Twins through the (Gestational) Ages: Ultrasound Pearls &
Antenatal Management of Twins: How Ultrasound Can Help

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Ultrasound and Twins

• What the ultrasound should tell you...
  First, Second and Third Trimesters
• What to do when...
  - you can't find an intertwin membrane?
  - the fetal sizes and/or amniotic fluid volumes are discordant?
  - one fetus has an anomaly or has died?

Ultrasound and Multiple Gestations

Perinatal complications are more common in twin pregnancies:
• Preterm labor, Hypertension, Fetal anomalies, Poly/Oligohydramnios, IUGR, Fetal demise, Malpresentation, Abruption, Previa, Postpartum hemorrhage
• Ultrasound is critically important in the management of these pregnancies!

OB Complications and Multiple Gestations

• Perinatal mortality rate is 4-10 times that of singletons
• Most risks increase further with increasing number of fetuses
• Risks differ with chorion/amnion types
Types of Twinning

- DIZYGOTIC ("Fraternal"): Fertilization of two ova by two sperm
- MONOZYGOTIC ("Identical"): Single zygote that separates after fertilization

Chorionicity & Zygosity

- MONO-chorionic = Mono-zygotic twins
- DI-chorionic = EITHER Mono- or Di-zygotic twins

Key points from the ultrasound: FIRST Trimester

- Accurate head count!
  Undercounting is easy, esp. with MC twins
  Outcomes are better when detected early
- 2nd most critical piece of information: CHORIONICITY!
**CHORIONICITY** is *(the most)* Important Predictor of Outcome in Twins

- Morbidity & Mortality rates higher with MC twins
- Discordant growth more common with monochorionic (MC) twins
- Twin-twin transfusion occurs only with MC twins
- Risk of anomalies higher with MZ twins
- Risk of injury to MC survivor with co-twin demise is substantial

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**Mortality Rates in Twin Pregnancies**

<table>
<thead>
<tr>
<th>Type</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dichorionic</td>
<td>9%</td>
</tr>
<tr>
<td>Monochorionic/Diamniotic</td>
<td>26%</td>
</tr>
<tr>
<td>Monoamniotic</td>
<td>50%</td>
</tr>
<tr>
<td><strong>OVERALL</strong></td>
<td>14%</td>
</tr>
</tbody>
</table>

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Dichorionic Diamniotic
Monochorionic Diamniotic

IVF and Twinning

IVF does NOT always = DICHORIONIC Twins
Rates of MONOZYGOTIC Twinning:
- after conventional IVF about 2%
- after blastocyst transfer 5-10%
Triplets, S/P IVF

Other First Trimester concerns:

- Heterotopic pregnancy:
  Risk increased with IVF
- Early growth discordance
- Nuchal Translucency screening

Nuchal Translucency Screening

- Enlarged NT increases risk for chromosome abnormalities and structural anomalies.
- Risk of TTTS and/or fetal death > 30% with discordant NT sizes.

Anomalies in Twins

- Increased risk for chromosome abnormalities (in one or both)
- Offer invasive testing (amnio or CVS) at 32 y.o.
- Can screen with NT/first trimester combined screen or expanded AFP
**Anomalies in Twins**

- MC (MZ) twins almost always have same karyotype
- CVS or Amniocentesis sample both, if possible:
  - chorionicity not certain
  - karyotype may be discordant
  - risk of loss not increased
- DNA Testing can determine zygosity
- Structural anomalies are usually NOT concordant

**Important ultrasound observations: SECOND Trimester**

- Accurate head count
- CHORIONICITY (if unknown)
- Cervix / Length (risk for PTL and previa)
- Anomalies (increased in twins)
- Fetal size/AFV discordance (?) TTTS

**Management of Twins: SECOND Trimester**

<table>
<thead>
<tr>
<th>Anomalies</th>
<th>MC twins</th>
<th>DC twins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aneuploidy</td>
<td>--</td>
<td>+</td>
</tr>
<tr>
<td>Preterm labor</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>TTTS</td>
<td>+++</td>
<td>--</td>
</tr>
<tr>
<td>Size discordance</td>
<td>+++</td>
<td>+</td>
</tr>
<tr>
<td>Single IUFD</td>
<td>+++</td>
<td>--</td>
</tr>
<tr>
<td>US F/U</td>
<td>q 2-3 wks q 6 wks</td>
<td></td>
</tr>
</tbody>
</table>

**Ultrasound Assessment of Twins**

**U/S Clues to CHORIONICITY:**

- Placental Number
- Fetal Gender
- ? “Twin Peak” Sign
- Membrane Thickness
Dichorionic Diamniotic

Dizygotic

“Twin Peak” Sign
Monochorionic Diamniotic

Discordant Twin Size / Weight
≠
Twin-Twin Transfusion Syndrome

Unequal Placental Sharing
### Umbilical Cord Insertion Site

- **C**: Umbilical Cord
- **V**: Umbilical Vein

### Table: LMP Twin A Twin B % discord

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>16 / 159 / NA</td>
<td>17 / 200 / NA</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>19 / 296 / NA</td>
<td>20 / 349 / NA</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>20 / 358 / 18</td>
<td>22 / 483 / 41</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>22 / 470 / 21</td>
<td>23 / 634 / 45</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>25 / 869 / 23</td>
<td>28 / 1071 / 40</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>28 / 1181 / 25</td>
<td>30 / 1466 / 45</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>29 / 1427 / 18</td>
<td>32 / 1794 / 40</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>30 / 1614 / &lt;10</td>
<td>33 / 2067 / 29</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

- $\left[ \frac{\text{EFW (large)-EFW (small)}}{\text{EFW (large)}} \right] \times 100$
Twin-Twin Transfusion Syndrome

- Affects ~15% of Monochorionic twin pregnancies
- Varies in: Gestational age at onset, Severity, Acuity, Degree of discordance in EFWs and in AF volumes
- Poor prognosis for both fetuses
- Definition:
  - Concomitant OLIGO & POLY in MC twins

Oligohydramnios / Polyhydramnios

Urinary Bladders

Recipient

Donor
“Stuck” Twin

Donor
Recipient

Arterio-Venous Anastomosis

Artery-Artery
Vein-Vein
Artery-Vein
Twin-Twin Transfusion Syndrome

**Poor perinatal outcome:**
- Perinatal mortality as high as 70-90% without treatment
- Long term neurologic sequelae common in survivors
- Treatment options include amnioreduction and laser
- Optimal treatment uncertain, under study

Arterio-Venous Anastomosis

TTTS vs Unequal Sharing

<table>
<thead>
<tr>
<th>TTTS</th>
<th>Unequal sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFV</td>
<td>Poly/Oligo</td>
</tr>
<tr>
<td>EFW</td>
<td>NI-LGA/SGA</td>
</tr>
<tr>
<td>PTL</td>
<td>++++</td>
</tr>
<tr>
<td>Rx</td>
<td>Amnio/Laser</td>
</tr>
<tr>
<td></td>
<td>Normal/Oligo</td>
</tr>
<tr>
<td></td>
<td>Normal/LGA/SGA</td>
</tr>
<tr>
<td></td>
<td>+/-</td>
</tr>
<tr>
<td></td>
<td>Follow/Deliver</td>
</tr>
</tbody>
</table>
**Amniotic Fluid Volume Abnormalities in MC Twins**

<table>
<thead>
<tr>
<th>Twin A</th>
<th>Twin B</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLY</td>
<td>OLIGO</td>
<td>TTTS</td>
</tr>
<tr>
<td>Normal</td>
<td>OLIGO</td>
<td>Unequal sharing (IUGR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fetal abnormality (renal)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PROM</td>
</tr>
<tr>
<td>POLY</td>
<td>Normal</td>
<td>Fetal abnormality (hydrops, NTD, GI tract, macrosomia)</td>
</tr>
</tbody>
</table>

**Twins & Fetal Anomalies**

- Increased risk for structural anomalies in twins, esp. monozygotic twins
- Most isolated anomalies (CHD, NTD, etc) affect just one twin, even MZ pairs

**Selective Termination**

- Can be offered until 24 weeks GA
- May improve outcome of PROM
- Determination of chorionicity is of critical importance!
- Different techniques must be used with MC pairs

**Selective Termination**

*Issues to consider:*

- How will ST affect outcome for normal fetus?
- Is anomaly lethal or will it result in handicapped survivor?
- Which fetus is affected? (presenting)
- Is there a risk of IUFD?
- What is chorionicity?!
Important Ultrasound Observations: THIRD Trimester

- Growth
- Amniotic Fluid Volume
- Position / Lie (Planning for delivery)
- Presentation / EFW of non-presenting twin important predictors of NSVD

Third Trimester Management

<table>
<thead>
<tr>
<th></th>
<th>MC twins</th>
<th>DC twins</th>
</tr>
</thead>
<tbody>
<tr>
<td>US frequency</td>
<td>q 2-3 wks</td>
<td>q 4-6 wks</td>
</tr>
<tr>
<td>Delivery</td>
<td>36 wks</td>
<td>38-39 wks</td>
</tr>
</tbody>
</table>

What to do when...

First Trimester
- Try EV US
- Count yolk sacs
- Review prior films
- Return in 2 weeks

Second Trimester

Third Trimester

You can’t see an intertwin membrane?

First Trimester:
- Try EV US
- Count yolk sacs
- Review prior films
- Return in 2 weeks
What to do when...

You can’t see an intertwin membrane?

SECOND Trimester:
Consider
• Monoamniotic twins (no membrane)
• TTTS with “Stuck” Twin, ? Poly
• One twin with renal / other anomaly
• PROM with severe oligohydramnios
Dx: Monochorionic Diamniotic Twins, one with Hypoplastic Left Heart
*What to do when...*

Membrane present, but thickness (chorionicity) uncertain?

- Get prior 1st trimester US images
- Search for Arterio-Arterial anastomosis
- DNA Testing can determine zygosity
What to do when...

* EFWs/AF volumes are discordant?
  * Second Trimester/MC Twins
    Think TTTS, requires urgent referral!
  * DC Twins
    Anomaly/IUGR in 1 twin?
  * PROM is possible with either DC or MC twins
  * PROM can affect non-presenting twin, although this is less common

? Twin-Twin Transfusion Syndrome
What to do when...

One twin has died?

- Are they DC or MC?
- Is other twin at risk for injury? (MC only) Consider MRI scan.
- With DC twins, surviving twin not typically at risk unless ongoing process such as preeclampsia, etc.

MRI in Complicated Twin Pregnancies
**Conclusions**

- Twins have increased risk of perinatal complications compared with singletons
- MC twins have more complications than DC twins
- Management of twin pregnancies depends on accurate knowledge of chorionicity!

**S/P Demise of Co-Twin**

- Intraventricular and Parenchymal Hemorrhage

**CHORIONICITY** can be determined by US
- Assessment is easiest in 1st Trimester
- US Examination and Report should address CHORIONICITY!
- NOTE: Discordant EFWs, AFVs, Bladders
- Unequal Placental Sharing
- Vascular Anastomoses in shared placenta