Twin-To-Twin Transfusion Syndrome

Etiology, Management, and Outcomes

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Disclosure

• I have no actual or potential conflict of interest in relation to this program/presentation.
Objectives

• Background
• Identify methods to determine chorionicity of a twin gestation
• With regard to Monochorionic-Diamnionic twin gestations, what is the recommended surveillance?
• Describe possible treatment options for Twin-to-Twin Transfusion Syndrome
Multiple Gestations:
Why do we care other than gum commercials and movies?

“We’re having twins? This is great! We can have both of our children in one pregnancy and then be done!”
Multiple Gestation Pregnancies

• Increased Rates
  • Delayed Childbearing 31%
  • Ovarian Stimulation 34%
  • *In-Vitro* Fertilization 35%

• Fertility Treatment and Risk of Twinning
  • Clomiphene 7-8%
  • Gonadotropins 20-30%
  • *In-Vitro* Fertilization 20-30%


## 2013 Birth Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Births</td>
<td>3,932,181</td>
<td></td>
</tr>
<tr>
<td>Singletons</td>
<td>3,795,157</td>
<td>(96.5%)</td>
</tr>
<tr>
<td>Multiple Gestations</td>
<td>137,024</td>
<td>(3.5%)</td>
</tr>
<tr>
<td>Twins</td>
<td>132,324</td>
<td>(3.4%)</td>
</tr>
<tr>
<td>Triplets</td>
<td>4,364</td>
<td>(0.11%)</td>
</tr>
<tr>
<td>Quadruplets</td>
<td>270</td>
<td>(0.007%)</td>
</tr>
<tr>
<td>Quintuplets and Higher</td>
<td>66</td>
<td>(0.002%)</td>
</tr>
</tbody>
</table>

## Trends in Pregnancy Characteristics

- **Overall Number of births**: Decreased annually since 2007
- **Teen Birth Rate**: Decreased annually since 1991
- **Birth rates for women 25-34**: Essentially unchanged since 1990
- **Birth rates for women 35-44**: Increased 1-2% per year since 1990
- **Birth rates for women 45-49**: Increased 14% from 2012
- **Birth rates for women ≥ 50**: Increased annually since 1997
- **Twin Birth rates**: Increased 76% from 1980-2009
- **Triplet and greater Birth rates**: Increased 400% from 1980-1998
- **Stable since 2009**

# Maternal Complications of Twin Pregnancy

<table>
<thead>
<tr>
<th>Complication</th>
<th>Singleton (%)</th>
<th>Twin (%)</th>
<th>RR</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperemesis</td>
<td>1.7</td>
<td>5.1</td>
<td>3</td>
<td>2.1-4.1</td>
</tr>
<tr>
<td>Spontaneous Abortion</td>
<td>18.6</td>
<td>26.5</td>
<td>1.4</td>
<td>1.3-1.6</td>
</tr>
<tr>
<td>Anemia</td>
<td>16.2</td>
<td>27.5</td>
<td>1.7</td>
<td>1.5-1.9</td>
</tr>
<tr>
<td>Placental Abruption</td>
<td>0.5</td>
<td>0.9</td>
<td>2.0</td>
<td>1.2-3.3</td>
</tr>
<tr>
<td>Gestational Hypertension</td>
<td>17.8</td>
<td>23.8</td>
<td>1.3</td>
<td>1.2-1.5</td>
</tr>
<tr>
<td>Preeclampsia</td>
<td>3.4</td>
<td>12.5</td>
<td>3.7</td>
<td>3.3-4.3</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>0.1</td>
<td>0.2</td>
<td>3.4</td>
<td>1.2-9.4</td>
</tr>
<tr>
<td>Antepartum DVT</td>
<td>0.1</td>
<td>0.5</td>
<td>3.3</td>
<td>1.3-8.1</td>
</tr>
<tr>
<td>Retained Placenta</td>
<td>2.5</td>
<td>6.7</td>
<td>2.7</td>
<td>2.2-3.3</td>
</tr>
<tr>
<td>D&amp;C</td>
<td>0.6</td>
<td>2.0</td>
<td>3.1</td>
<td>2.0-4.8</td>
</tr>
<tr>
<td>Postpartum Hemorrhage</td>
<td>0.9</td>
<td>3.1</td>
<td>3.4</td>
<td>2.9-4.1</td>
</tr>
<tr>
<td>Secondary PPH</td>
<td>0.6</td>
<td>1.7</td>
<td>2.6</td>
<td>1.8-4.6</td>
</tr>
<tr>
<td>Postpartum DVT</td>
<td>0.2</td>
<td>0.6</td>
<td>2.6</td>
<td>1.1-5.9</td>
</tr>
</tbody>
</table>

# Neonatal Complications

<table>
<thead>
<tr>
<th></th>
<th>Mean Birthweight (g)</th>
<th>GA at Delivery (wk)</th>
<th>Delivery &lt;32 weeks (%)</th>
<th>LBW &lt;2500g (%)</th>
<th>VLBW &lt;1500g (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singleton</td>
<td>3298</td>
<td>38.7</td>
<td>1.54</td>
<td>6.27</td>
<td>1.08</td>
</tr>
<tr>
<td>Twin</td>
<td>2323</td>
<td>35.2</td>
<td>11.31</td>
<td>55.39</td>
<td>9.75</td>
</tr>
<tr>
<td>Triplet</td>
<td>1655</td>
<td>32.0</td>
<td>40.77</td>
<td>94.54</td>
<td>37.22</td>
</tr>
<tr>
<td>Quadruplet</td>
<td>1225</td>
<td>29.3</td>
<td>69.63</td>
<td>98.51</td>
<td>66.91</td>
</tr>
<tr>
<td>Quintuplets and greater</td>
<td>1002</td>
<td>26.6</td>
<td>92.42</td>
<td>100</td>
<td>87.93</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Complication</th>
<th>Excess Morbidity and Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerebral Palsy</td>
<td>15%</td>
</tr>
<tr>
<td>RDS</td>
<td>14%</td>
</tr>
<tr>
<td>Severe IVH</td>
<td>12%</td>
</tr>
<tr>
<td>Sepsis</td>
<td>10%</td>
</tr>
<tr>
<td>VLBW</td>
<td>25%</td>
</tr>
<tr>
<td>LBW</td>
<td>21%</td>
</tr>
<tr>
<td>Delivery &lt;32 weeks</td>
<td>15%</td>
</tr>
<tr>
<td>Delivery &lt;37 weeks</td>
<td>13%</td>
</tr>
<tr>
<td>Perinatal Death</td>
<td>13%</td>
</tr>
<tr>
<td>Neonatal Death</td>
<td>16%</td>
</tr>
<tr>
<td>Stillbirth</td>
<td>10%</td>
</tr>
<tr>
<td>Live Birth</td>
<td>2.9%</td>
</tr>
</tbody>
</table>
Complications of Twin Pregnancies

- Vanishing Twin
  - Loss in the first trimester

- Single Fetal Death
  - Monochorionic Twins at a higher risk of complications

- Preterm Labor and Preterm Delivery

- Preterm Premature Rupture of Membranes

- Intrauterine Fetal Growth Restriction
  - Fetal Discordance
    - \( \frac{\text{larger twin} - \text{smaller twin}}{\text{larger twin}} \times 100 \)
  - Selective Growth restriction
    - Unequal sharing of placental mass

Types of Twins: Zygosity and Chorionicity

“Are they fraternal or identical twins?”
Zygosity

- **Dizygotic Twins**
  - In natural conceptions, about 1-1.5% of pregnancies
    - Approximately 70% of all twins
  - Rate of DZ twins affected by:
    - Maternal Age (peak risk at 37 years)
    - Maternal Family History
    - Race (African > Caucasian > Asian)
    - ART (Approximately 90% of ART-conceived twins)
  - Results from multiple ovulation
    - Separate eggs fertilized by separate sperm
  - **Always Dichorionic-Diamnionic**
    - Placenta can be separate or fused
  - Fetal genders can be same or discordant
  - Lower risk of complications

Zygosity

• Monozygotic Twins
  – In natural conceptions, about 0.4% of pregnancies
  – Rate of DZ twins affected by:
    • IVF or Ovulation Induction
    • Up to 10-fold higher
  – Results from splitting of a single fertilized ovum
    • Chorionicity and Amnionicity determined by timing of split
  – Fetal genders are always same
  – Higher risk of complications
    » Fetal anomalies
    » Earlier delivery
    » Fetal demise
    » IUGR
## Monozygotic Twins

<table>
<thead>
<tr>
<th>Timing of Cleavage of Fertilized Ovum</th>
<th>Resulting Placentation</th>
<th>Percentage of Monozygotic Twins</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 72 hours</td>
<td>Dichorionic - Diamnionic</td>
<td>25-30%</td>
</tr>
<tr>
<td>Days 4-7</td>
<td>Monochorionic – Diamnionic</td>
<td>70-75%</td>
</tr>
<tr>
<td>Days 8-12</td>
<td>Monochorionic - Monoamnionic</td>
<td>1-2%</td>
</tr>
<tr>
<td>&gt; Day 12</td>
<td>Conjoined</td>
<td>Very Rare</td>
</tr>
</tbody>
</table>

Determining Chorionicity

- Accurate determination of chorionicity and amnionicity early in pregnancy is vital to optimal obstetrical care.
  - Transvaginal sonogram as early as 5 weeks (6-10 weeks)
    - Number of Placentas
    - Thick Dividing Membrane
    - Twin Peak Sign (Dichorionic)
    - T-Sign (Monochorionic)
  - Required to formulate surveillance and management plan
  - Very difficult to determine chorionicity in the third trimester
    - Discordant sexes
    - Placentas are often fused by this time
    - Interamnionic Septum thickness
Dichorionic-Diamnionic Twins

- Twin Peak or Lambda Sign created by projection of placenta tissue between interamnionic membranes

- Thicker interamnionic septum in third trimester (>2mm or 4 layers)

Monochorionic-Diamnionic Twins

- T-Sign absence of projection of placenta tissue between interamnionic membranes
- Thinner interamnionic septum in third trimester (<2mm or 2 layers)

Monochorionic-Monoamnionic Twins

- Absence of interamnionic septum
Monochorionic-Diamnionic Twins: Surveillance and Management

“Will they be able to read each others thoughts/ESP?”
Surveillance of Twin Pregnancies

- First Trimester Ultrasound
  - Ideal 6-10 weeks to determine chorionicity and amnionicity
    - No ultrasound report on twins is complete without this information
- Nuchal translucency at 11-14 weeks gestation
  - Offer First trimester screening for aneuploidy
- Anatomy sonogram at 20-22 weeks gestation
- Growth sonogram every 4 weeks until delivery
- Surveillance for Monochorionic Twins
  - 16 weeks to delivery
    - Every 2 weeks
    - Amniotic fluid (maximum vertical pocket for each twin)
    - Fetal stomachs and bladders
    - Delivery at 36-37 weeks gestation
Complications Specific to Monochorionic Pregnancies

- Twin-to-Twin Transfusion Syndrome (TTTS)
- Twin Anemia Polycythemia Sequence (TAPS)
- Twin Reversed Arterial Perfusion Sequence (TRAP)
- Monochorionic-Monoamnionic Twins
- Conjoined Twins
Twin-to-Twin Transfusion Syndrome (TTTS)

- A complication of monochorionic twins resulting from an imbalance of blood flow through vascular communications such that one twin receives a higher volume of blood flow and the other less blood flow.

- Results in stuck twin (oligohydramnios) that is anemic and growth restricted.
Twin-to-Twin Transfusion Syndrome (TTTS)

- 3 types of anastomoses:
  - Arterioarterial (AA)
    - not usually a problem
  - Venovenous (VV)
    - not usually a problem
  - Arteriovenous (AV)
    - Connects cotyledons from the two sides of the placenta with net flow of blood from one side to the other
    - These are identifiable in the chorionic surface

Twin-to-Twin Transfusion Syndrome (TTTS)

• Donor Twin
  • Anemia
  • Oligohydramnios
  • IUGR

• Recipient Twin
  • Polycythemia
  • Polyhydramnios
  • Heart failure

• Affects 10-15% of MCDA twin pregnancies

• High Perinatal Mortality (PM)
  • 15-77% of all PM in twins
  • Presentation <26 weeks 90% PM
  • If untreated stage III 70-100% PM
Staging Twin-to-Twin Transfusion Syndrome (TTTS)

- Oligohydramnios (<2 cm maximum vertical pocket)
- Polyhydramnios (>8 cm maximum vertical pocket)
- Doppler wave forms assessed in Middle Cerebral Artery (MCA)

**Quintero staging system**

<table>
<thead>
<tr>
<th>Stages</th>
<th>Donor Bladder</th>
<th>Amniotic Fluid: Donor/Recipient</th>
<th>Doppler Wave Forms</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Visible</td>
<td>Oligohydramnios/ polyhydramnios</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Not visible</td>
<td>Oligohydramnios/ polyhydramnios</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>Visible or not visible</td>
<td>Oligohydramnios/ polyhydramnios</td>
<td>Abnormal</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td></td>
<td>Fetal hydrops or abdominal ascites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td></td>
<td>Demise of either fetus</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Staging Twin-to-Twin Transfusion Syndrome (TTTS)**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Donor</th>
<th>Recipient</th>
<th>Recipient cardiomyopathy</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Oligohydramnios (DVP &lt; 2 cm)</td>
<td>Polyhydramnios (DVP &gt; 8 cm)</td>
<td>No</td>
</tr>
<tr>
<td>II</td>
<td>Absent bladder</td>
<td>Bladder seen</td>
<td>No</td>
</tr>
<tr>
<td>III</td>
<td>Abnormal Doppler findings</td>
<td>Abnormal Doppler findings</td>
<td>None</td>
</tr>
<tr>
<td>IIia</td>
<td></td>
<td></td>
<td>Mild</td>
</tr>
<tr>
<td>IIib</td>
<td></td>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td>IIic</td>
<td></td>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td>IV</td>
<td>Hydrops</td>
<td>Hydrops</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Death</td>
<td>Death</td>
<td></td>
</tr>
</tbody>
</table>

**Classifications of recipient cardiomyopathy**

- **IIIA**
  - Variables/cardiomyopathy: Mild
  - Atrioventricular valve regurgitation: Mild
  - Right/left ventricular hypertrophy: Mild
  - Myocardial performance index: > +2 Z-score
  - Left: > 0.43
  - Right: > 0.48

- **IIIB**
  - Variables/cardiomyopathy: Moderate
  - Atrioventricular valve regurgitation: Moderate
  - Right/left ventricular hypertrophy: Moderate
  - Myocardial performance index: > +3 Z-score
  - Left: > 0.48
  - Right: > 0.56

- **IIIC**
  - Variables/cardiomyopathy: Severe
  - Atrioventricular valve regurgitation: Severe
  - Right/left ventricular hypertrophy: Severe
  - Myocardial performance index: > +4 Z-score or severe biventricular dysfunction
  - Left: > 0.53
  - Right: > 0.64

-DP: deepest vertical pocket.

- Takes into account cardiac findings of recipient that may up-stage case

Treatment of Twin-to-Twin Transfusion Syndrome (TTTS)

- Stage I – Observation
- Stage II and IIIA
  - Serial Amnioreduction
- Stage IIIC and IIIB
  - Referral to Fetal Therapy Center
  - Laser Photocoagulation
  - Microseptostomy
  - Amnioreduction
- Stage IV
  - Radiofrequency Ablation

Twin Anemia Polycythemia Sequence (TAPS)

- Chronic and severe hemoglobin discordance in a monochorionic twin pair in the absence of TTTS
- Results from smaller AV anastomoses that allow a slow transfusion from donor to recipient
- Occurs 3-5% of MCDA twins
  - Up to 13% of TTTS after laser

Diagnostic criteria:
- Donor MCA PSV >1.5 MoM (equal to Hgb <11)
- Recipient MCA PSV <0.8 MoM (equal to Hgb >20)

Treatment
- Intrauterine transfusion of donor fetus
Twin Reversed Arterial Perfusion Sequence (TRAP)

• Series of rare complications all required for condition to develop
  • Monochorionic twins
  • One of twins has acardiac malformation
  • Placenta has direct A-A anastomoses

• Blood flows from heart of “pump” twin to acardiac twin, providing perfusion to its tissues
  • Acardiac twin is severely malformed because blood flow from “pump” twin preferentially perfuses lower extremities

• “Pump” twin goes into heart failure
• Treatment is occlusion of acardiac twin cord

Sugibayashi R et al. (2016) Forty cases of twin reversed arterial perfusion sequence treated with radio frequency ablation using the multistep coagulation method: a single center experience. Prenat Diagn. 36(5); 437-443.
Review

• Background
• Identify methods to determine chorionicity of a twin gestation
• With regard to Monochorionic-Diamnionic twin gestations, what is the recommended surveillance?
• Describe possible treatment options for Twin-to-Twin Transfusion Syndrome
Management of Monochorionic Twins: Cases from South Dakota

“Is it true you can’t breastfeed twins?”
So, how are we doing?

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Avera McKennan (n=32)</th>
<th>Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncomplicated</td>
<td>34%</td>
<td></td>
</tr>
<tr>
<td>Preterm Delivery</td>
<td>75%</td>
<td>&gt;50%</td>
</tr>
<tr>
<td>Selective IUGR</td>
<td>22%</td>
<td>10-20%</td>
</tr>
<tr>
<td>Fetal Anomalies</td>
<td>13%</td>
<td>10-20%</td>
</tr>
<tr>
<td>PPROM</td>
<td>9%</td>
<td>10%</td>
</tr>
<tr>
<td>Preeclampsia</td>
<td>9%</td>
<td>10-20%</td>
</tr>
<tr>
<td>GDM</td>
<td>6%</td>
<td>5-10%</td>
</tr>
<tr>
<td>TTTS</td>
<td>9%</td>
<td>8-10%</td>
</tr>
<tr>
<td>TAPS</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td>TRAP</td>
<td>3%</td>
<td>1%</td>
</tr>
</tbody>
</table>
Case 1

- 31 y/o G2P1001 referred at 20 weeks 0 days gestation for Mono-Di twins with concerns for TTTS
- Ultrasound shows Quintero Stage II TTTS
  - Fetus A (recipient) MVP 15.6 cm with normal MCA Dopplers
  - Fetus B (donor) MVP 1.2 cm with bladder not visible and normal MCA Dopplers
  - Intertwin discordance 33.7%
- Undergoes amnioreduction of 1,900 ml
  - Post-amnioreduction MVP 10.9 cm
- Fetal echocardiogram performed the next day showing mild ventricular hypertrophy of recipient twin.
- Follow-up sonogram 4 days later
  - Recipient MVP 13.3 cm
  - Donor MVP 2.0 cm with bladder not visible and normal MCA Dopplers
- Referred to Colorado Fetal Care Center for definitive therapy
Case 1 (TTTS)
Case 1 (Cont)

- **Colorado Fetal Care Center**
  - Fetal echocardiogram showing biventricular hypertrophy with moderate RV dysfunction and mild to moderate LV dysfunction in recipient twin with Doppler blood flow abnormalities in DV and IVC
  - This finding upstaged TTTS from Stage II to Stage IIIC
  - Underwent Selective fetoscopic laser photocoagulation of anastomotic vessels, laser microseptostomy, and amnioreduction of recipient twin at 20 weeks 6 days gestation

- **Follow-Up at 23 weeks 0 days**
  - Donor MVP 5.1 cm and Recipient MVP 6.3 cm
  - Bladders visible
  - MCA Dopplers normal
  - Normal fetal echo on donor twin
  - Improving fetal echo on recipient twin
Case 1 (s/p SFLP)
Case 1 (Cont)

• Follow-Up at 24 weeks 1 day
  • Donor MVP 5.5 cm and Recipient MVP 6.2 cm
  • Bladders visible
  • Normal fetal echo on donor twin
  • Recipient fetal echo shows worsening of biventricular hypertrophy
  • MCA Dopplers 0.61 MoM for TTTS recipient and 1.56 MoM for TTTS donor, consistent with TAPS Stage I (reversal)

• Percutaneous Umbilical Sampling with Intrauterine Transfusion at 24 weeks 5 days
  • Opening HCT 29.6% and MCV 122.8
  • Transfusion of 27 mL irradiated leukopoor RBCs
  • Closing HCT 42.4% and MCV 106.5
  • Closing MCA 0.95 MoM

• Normal weekly follow-up
Case 1 (TAPS)

TTTS Recipient
TAPS Donor

TTTS Donor
TAPS Recipient
Case 1 (Cont)

• Follow-Up at 28 weeks 1 day
  • Concordant fetal growth and amniotic fluid
  • Bladders visible
  • Fetal echo exams on both fetuses
  • MCA Dopplers 0.69 MoM for TTTS recipient and 1.54 MoM for TTTS donor, consistent with TAPS Stage I (reversal)

• Percutaneous Umbilical Sampling with Intrauterine Transfusion at 24 weeks 5 days
  • Transfusion of 32 mL irradiated leukopoor RBCs
  • Closing HCT 35.1%
  • Closing MCA 0.92 MoM

• Cesarean delivery at 32 weeks for increased risk of vascular sludging in polycythemic fetus
  • A male, 1600g, Apgars 7₁,8₅
  • B male, 1940g, Apgars 7₁,8₅
Case 2

• 28 y/o G3P2002 referred at 16 weeks 5 days gestation for Mono-Di twins screening for TTTS

• Ultrasound shows Quintero Stage II TTTS
  • Fetus A (donor) MVP 1.3 cm with bladder not visible and normal MCA Dopplers
  • Fetus B (recipient) MVP 8.5 cm with normal MCA Dopplers

• Fetal echocardiogram
  • Biventricular hypertrophy in fetus B, upstaging to Stage IIIC

• Colorado Fetal Care Center
  • Fetal echocardiogram showing RV hypertrophy in recipient twin with Doppler blood flow abnormalities in DV and IVC
  • This finding upstaged TTTS from Stage II to Stage IIIB
  • Underwent Selective fetoscopic laser photocoagulation of anastomotic vessels, laser microseptostomy, and amnioreduction of recipient twin at 18 weeks 0 days gestation
Case 2 (TTTS)

Recipient

Donor
Case 2 (s/p SFLP)
Case 2 (Cont)

• Follow-Up at 19 weeks 2 days
  • Donor MVP 5.1 cm and Recipient MVP 6.3 cm
  • Bladders visible
  • MCA Dopplers normal
  • Normal fetal echo on donor twin
  • Improving fetal echo on recipient twin

• PPROM at 23 weeks 5 days
  • Admitted for expectant management
  • Latency Antibiotics
  • Antenatal Corticosteroids

• Cesarean delivery at 25 weeks 3 days gestation for chorioamnionitis
  • A male, 860g, Apgars 2¹, 5⁵, 8¹⁰
  • B male, 775g, Apgars 2¹, 5⁵, 8¹⁰
Case 2 (PPROM)
Case 3 (Selective IUGR)

- 33 y/o G6P2032 referred at 21 weeks 6 days gestation for Di-Di twins with shortened femurs

- Ultrasound results
  - Fetus A (male) EFW 358g (<5%) with isolated lagging femurs, normal fluid, bladder visible, MCA Dopplers normal
  - Fetus B (male) EFW 530g (>95%) with normal fluid, MCA Dopplers normal
  - Intertwin Discordance 32.5%
  - Thin interamnionic septum <2mm
  - Offered genetic testing but declined
  - Findings most consistent with Mono-Di twins with Selective IUGR
  - Follow with serial growth sonograms and umbilical artery Dopplers of fetus A looking for decompensation

- Cesarean delivery at 35 weeks 2 days for Selective IUGR of fetus A with inadequate interval growth
  - A male, 1740g, 8¹,9⁵
  - B male, 2860g, 9¹,9⁵