Sonography of Twins
Deborah Levine, MD

- Naturally occurring twins about 1/80 (1.2%)
- In 2014 in U.S. 33.7/1000 (3.4%)


Risks
Di-di
  - preterm delivery - check the cervix!
  - IUGR
  - congenital malformations
Di-mo
  - twin twin transfusion syndrome
Mo-mo
  - cord entanglement

Twin Morbidity
Survey of 33,873 women, 1.3% twins
- Preterm delivery
  - 54% of twins
  - 9.6% of singletons
- 15.4% of neonatal deaths
- 9.5% of fetal deaths

Gardner et al, Obstet Gynecol 1995
Twins

- Dizygotic (2/3 of twins)
  - maternal age
  - race
  - Parity
  - IVF
- Monozygotic (1/3 of twins)
  - 1/250

IVF 2-12 times expected rate of monozygotic twins higher after 5-6 day transfers compared to 2-3 day transfer

**Multiple Gestations**

Chorionicity is most accurately determined in the first trimester

**Why Do Endovaginal Scanning?**

Transabdominal
“Empty Sac”

Transvaginal
Di-Mo Twins!

**Amnionicity/Chorionicity**

Di-Di
- Thick membrane (> 2 mm) - 92%
- 2 Placenta sites - another 4%

Di-Mo
- Thin membrane (< 1 mm) - 88%

*Kurtz, Radiology 1992

**Chorionicity**

- Discordant twins
- Twin-twin transfusion
- Congenital abnormalities
- Fetal death of one twin
  - Di-Di allow pregnancy to continue
  - Di-Mo at risk for anomalies/demise
- Amniocentesis
Di-Di Twins

- Different sex
- Separate placentae
- Thick membrane (≥2mm)
- “Twin peak”

Diamniotic Monochorionic Twins

Twin Mimic: Synnechia
Decidual reaction in other horn, not twin

Twin Mimic: Bicornuate Uterus
Decidual reaction in other horn, not twin
Regardless of history: make sure they are in the uterus

Dichorionic Triamniotic Triplets

Twins at > 6 weeks who were studied at 5-5.9 weeks
- 24/213 (11%) Di-Di twins missed
- 6/7 (86%) Di-Mo twins missed

Doubilet, JUM 1998
Vanishing Twin

- 21% of twins verified to be alive with sonography disappeared subsequently*
- Late 1st trimester, early 2nd trimester
- No significant risk to the living co-twin

* Landy, Obstet Gynecol 1986

7 weeks, 2 sacs
One with fetal pole with FH
Smaller sac with yolk sac, no FH
10 weeks, 1 live fetus
Second empty sac

Twins of Different Sizes

Fetus Papyraceous

- Small non-viable fetus in a small sac
- Flattening, necrosis, atrophy
- 1/184 twin births

Twin Anomalies

- Embryologic hypothesis
  - Monozygous twinning is a result of abnormal embryologic development
  - Therefore is associated with other anomalies
Growth Discordance

Weight discordance > 20% is worrisome

Monochorionic twins

- 6 weeks, two heartbeats
  - 40% 2 liveborn
  - 30% 1 liveborn
  - 30% 0 liveborn
- 12 weeks, two heartbeats
  - 74.5% 2 liveborn
  - 25.0% 0 liveborn

Benson, Radiology, 1994

Twin Twin Transfusion

- Occurs in 10-23% of monochorionic multiple gestations
- Perinatal mortality >80% (17% of twin mortality
- Vascular anastomoses
Twin Twin Transfusion
Classic description
• Donor twin
  – Anemia
  – Growth restriction
  – Oligohydramnios
  – Small bladder
• Recipient twin
  – Polyhydramnios
  – Polycythemia
  – Distended bladder
  – Cardiomegaly
  – Hydrops

Twin anemia/polycythemia Sequence (TAPS)
• 5% Monochorionic twins; higher after laser ablation
• MCA-PSV >1.5 MoM in one fetus
• MCA-PSV of <0.8 MoM in the co-twin
• Postnatal TAPS inter-twin hemoglobin difference of ≥ 8 g/dL at birth and at least one of
  – reticulocytosis in the donor with an inter-twin reticulocyte count ratio >1.7
  – only small (<1 mm in diameter) residual anastomoses on postnatal placental injection studies

TTTS currently felt to be a misnomer
Oligo/Poly
• MVP <2 cm donor sac
• MVP >8 cm recipient sac
• Distended bladder in recipient
• Hematocrits are often similar

Growth Discordance
• EFW difference 20%
  – sensitivity 93%
  – ppv 72%
• AC difference of 20 mm
  – sensitivity 83%
  – ppv 83%

Placental Anastomoses
• Location
  – Superficial
  – Deep
• Type
  – A-A (common, superficial)
  – V-V (rare)
  – A-V (unequal sharing)

Placental Anastomoses
• More anastomoses are protective
• AA anastomoses are protective

De Villiers et al, Placenta 2012
Twin Twin Transfusion Therapy

- Amnioreduction
- Laser ablation of placental anastomoses
- Selective feticide
- These have reduced fatalities by 50%

Quintero Staging TTS

I - MVP <2 cm donor sac; MVP >8 cm recipient sac; both twins bladder present
II - Absence of urine-filled bladder
III - Absent/reverse end diastolic flow UA
- Reverse flow ductus venosus
- Pulsatile umbilical venous flow
IV - Ascites, pericardial/pleural effusion, hydrops
V - Death of one of the twins

Comparing Therapies: Stage III/IV

<table>
<thead>
<tr>
<th>Laser</th>
<th>Amnioreduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>79</td>
<td>61</td>
</tr>
<tr>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>1750</td>
<td>1145</td>
</tr>
<tr>
<td>2000</td>
<td>1560</td>
</tr>
</tbody>
</table>

Images courtesy of V. Feldstein, UCSF
Fluid Discordance

Co-twin Demise
Monochorionic Pairs
- Cerebral palsy

Twin Anomalies
- Thromboembolic vs. ischemic
  - microcephaly
  - multicystic encephalomalacia
  - hydrocephaly
  - hydranencephaly
  - limb amputation
  - intestinal atresia
  - aplasia cutis

Acardiac Twin
chorioangiopagus parasiticus
- 1% monochorionic twins
- Umbilical arterial to arterial anastomoses
- Pulsatile flow to internal iliac arteries
- Structures supplied by the distal abdominal aorta and iliac arteries are developed best
- Upper trunk and head are not perfused

Acardiac Twin
- Blood retrograde from normal to abnormal fetus
- Retrograde flow in umbilical cord of acardiac twin
- Cardiac failure and death of the normal twin in 50%
  - Additional workload increases in third trimester when size of the acardiac twin becomes larger

Image from Rodeck, NEJM, 1998: 1294
Amniocentesis in Monzygotic Twins

- Usually have the same karyotype
- Rare postzygotic nondysjunction
- Turner and normal male; Mosaic Turners

Mo-Mo twins

- One yolk sac
- Need to follow-up, since with early di-mo twins, only one yolk sac may be seen

Mo-Mo Twins

- Conjoined twins
- Cord entanglement – perinatal mortality 30-70%
- Monitor heart tracings
- Deliver early

Cord Entanglement

- 7 nonconjoined monoamniotic twins
  – Cord entanglement seen in 4
  – Missed in one

Aisenbrey et al ObGyn 1995
Intertwined Cords

Conjoined twins

- Suffix -pagus, “fastened”
  - Craniopagus
  - Thoracopagus
  - Omphalopagus
- Thoraco-omphalopagus most common
Summary: TWINS

- Congenital abnormalities
- F/U - growth - Discordant twins
- Chorionicity is important
  - TTTS, TAPS, TRAP
  - Fetal death of one twin
    - Di-Mo at risk for anomalies/demise
  - Amniocentesis
- Amnioncicity is important
  - Monoamniotic twins at highest risk