Advancements in Fetal Surgery
Service with a Heart: The tiniest of lives
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Fetal Intervention
Fetal Surgery

Fetal Surgery
Fetal surgery

- The treatment of fetal abnormalities that might otherwise cause fetal demise or significant problems if permitted to persist.

http://www.surgeryencyclopedia.com/Ce-Fi/Fetal-Surgery.html

Fetal surgery improves outcomes from congenital malformations and improves postnatal outcomes.

- Lung mass (CCAM-congenital cystic adenomatous malformation)
- Sacrococcygeal teratoma
- Giant neck masses/obstructions
- Congenital diaphragmatic hernia
- Spina bifida
Fetal Surgery

- Risks to the mother
- Two lives at risk
- Long term morbidity to mother
- PRE-TERM LABOR

Recent advances in fetal surgery

The Fetal Surgery Team

- Pediatric surgery (fetal surgery)
- Maternal fetal medicine (OB)
- Anesthesia (maternal/fetal)
- Cardiology
- ENT
- Neurosurgery
- Nursing

EXIT Procedure

- Giant neck masses
- Lung lesions
- CHAOS (Congenital High Airway Obstruction Syndrome)
FETAL SURGERY

• Congenital Lung mass (CCAM - congenital cystic adenomatoid malformation)

• Entire lobe of lung is replaced by a non-working cystic piece

When Marle’s routine ultrasound revealed a grapefruit-sized tumor attached to her gallbladder, she was given only a 10% chance of survival. When her family came to Texas Children’s Fetal Center, we were able to operate in utero to save her life.
In utero spina bifida repair

Spina Bifida (Myelomeningocele)

• Second most common birth defect
• One out of every one thousand pregnancies
• Myelomeningocele – most severe

In utero spina bifida repair

• MOMs Trial
• Surgery between 19 and 25 weeks
• Benefits
Minimally Invasive Fetal Intervention

- Twin twin transfusion syndrome
- Fetal bladder obstructions
- Fetal chest tube placement
- Cardiac intervention (HLHS)
- FETO (Fetal Tracheal Balloon Occlusion)

Brief History of Fetal Intervention

- 1961 Fetal peritoneal transfusion
- 1970’s Diagnostic embryo-fetoscopy
- 1970’s Introduction of ultrasound
- 1983 Ultrasound guided cordocentesis
- 1988 Placental laser ablation for twin to twin transfusion syndrome (DeLia MD)
- Dr. Michael Harrison (UCSF)

[Image of a fetus]
Twin to Twin Transfusion Syndrome

• A complication of disproportionate blood supply between monochorionic (one placenta) diamniotic (2 amniotic cavities) monozygotic (identical) twins.

• Blood vessels in the placenta are shared by the twins.

• Complicates approximately 9% of identical twin pregnancies.

• Usually begins in the 2nd trimester of pregnancy.

Twin to Twin Transfusion Syndrome

- DONOR TWIN
- Intra-uterine growth retardation
- Chronic hypoxia and anemia
- Hypovolemia
- Hypotension
- Decreased urine production
- Oligohydramnios

- RECIPIENT TWIN
- Increased urine production
- Polyhydramnios
- Heart failure
- Hypertension
- Hydrops

Twin to Twin Transfusion Syndrome

• Improving survival in twin to twin transfusion syndrome. Juhlin, J. et al. 2009 Contemporary OB/GYN

Twin to Twin Transfusion Syndrome

• Twin to twin transfusion: An Update. Skupski, 2000

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TTTS Staging System

- **Stage I:** The fetal bladder of the donor twin remains visible.
- **Stage II:** The bladder of the donor twin is collapsed and not visible by ultrasound.
- **Stage III:** Critically abnormal fetal doppler studies.
- **Stage IV:** Fetal hydrops present.
- **Stage V:** Demise of one or both twins.

Consequences of No Treatment

- 90% to 100% mortality without treatment of one or both fetuses.
- 30% chance of a neurological compromise in surviving singleton.
- Pre-term labor.

Amnioreduction & Septostomy

- 50% survivability of a singleton.
- Septostomy/amnio-reduction only treats the polyhydramnios and not the TTTS.
Placental Laser Ablation

- Ultrasound guidance for entry to uterus.
- Percutaneous entry into the womb.
- Introduction of a fetoscope into the uterus.
- Laser photocoagulation of conjoined placental vessels.
- Amnioreduction post laser ablation without septostomy.

Twin to Twin Transfusion Syndrome

Outcomes of Laser Ablation

- 75% for one live twin
- 35% two live twins
- 25% chance of neither twin surviving
- 7% chance of complications to a surviving twin after a fetal demise

http://fetus.ucsfmedicalcenter.org/twin/twin_twin_transfusion.asp, 2/7/2011
RISKS

- Bleeding
- Premature rupture of membranes
- Pre-term labor
- Infection

Other Fetal Procedures

- Intra-uterine fetal blood transfusion
  - Fetal Anemia
- Thoracic shunt placement
  - CCAM (congenital adenomatoid cystic malformation)
- Tracheal balloon occlusion (FETO)
  - Congenital diaphragmatic hernia
- Posterior urethral valve ablation – fetal cystoscopy-shunt placement
- Fetal cardiac intervention
  - Hypoplastic left heart syndrome