Prenatal Care for Twin Gestations

William Goodnight, MD, MSCR
Associate Professor
Maternal Fetal Medicine
UNC Department of Obstetrics and Gynecology
Dr Goodnight has no conflicts of interest or other disclosures to report

Levels of evidence:
Level I – RCT
Level II-1 – controlled trials without randomization
Level II-2 – cohort, cross sectional
Level II-3 - cross-sectional and uncontrolled investigational
Level III – case study, expert opinion
Etiology/Epidemiology of twining

- **MZ (31%)** – unknown
  - constant rate 4/1000 births
- **DZ (69%)** – ovulation of multiple follicles
  - Elevated FSH
  - Ovarian stimulation
  - IVF

- **Increased risk twins**
  - Black/African (1/30), Asian (1/100), Caucasians (1/80)
  - Increasing parity
  - Increasing maternal age
  - Obese/tall
  - Maternal family history
    - Paternal may pass to daughter
Maternal Adaptation to Twins

- HR and Stroke volume = increased CO
  - Increased myocardial contractility
- SBP/DBP – more pronounced decline in second trimester

- Plasma volume increase 50-100%
- Red cell volume increase

- Increased tidal volume, VO$_2$
- Respiratory alkalosis
- Increased GFR
The ‘average’ twin is born preterm (35.2 weeks EGA) and low birth weight (2323 grams)
Twin pregnancy

- Low rates of macrosomia and post term pregnancy!
- Higher rates:
  - Gestational HTN (2-3 x increase)
  - Gestational DM
  - Iron deficiency anemia
  - VTE
  - PTB (<32 weeks) 12.1% vs 1.6%
    - PTB (< 37 weeks) 60.4% vs 11.1%
  - LBW (<2500 grams) 57 % vs 6.5%
    - VLBW (<1500 grams) 10.2% vs 1.1%
  - Congenital anomalies (monochorionic twins) – 3-5 x increase

Prenatal Care for Twins

- Risk factor screening | nutrition | weight gain
- Chorionicity/EGA
- Fetal assessment
- Chorionicity based fetal monitoring
- Preterm birth prevention approach
- When/how to deliver
PRACTICE BULLETIN

CLINICAL MANAGEMENT GUIDELINES FOR OBSTETRICIAN–GYNECOLOGISTS

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Multifetal Gestations: Twin, Triplet, and Higher-Order Multifetal Pregnancies

Multiple pregnancy: the management of twin and triplet pregnancies in the antenatal period

September 2011
NICE Clinical Guideline
Risk factor screening, nutrition, weight gain – enhanced prenatal care for twins
Enhanced Prenatal Care

- **Baseline screening** (level III)
  - Early diabetes screen: BMI > 25, prior GDM, age > 35, PCOS
  - Baseline serum ferritin; urine protein assessment, serum creatinine, AST/ALT

- **Supplementation**
  - Low dose aspirin starting 12 weeks EGA (level II)

- **Each visit** (level III)
  - Blood pressure, maternal weight, urine proteinuria
  - PTL s/s review after 20-22 weeks

Twin Pregnancy Expertise

- Engage HROB/MFM with experience in multifetal pregnancy at time of diagnosis
  - Obtain consult or refer for dichorionic placentation
  - Refer for monochorionic placentation
  - Refer higher order multifetal pregnancy
  - Refer for fetal anomaly, discordant fetal growth, discordant amniotic fluid volume, fetal death after 16 weeks of gestation


Nutrition Enhancements

• Dietitian/nutrition consultation
  » Dx of twin pregnancy
  » High or low weight gain
  » BMI < 18 kg/m² or < 30 kg/m²
  » Underlying nutritional risk factor
  » Anemia

• Breastfeeding
  » Third trimester lactation consult
    • Improved breastfeeding rates
  » Continue calorie intake and micronutrient supplement
Maternal BMI-specific Weight Gain (Level II-III)

- Prolonged pregnancy
- Increased birthweight
- Without post partum weight retention

<table>
<thead>
<tr>
<th>Pre-pregnancy BMI</th>
<th>Total wt gain (kg)</th>
<th>Total wt gain (lbs)</th>
<th>Initial suggested daily calorie intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 18.5 kg/m²</td>
<td>17-25*</td>
<td>37-54*</td>
<td>42-50 cal/kg/day</td>
</tr>
<tr>
<td>18.5 – 24.9 kg/m²</td>
<td>17-25</td>
<td>37-54</td>
<td>40-45 cal/kg/day</td>
</tr>
<tr>
<td>25.0-29.9 kg/m²</td>
<td>14-23</td>
<td>31-50</td>
<td>30-35 cal/kg/day</td>
</tr>
<tr>
<td>&gt;=30 kg/m²</td>
<td>11-19</td>
<td>25-42</td>
<td>30 cal/kg/day</td>
</tr>
</tbody>
</table>

* IOM does not give low BMI wt gain ranges

Nutrition Enhancements

- Calorie requirement: 250 calorie/day/fetus
  - 30-50 calories/kg/day
  - 3 meals, 3 snacks
- Composition
  - 20% protein
  - 40% fats
  - 40% carbohydrates

- Micronutrient supplement (level II-III)
  - PNV + iron (30mg daily)
  - Omega 3-FA 300-500 mg DHA/EPA daily
    - 2-3 servings of low-mercury fish per week
  - Folic acid 1 mg daily
  - Ca 1,500-2,500 mg daily
  - Vitamin D 1000 IU daily

Prenatal visits

- Visit frequency
  - Q 4 weeks to 24 weeks
  - Q 2 weeks 24-34 weeks
  - Q week after 34 weeks

Fundal height assessment not accurate!
Chorionicity matters!

Ultrasound assessment of twin pregnancy
- Dizygotic: 66%
- Monochorionic Diamniotic: 20%
- Dichorionic Diamniotic: 12%
- Monochorionic Monoamniotic: 2%
MZ Twining - placentation

Days post ovulation

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Di/Di

Di/Mo

Mo/Mo

Conjoined

30%

60%

1-5%

<1%
Placentation/Chorionicity diagnosis

- Monoamniotic monochorionic
- Diamniotic dichorionic (fused)
- Diamniotic monochorionic
- Diamniotic dichorionic (separated)
**Chorionicity matters!**

Monochorionic twins

- **Increased risk:**
  - sIUGR
  - Growth discordance
  - Discordant fetal anomalies
  - Twin-twin transfusion syndrome
  - Neurologic morbidity
  - Fetal death:
    - <24 weeks: 12.7% (2.5% DC)
    - >24 weeks: 4.9% (2.8% DC)

- **Require specific pregnancy monitoring**
Ultrasound Determination of Chorionicity

- Optimal time is 11-14 weeks
  - T-sign and λ-sign
Sonographic markers of chorionicity

Figure 3—The ‘T’ sign
Ultrasound Determination of Chorionicity

- Optimal time is 11-14 weeks
  - T-sign and λ-sign
- Discordant gender – dichorionic
- Separate placentas
  - USE CAUTION
- Second trimester
  - Membrane thickness
    - > 2 mm c/w dichorionic
    - 3-4 layers vs 2 layers
- IF UNSURE – MANAGE AS MONOCHORIONIC
Dichorionic

Monochorionic
Ultrasound/ fetal assessment in twin pregnancy

- All twins: US 11-14 weeks
  - Chorionicity
  - Confirm EGA

- Embryo transfer dating
- LMP
- Confirmation by US at 10-14 weeks, using CRL:
  - If CRL A and B are < 10 mm different, use smaller CRL
  - If CRL A and B are > 10 mm different, use larger CRL (high risk of early growth issues/aneuploidy in this setting in the smaller twin)
Ultrasound/ fetal assessment in twin pregnancy

- All twins: US 11-14 weeks
  - Chorionicity
  - Confirm EGA
  - Aneuploidy screening
    - MC: maternal age risk
    - DC: 2x maternal age risk

- Combined serum and nuchal translucency screening at 11-14 weeks EGA
- Maternal serum screen at 15-20 weeks EGA
- CVS at 11-14 weeks
- Amniocentesis at > 15 weeks
  - Cell free fetal DNA currently not recommended in twins
  - MSS < 4-6 weeks from twin loss not recommended
Ultrasound/ fetal assessment in twin pregnancy

- Dichorionic twins:
  - Fetal anatomy survey 18-20 weeks EGA
    - Fetal echo if IVF pregnancy
  - US q 3-4 weeks for fetal growth
  - Antenatal testing in absence of growth abnormalities of unproven benefit
  - Abnormal growth defined as EFW < 10\(^{th}\) % tile; discordant EFW > 20%
Ultrasound/ fetal assessment in twin pregnancy

- **Monochorionic twins:**
  - US for MVP of Amniotic fluid q 2 weeks from 16 weeks EGA
    - Abnormal AFV defined as MVP < 2 cm and/or MVP > 8 cm
      - Prompt referral to fetal center with twin pregnancy experience
    - Fetal anatomy survey 18-20 weeks EGA | fetal echo
    - EFW assessment q 3-4 weeks
    - Weekly fetal testing from 32 weeks
    - Abnormal growth defined as EFW < 10th % tile; discordant EFW > 20%
Monochorionic twins: twin-twin transfusion syndrome

- 10-15% of MC twins
- Defined
  - Monochorionic
  - Polyhydramnios/oligohydramnios
    - >8cm, <2cm MVP
  - Growth discordance
  - Historic – 5 gm/dl Hgb
- Outcome stage based
  - High mortality
  - CP – 5%
  - Developmental delay 10-20%
<table>
<thead>
<tr>
<th>Interventions</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>No treatment</td>
<td>80-90% mortality</td>
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</table>
| Serial amnioreduction | Easy  
Widely available  
Less successful  
50% survival  
Septostomy |
| Laser photocoagulation | Fetoscopy  
Select centers  
Selective  
62-77%  
Nonselective  
53-56% |
| Fetal cord occlusion | Umbilical cord ligation/cautery  
Termination  
50% survival |
Monoamniotic

- 1-5% of monozygotic pregnancies
- Diagnosis
  - No dividing membrane
  - Same gender
  - Single placenta
  - First trimester – one yolk sac = monoamniotic
- High mortality due to cord entanglement
Monoamniotic twins Management

Monamniotic Twin Diagnosis

Targeted US for fetal anomaly

24-26 weeks EGA
Discussion re GA for intervention/admission or outpatient
- Antenatal corticosteroids

Outpatient
- Daily NST testing

Inpatient
- 1-2 per day NST Continuous testing for variables

Delivery 32-34 weeks Cesarean
Ultrasound fetal assessment

- Chorionicity matters!
- 11-14 weeks
  » Chorionicity, EGA, aneuploidy screening
- 18-20 weeks anatomic evaluation
- Chorionicity based US follow up
Approach to PTB Prevention
Scope of the problem

- **2013 – National Vital Statistics**
  - 33/1000 deliveries
  - PTB 56.6% vs 9.7%
    - OR 12.8 (12.6-12.9)
  - < 32 weeks: 11.3% vs 1.5%
- ~80% is spontaneous PTB

<table>
<thead>
<tr>
<th></th>
<th>32 weeks</th>
<th>34 weeks</th>
<th>37 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTB</td>
<td>7%</td>
<td>13%</td>
<td>41%</td>
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</tbody>
</table>

PTB prediction in twins

**Predicts**
- Cervical length (20-24 weeks EGA) < 20mm and 25 mm - % PTB
  - < 20 mm
    - PTB < 32 weeks 42.4%
    - PTB < 34 weeks 62%
  - < 25 mm
    - PTB < 28 weeks 26%
  - > 25 mm
    - PTB < 28 weeks 1.4%
    - Birth > 37 weeks 63.2%
- FFN
- Prior PTB

**Does not predict**
- HUAM
- Bedrest/activity restriction
- Biochemical markers
- Routine hospitalization
Twin Preterm Birth Prevention

Asymptomatic, unselected twins

- Review s/s PTB
- Corticosteroids in setting of high risk of delivery < 7 days
- Frequent provider contact
- Not recommended (level I-II)
  - Planned bedrest
  - 17 OHP
  - Cerclage or pessary
  - Oral tocolytics
  - Universal cervical length screening/serial cervical length screening/FFN screening

Twin Preterm Birth Prevention

Current twin with prior preterm birth

- 17 OHP or cerclage may be individualized based on traditional indications (level III)

Twin Preterm Birth Prevention

Current twin with asymptomatic short cervix
- < 25 mm
- 18-24 weeks EGA

- **Not beneficial:**
  - 17 OHP (level I)
  - Cerclage (level II)

- **May be beneficial:**
  - HROB/MFM referral
  - Vaginal progesterone (level II)
  - Arabin-type cervical pessary (level I)

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Current twin with asymptomatic cervical dilatation, 18-23 weeks EGA

- Highly selective cerclage may provide prolongation of pregnancy (level II-2)
  » HROB/MFM referral

PROSPECT

• Currently underway
• RCT of twin pregnancy with TVCL < 30 mm
  » 16 0/7 – 23 6/7 weeks EGA
• Three arms
  » Matching Placebo
  » Arabin-type pessary
  » 200mg micronized vaginal progesterone
• Outcomes:
  » Primary: PTB < 35 weeks
  » Secondary
    • randomization to delivery interval
    • EGA at delivery
    • Neonatal morbidity/mortality
    • Physician interventions
When and how to deliver twins
When – Kahn, 2003
Prospective risk of fetal death
Nation Center for Health Statistics database

43 weeks:
Fetal death rate: 1.23/1000
Prospective risk of fetal death: 1.23/1000
Neonatal death rate: 1.12/1000

Figure 1. Fetal death rate and prospective risk of fetal death for singletons.
When – Kahn, 2003
Prospective risk of fetal death
Nation Center for Health Statistics database

39 weeks:
Fetal death rate: 4.57/1000
Prospective risk of fetal death: 2.4/1000
Neonatal death rate: 2.05/1000

Twins
When – Kahn, 2003
Prospective risk of fetal death
Nation Center for Health Statistics database

36 weeks:
Fetal death rate: 9.61/1000
Prospective risk of fetal death: 4.93/1000
Neonatal death rate: 1.62/1000

Figure 3. Fetal death rate and prospective risk of fetal death for triplets.
When to deliver twins (Level II)

- **Di/Di:** 38 [37 - 38 6/7] weeks EGA – favor 38 0/7 weeks
- **Mo/Di:** 36-37 weeks EGA – favor 37 0/7 weeks

- **ACOG**
  - Di/di - 38 0/7 – 38 6/7
  - Monochorionic – 34 0/7 – 37 6/7

- **NICHD (Spong, et al Obstet Gynecol 2011)**
  - 38 weeks di/di
  - 34-37 weeks mo/di
  - 32-34 weeks monoamniotic

- **NICE guidelines**
  - Di/di twin pregnancy – 37 0/7
  - Monochorionic – 36 weeks (after corticosteroids)
How to deliver twins

• Options
  » Cesarean
  » Vaginal delivery
  » Non-vertex second twin vaginal delivery
    • External cephalic version
    • Breech extraction
    • Cesarean of twin B for non-vertex presentation
Prediction of success twin VD

- Williams, Yale, 2003
- 927 twins ≥ 32 weeks eligible for TOL
  - 28.7% cesarean/ 2.2% combined vag-abd
  - Cesarean – nulliparous, B nonvertex/breech, IOL, no epidural

<table>
<thead>
<tr>
<th></th>
<th>RR combined cesarean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twin B vertex</td>
<td>0.782 (0.631-0.968)</td>
</tr>
<tr>
<td>Epidural</td>
<td>0.46 (0.375-0.566)</td>
</tr>
<tr>
<td>BW &lt; 25% discord</td>
<td>0.695 (0.524-0.922)</td>
</tr>
</tbody>
</table>
• 32-38 weeks, A vertex, 1500-4000 grams
• RCT cesarean vs trial of labor
  » Recruit at 32 weeks or in labor
Study design

- Exclusion – monoamniotic twins, lethal anomaly, contraindication to vaginal delivery
- Planned delivery 37 5/7 – 38 6/7 weeks EGA
  - IOL vs cesarean
- Vaginal delivery
  - A vertex
  - B – active management
    - Cephalic – engagement, ROM, delivery
    - Breech – extraction, version (inter or external)
- Outcome - 28 days of life
  - Mortality
  - Morbidity - birth trauma, brachial palsy, subdural/ICH, Nec, APGAR < 4 at 5 min, seizures, sepsis, IVH, BPD
  - Maternal death or morbidity – EBL > 1500 or D&C, laparotomy, genital tract injury, VTE, infection, DIC, bowel obstruction, readmission
1393 planned cesarean delivery

- 89.9% cesarean
- 9.3% vaginal
- 0.8% combined

2.2% composite neonatal outcome
7.3% composite maternal outcome

1392 planned vaginal delivery

- 43.8% cesarean
- 56.2% vaginal
- 4.2% combined

1.9% composite neonatal outcome
8.5% composite maternal outcome
No difference in primary outcome OR 1.16 (95% CI 0.77, 1.74)

Vaginal delivery of twin pregnancy appropriate
How to deliver?

• Vaginal delivery twin possible (Level I)
  » EFW > 1500 grams, < 4000 grams, < 25% discordance

• Active management of second stage (level II-III)
  » Reduce chance of combined abdominal/vaginal delivery
  » Antenatal counseling
  » Provider training; OB anesthesia; delivery setting
Route of delivery

- **Vertex - Vertex**
  - Vaginal delivery of both

- **First twin Breech**
  - Cesarean of both

- **Monoamniotic, conjoined twins**
  - Cesarean of both
Route of Delivery

Vertex - Nonvertex

- EFW >1500gram
- Concordant (<25%) or B smaller
- Experienced operator
- Consider delivery in OR setting w anesthesia

Yes
- Vaginal delivery A
- Breech extraction of B

No
- Cesarean both
Prenatal Care for Twins

- Risk factor screening | nutrition | weight gain
- Chorionicity/EGA
- Fetal assessment
- Chorionicity based fetal monitoring
- Preterm birth prevention approach
- When/how to deliver