



Cincinnati
Fetal Center

Ex-Utero Intrapartum Treatment Procedures

For the Management of Prenatally Diagnosed Congenital Malformations





Ex-Utero Intrapartum Treatment (EXIT) Procedures

The Ex-Utero Intrapartum Treatment (EXIT) procedure is an important strategy in the management of prenatally diagnosed congenital malformations. The EXIT procedure helps enable physicians to transform a potentially fatal neonatal emergency into a controlled environment to ensure a better outcome.

The EXIT procedure was originally described for the reversal of tracheal occlusion in cases of severe congenital diaphragmatic hernias. The principles of the EXIT procedure have been successfully applied to improve the outcome in various other settings where cardio-pulmonary compromise is anticipated, most notably in cases of airway obstruction.



EXIT Procedure Indications and Goals

The range of indications for the EXIT procedure has expanded to include:

- Giant fetal neck masses
- Lung or mediastinal tumors that obstruct the airway
- Congenital high airway obstruction syndrome (CHAOS)
- EXIT-to-ECMO (extra-corporeal membrane oxygenation)

During the EXIT procedure, the goals are to:

- Achieve a state of uterine hypotonia through use of deep inhalational anesthesia
- Preserve uterine volume to prevent placental abruption
- Maintain normal maternal blood pressure
- Achieve a surgical level of fetal anesthesia without cardiac depression

EXIT-to-Airway

The most common indications for the EXIT procedure are a fetus with an airway compromised by a neck or chest mass such as cervical teratoma, lymphangioma or congenital pulmonary airway malformation (CPAM), trachea or laryngeal atresia (such as in CHAOS), or severe micrognathia. The EXIT procedure allows time to secure the fetal airway by laryngoscopy, bronchoscopy, endotracheal intubation or tracheostomy. As a result, the EXIT-to-Airway turns an airway emergency into a controlled, planned procedure.

EXIT-to-Extra-Corporeal Membrane Oxygenation (ECMO)

The EXIT-to-ECMO strategy is useful in cases of severe pulmonary or cardiac malformations in which separation from the uteroplacental circulation will lead to immediate instability in the newborn. In such cases, the EXIT-to-ECMO strategy can be applied to secure the airway and insert venous and arterial cannulas for ECMO while on placental support.

This approach avoids any period of hypoxia or acidosis during neonatal resuscitation. Cincinnati Fetal Center offers EXIT-to-ECMO in cases of high-risk congenital diaphragmatic hernia (CDH) with lung-head circumference ratios (LHR) less than 1.0 with associated liver herniation, which is the highest risk category for mortality and morbidity.

We also offer EXIT-to-ECMO in the cardiac catheterization lab for cases of severe aortic stenosis (AS) or hypoplastic left heart syndrome (HLHS) when they are associated with restrictive atrial septum in which severe instability would be anticipated before the newborn could be transferred from the delivery room. This allows for immediate cardiac intervention if warranted.

EXIT-to-Resection

The EXIT-to-Resection procedure can be appropriate for conditions involving large, high-risk chest masses such as CPAM or mediastinal teratomas compromising the intrathoracic trachea. In these cases, the rationale for the EXIT strategy is to allow for the resection of the mass while on placental support, facilitating postnatal ventilation and venous return to the heart if ECMO is necessary for pulmonary hypoplasia.

The EXIT procedure requires synchronized teamwork involving multiple disciplines, including:

- Fetal surgeons
- Pediatric surgeons
or a pediatric otolaryngologist
- Maternal-fetal medicine specialist
- Neonatologist
- Anesthesiologists
- Echocardiographer
- Circulating nurses
- Surgical technician

EXIT Procedures Performed by Physicians at Cincinnati Fetal Center

EXIT-TO-AIRWAY

- Cervical teratoma/lymphangioma
- Congenital high airway obstruction syndrome (CHAOS)
- Micrognathia
- Chest masses

EXIT-TO-EXTRA-CORPOREAL MEMBRANE OXYGENATION (ECMO)

- Congenital diaphragmatic hernia (CDH)
- Severe congenital heart defects

EXIT-TO-RESECTION

- Congenital pulmonary airway malformation of the lung (CPAM)
- Bronchopulmonary sequestrations (BPS)
- Mediastinal teratoma

Cincinnati Fetal Center

Cincinnati Fetal Center brings together renowned fetal and maternal medicine specialists, leading technologies and a full range of integrated support services from Cincinnati Children's Hospital Medical Center, Good Samaritan Hospital and University of Cincinnati Medical Center to treat high-risk pregnancies due to severe structural abnormalities. We welcome and appreciate patient referrals.



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your referrals, consult requests,
or emergency transfer needs.

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