>
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Case Study - Background

- Fetal teratomas are rare with an estimated incidence of 1 in 35,000 live births and can be life threatening to the fetus depending on the size and location.
- EXIT procedure can be the best chance of survival for the fetus to secure the airway and allow for a safe delivery.
  - In her 1st trimester, 33 y.o. mother diagnosed with teratoma that continued to grow throughout pregnancy.
  - Ultrasound showed neck mass that was exponentially growing from the face and neck.
EXIT to Airway - Procedure Planning

- At 29 weeks gestation, the team planned a schedule EXIT procedure on L&D unit
- Based on ultrasound estimates, the teratoma measured 20 x 13 x 21 cm with a volume of 4072cc’s- 2x the size of the fetus
- 3D Model from UCSF Center for Advanced 3D+ Technologies to aid in surgery

Risks:
- Unknown airway status of neonate
- Uterine hemorrhaging – blood prepared for mother & baby

OR Preparation- Team

- Pediatric General Surgeon
- Scrub Person
- Circulating Nurse
- OB Nurse
- Ultrasound Technician
- Maternal-Fetal Medicine/OB MD
- Pediatric Fetal Surgeon
- Neonatologist
- OHNS Surgeon
- Anesthesia Providers

3D Printing

Model of fetus split showing known airway structures
Surgery Plan

- General anesthesia of mother for uterine relaxation
- Ultrasound to locate placenta & fetus
- Perform laparotomy and hysterotomy
- Partial delivery of fetus: head & one arm + lower body and umbilical cord in uterus to maintain temperature and amniotic fluid
- Establish airway: intubation
- Deliver baby and clamp cord -> neonatal resuscitation
- Delivery placenta & close

Continuous maternal & fetal monitoring

OR Preparation - Instruments & Supplies

- Various Laryngoscope blade sizes
- Tumor retractor
- Ultrasound gel & drapes
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- Fluid warmer - to be draped steriley
- Flexible rhino laryngoscope
- Turner Warwick retractor
- Multiple ET tube sizes
- Neonatal Bronchoscopy set
- Pulse Ox Probe & drapes for Baby

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OR Preparation - Instruments & Supplies

- Ultrasound probe covers & ultrasound machine drape
- Pulse Ox Probe & drape for baby
- Camera & Light Cords
- Suction: abdomen and for bronchoscope
- Stethoscope: to use by surgeon on baby
- Connector for ET tube to Circuit connection

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Surgery

- Opening the uterus using stapler to minimize bleeding: cuts & staples with absorbable staples simultaneously
- Stapling guided by ultrasound

- Fetus Assessment
  - Pulse ox placed
  - Laryngoscopy performed

- Fluid removed from cyst to assist in delivery.
Surgery

Teratoma covered with blue towel

Neonatologist transporting the baby from the delivery room to the resuscitation room. The Otolaryngologist is stabilizing the head and the endotracheal tube.

Anesthesiologist passing PRN emergency rescue meds to scrub person (Atropine/Epinephrine)

Post-op - Prior to teratoma excision

- Hemodynamic instability
- Large mass growing & becoming necrotic
- Surgery scheduled 3 days post delivery
- Teratoma found with old blood, cystic fluid, neural tissue, bone & cartilage
In the NICU

Development of Stage III Pressure Injury to occipital area

5 days post-op teratoma resection

Post-Op

3-month follow-up visit
References

