INTRODUCTION

Fetal treatment is:
- Pregnancy management
  - Alteration in mode of delivery (C-section vs. vaginal delivery)
  - Alteration in time of delivery
  - Alteration in place of delivery (community hospital vs. tertiary center)
  - Non-invasive fetal treatment (without entering the gravid uterus)
- Minimally invasive fetal treatment (percutaneous needle techniques, endoscopic surgery)
- Open fetal surgery (very few indications)

Most prenatally diagnosed conditions are best treated after birth.

RATIONALE FOR FETAL TREATMENT

- Reserved for (small) number of fetal anomalies seen to deteriorate throughout gestation
- Only if even earliest postnatal intervention too late, and following conditions are met:
  1. *The condition has to be diagnosable before birth.*
     Many defects cannot (yet) be diagnosed with current technology (imaging, molecular)
  2. *Differential diagnosis has to be accurate.*
     Some conditions have similar ultrasound appearance but different etiology. Examples: hydrocephalus from isolated aqueductal stenosis (potential for drainage) or chromosomomal anomaly (irreparable); oligohydramnios from untreatable Potter syndrome (renal agenesis) or low urinary tract obstruction (which can be drained)
  3. *The natural history of the condition should be known.*
     Often difficult – how to be certain of irreversible damage if left untreated?
     Example: posterior urethral valves → oligohydramnios → impaired chest expansion → pulmonary hypoplasia → neonatal death
Even if pathophysiology is predictable in general, possible variations in severity: importance of prognostic factors. Example: lung-head ratio (LHR) to predict severity of diaphragmatic hernia, staging of twin-to-twin transfusion syndrome

4. **There is no effective postnatal treatment.**

Most conditions are best treated after birth. Examples: abdominal wall defects (gastrochisis, omphalocele), esophageal atresia, cleft lip/cleft palate, intestinal atresia, club foot, most fetal tumors

5. **The condition should be lethal if left untreated.**

Fetal intervention (surgery) is highly invasive/dangerous to mother and fetus. Fetal surgery not justified for ‘less severe’ conditions. Example: cleft lip/cleft palate (despite promise of scarless healing). Most recent, and glaring exception: open neural tube defect (spina bifida) – a potentially devastating, but not often lethal anomaly. The MOMS trial (see chapter 12) established that prenatal surgery improves the chances of independent walking, reduces the risk of hydrocephalus and almost eliminates the development of the Chiari-II malformation.

6. **In utero treatment must be feasible.**

Treatment must also be expected to be effective. Examples: in utero open heart surgery (not (yet) feasible), spina bifida (in utero closure not shown to be effective in reversing damage from open neural tube)

7. **Fetal intervention should only be performed at specialized institutions with access to a multidisciplinary team of experts, and with pressure-free informed consent from appropriately counseled parents.**

**Types of Fetal Intervention**

- **Non-invasive intervention**
  - “Pregnancy management:” alterations in time, place or mode of delivery
  - Indirect treatment of the fetus through non-invasive means: ex. Transplacental therapy

- **Invasive intervention**
  - Requires entering the gravid uterus – needle, incision
  - Most aggressive form of fetal treatment
  - Significant risks: infection (wound, chorioamnionitis), bleeding (uterus, fetus), tear/rupture of amniotic or chorionic membrane, premature labor, chronic amniotic leak (and oligohydramnios)
  - Significant risk of fetal death
  - Needle techniques vs. endoscopic fetal surgery vs. open fetal surgery
  - Perinatal intervention: EXIT procedure (see chapter 16)