Prenatal Care for Twin Gestations

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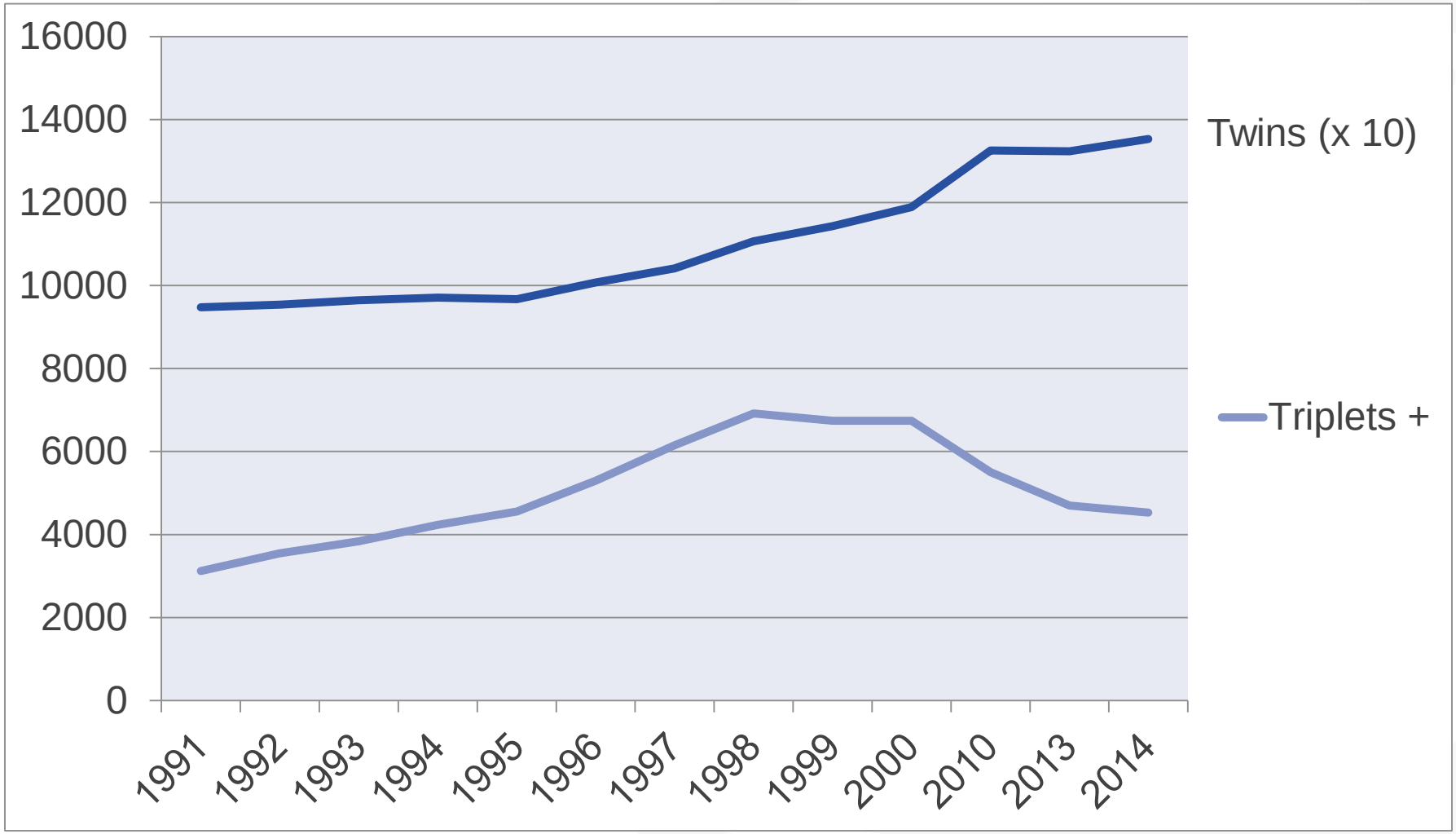
Dr Goodnight has no conflicts of interest or other disclosures to report

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

U.S. Incidence of Multiple Births



National Vital Statistics Reports, Vol. 64, No. 12, December 23, 2015

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

Martin JA, et al. Births: final data for 2006. Natl Vital Stat Rep 2009; 57:1

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*

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The American College of Obstetricians and Gynecologists
WOMEN'S HEALTH CARE PHYSICIANS

Society for Maternal-Fetal Medicine

PRACTICE BULLETIN

CLINICAL MANAGEMENT GUIDELINES FOR OBSTETRICIAN—GYNECOLOGISTS

NUMBER 144, MAY 2014 *(Replaces Practice Bulletin Number 56, October 2004)*

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

Community Care of North Carolina

Royal College of Obstetricians and Gynaecologists
Bringing to life the best in women's health care

The Royal College of Midwives

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

September 2011

NICE Clinical Guideline

Society for Maternal-Fetal Medicine

✓ *Patient Safety Checklist* Number 1 – March 2015

Checklist for Monochorionic Diamniotic (MC/DA) Twin Gestation Management

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

Final Recommendation Statement: Low-Dose Aspirin Use for the Prevention of Morbidity and Mortality From Preeclampsia: Preventive Medication . U.S. Preventive Services Task Force. December 2014

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

Luke, B., et al. Specialized Prenatal Care and Maternal and Infant Outcomes in Twin Pregnancy. Am J Obstet Gynecol 189.4 (2003): 934-8.

National Collaborating Centre for Women's and Children's Health (UK). *Multiple Pregnancy: The Management of Twin and Triplet Pregnancies in the Antenatal Period*. London: RCOG Press, 2011.

Nutrition Enhancements

- Dietitian/nutrition consultation
  - » Dx of twin pregnancy
  - » High or low weight gain
  - » BMI < 18 kg/m^2 or < 30 kg/m^2
  - » 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

Pre-pregnancy BMI	Total wt gain (kg)	Total wt gain (lbs)	Initial suggested daily calorie intake
< 18.5 kg/m^2	17-25*	37-54*	42-50 cal/kg/day
18.5 – 24.9 kg/m^2	17-25	37-54	40-45 cal/kg/day
25.0-29.9 kg/m^2	14-23	31-50	30-35 cal/kg/day
>=30 kg/m^2	11-19	25-42	30 cal/kg/day

* IOM does not give low BMI wt gain ranges

Weight Gain During Pregnancy: Reexamining the Guidelines. Ed. K M Rasmussen & A L Yaktine. Washington, DC: National Academies Press, 2009.
Luke, B., et al. Body Mass Index--Specific Weight Gains Associated with Optimal Birth Weights in Twin Pregnancies. J Reprod Med 48.4 (2003): 217-24.

Hyperspace - UNC MATERNAL FETAL MEDICINE RALEIGH (aka UNC OBGYN MATERNAL FETAL MED WOMENS CTR REX HOSP) - POC - Proof of Concept - KORTNEY G.

Epic | Patient Station | In Basket | Schedule | Build Tools | Record Viewer | Content Review | Reports | Support | TransChart | Med Student Note | Print | References | Log Out

Ob,Kortney | POC - PROOF OF CONCE | Search

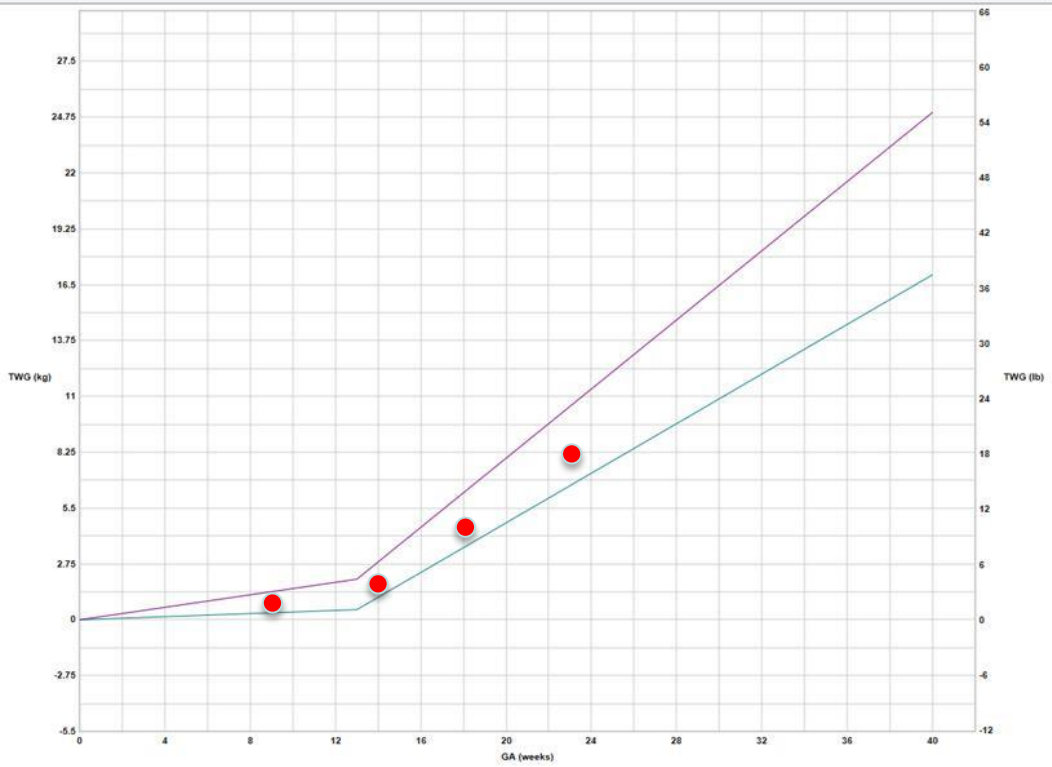
Ob, Kortney MRN: 100000000556 | DOB: 09/17/1... Age: 43 yrs | GA: 8w5d Hx: G6P0 | EDD: 10/14/2016 Blood Type: None | Allergies: Penicillins Isolation: None | Infection: None OB Provider: None | PCP: Weir, S... MyChart: Pen... | BestPractice Advisory: None OB Sticky Note: None | My Sticky Note: Research: None | CSN: 20000202689 Health Maintena...

SnapShot | Chart Review | Synopsis | Immunizations | Order Entry | Education | Communicatio... | Notes | Additional Activ... | Visit Navigator | Growth Chart | More Activities

Growth Chart | Close

Head Circum | Length | Weight-for-length | TWG-for-GA | BMI | Height Velocity | Parents' Height | Print | Print All | Refresh

Twin, BMI 18.5-25 | 100 % | 100 % | Zoom In | Zoom Out



Reference Datasets: OB NORMAL TWIN
Apply patient filter
Show encounter specialty data points only

Legend: Maximum, Minimum

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

Goodnight, W., and R. Newman. Optimal Nutrition for Improved Twin Pregnancy Outcome. Obstet Gynecol 114.5 (2009): 1121-34.

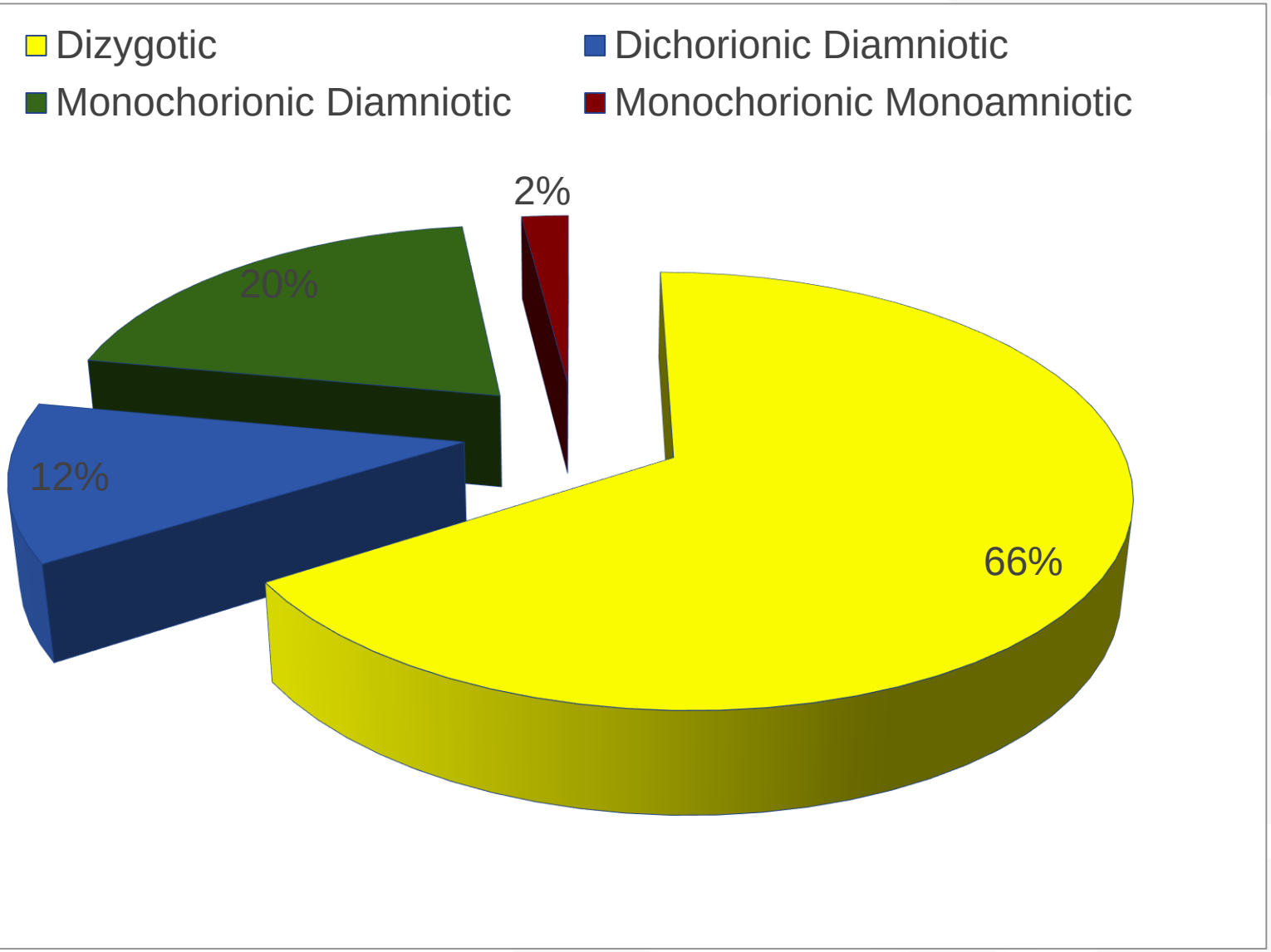
Prenatal visits

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

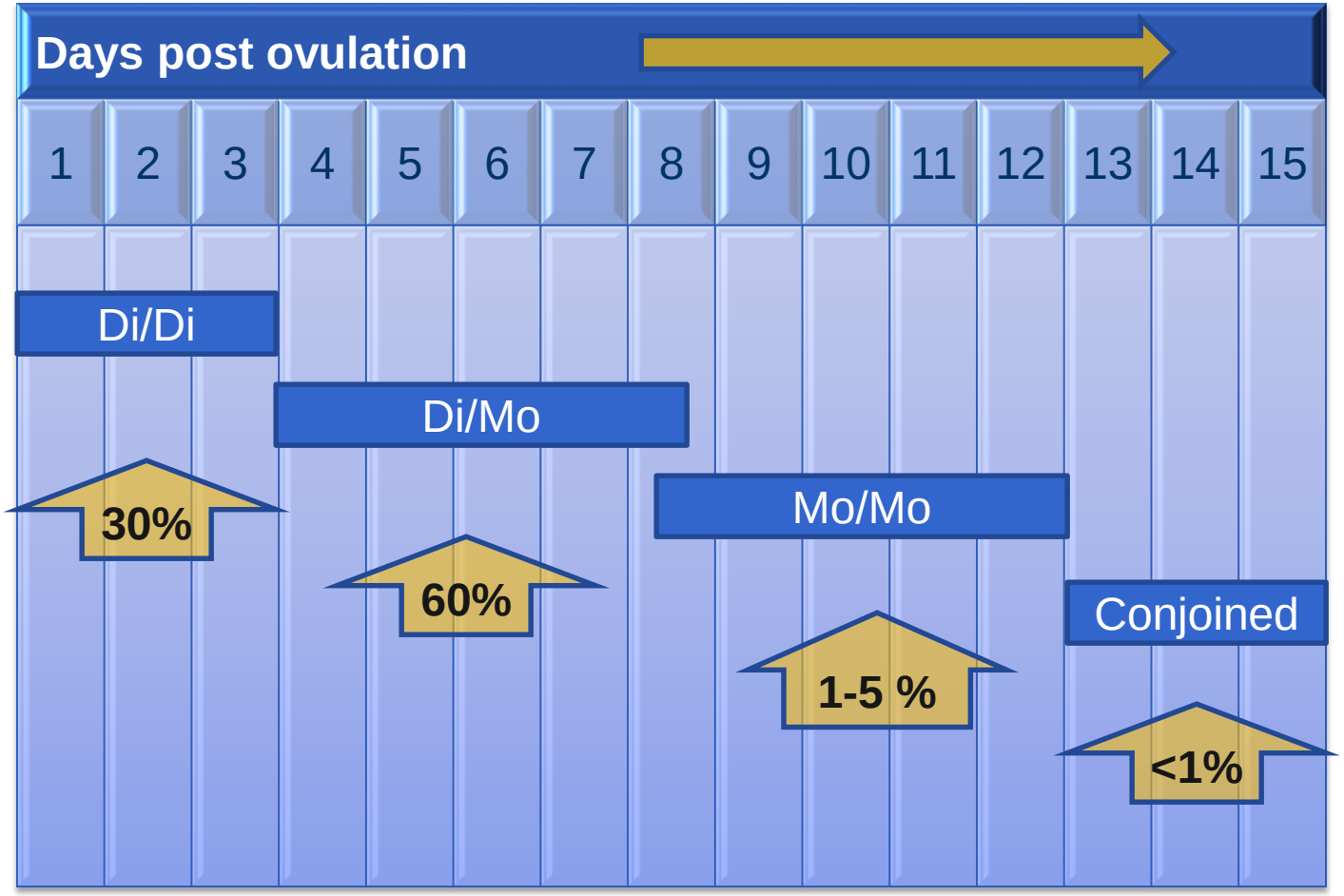
Fundal height assessment not accurate !

Chorionicity matters!

Ultrasound assessment of twin pregnancy


Dizygotic
Dichorionic Diamniotic
Monochorionic Diamniotic
Monochorionic Monoamniotic
2%
20%
12%
66%

MZ Twining - placentation



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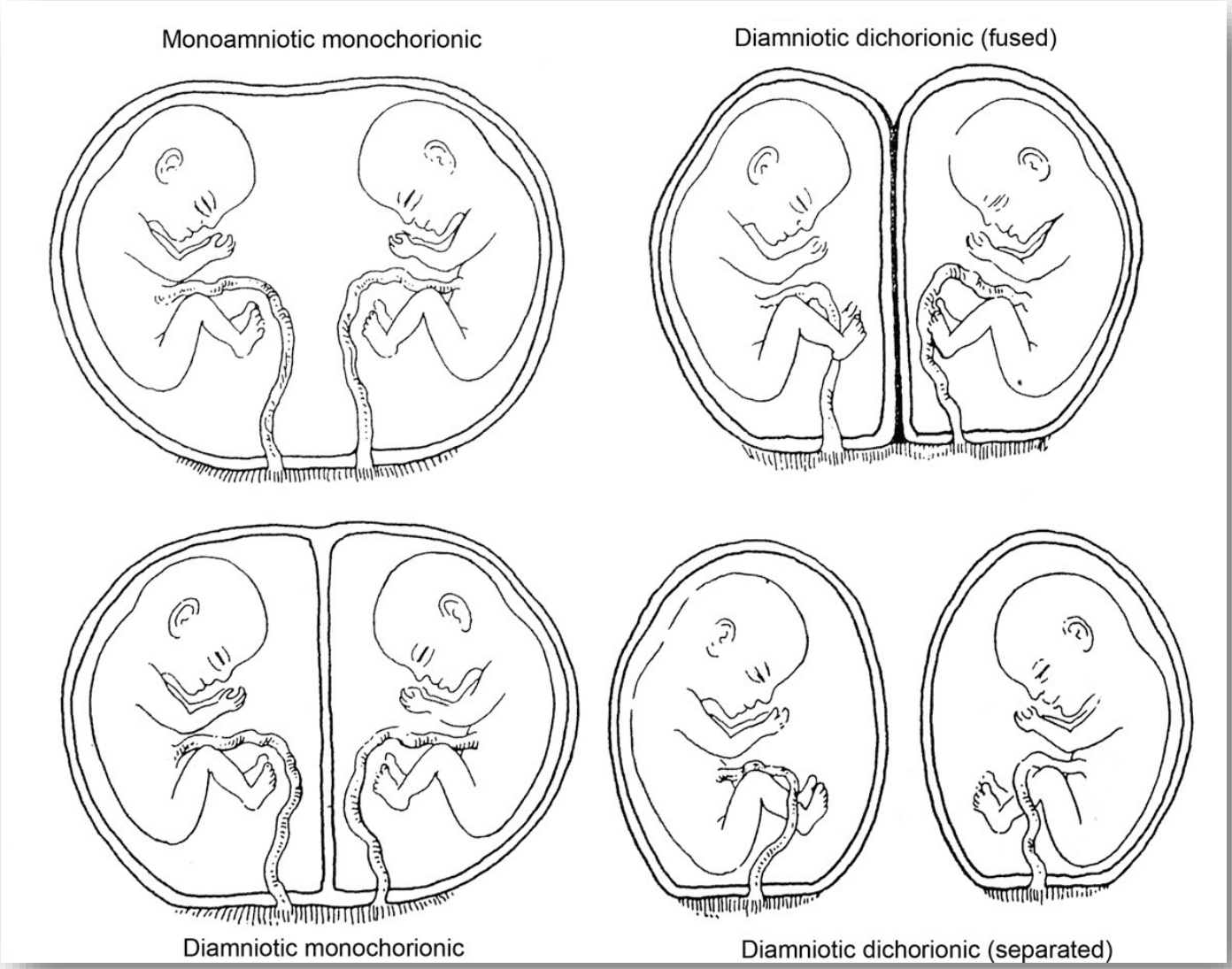
Placentation/Chorionicity diagnosis



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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

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Ultrasound Determination of Chorionicity

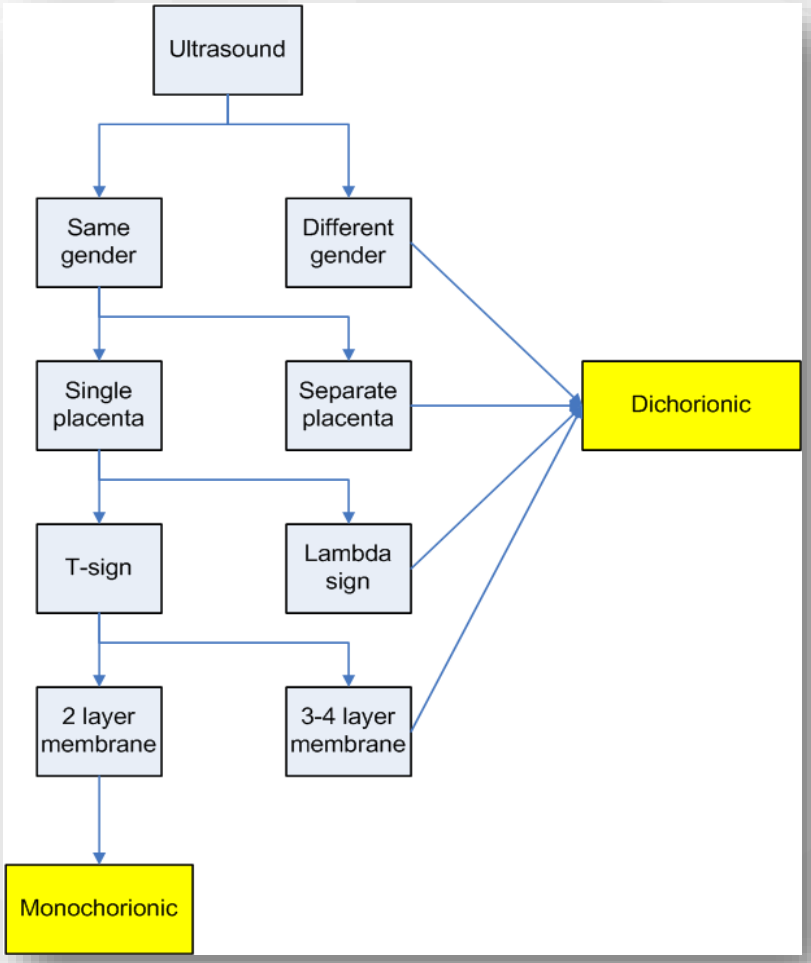
- Optimal time is 11-14 weeks
  - » T-sign and λ-sign

Sonographic markers of chorionicity

Figure 3—The 'T' sign

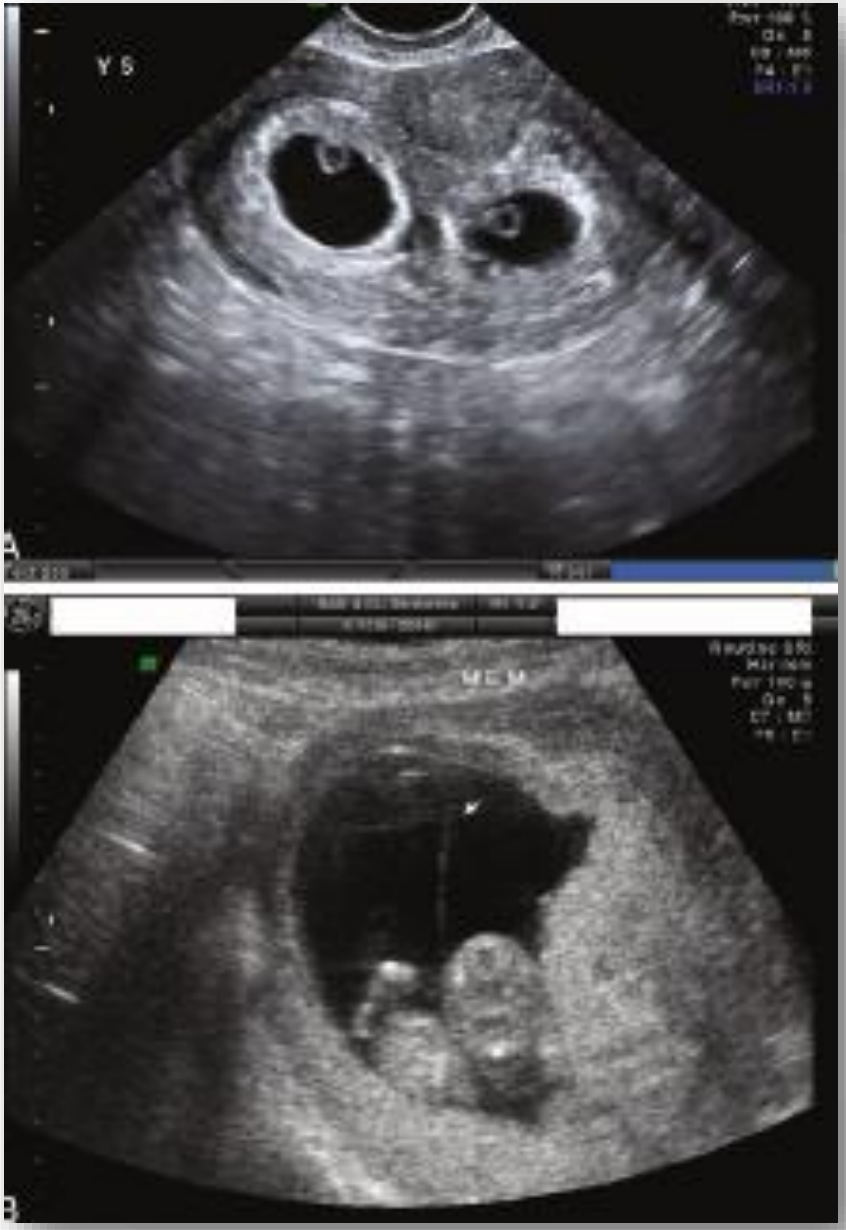
Ultrasound Determination of Chorionicity

- 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




Voluson
E6
LONG
1.Trim Rout.
Har-mid
95
Gn -2
C6 / M7
FF3 / E1
SRI II 0 / CRI 3


SAG LT TO RT

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

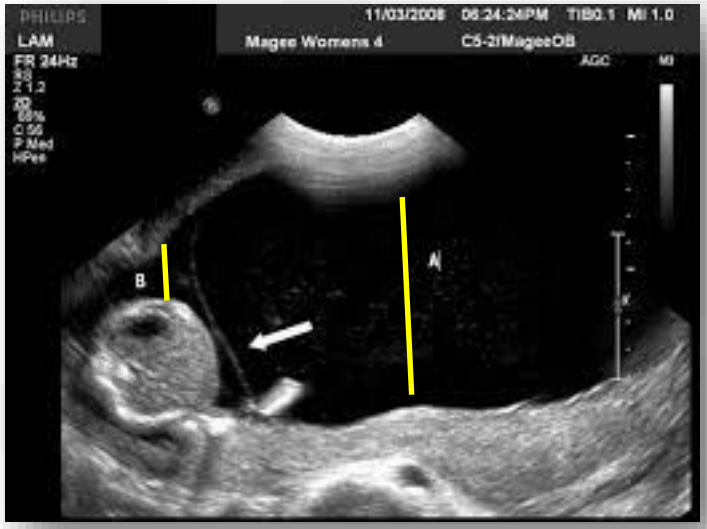
- All twins: US 11-14 weeks
  - Chorionicity
  - Confirm EGA
  - Aneuploidy screening
    - MC: maternal age risk
    - DC: 2x maternal age risk
- Combined serum and nuchal translucency screening at 11-14 weeks EGA
- Maternal serum screen at 15-20 weeks EGA
- CVS at 11-14 weeks
- Amniocentesis at > 15 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 < 10th % tile; discordant EFW > 20%

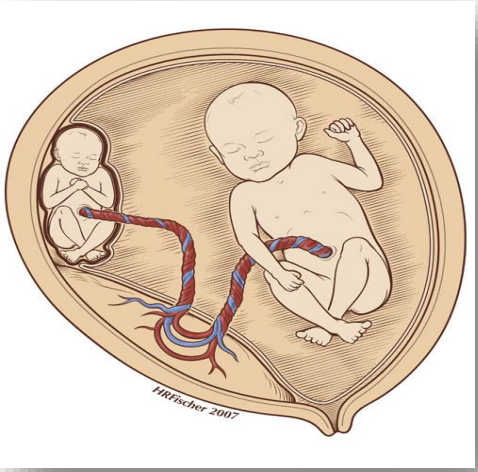
Ultrasound/ fetal assessment in twin pregnancy

- 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
  - » Polyhdramnios/oligohydramnios
    - >8cm, <2cm MVP
  - » Growth discordance
  - » Historic – 5 gm/dl Hgb
- Outcome stage based
  - » High mortality
  - » CP – 5%
  - » Developmental delay 10-20%



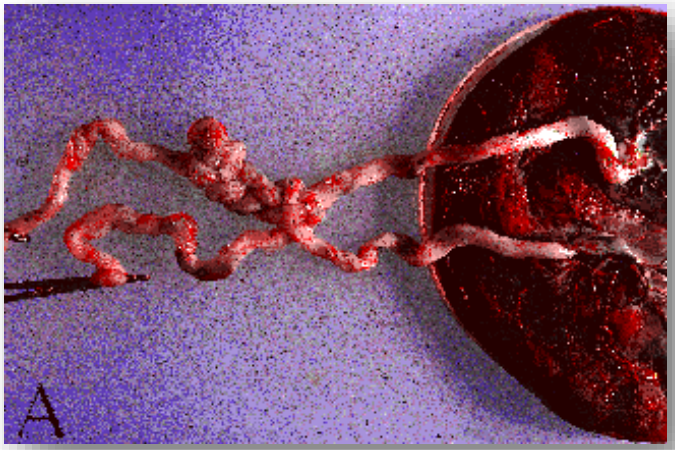
Outcomes | Interventions for TTTS

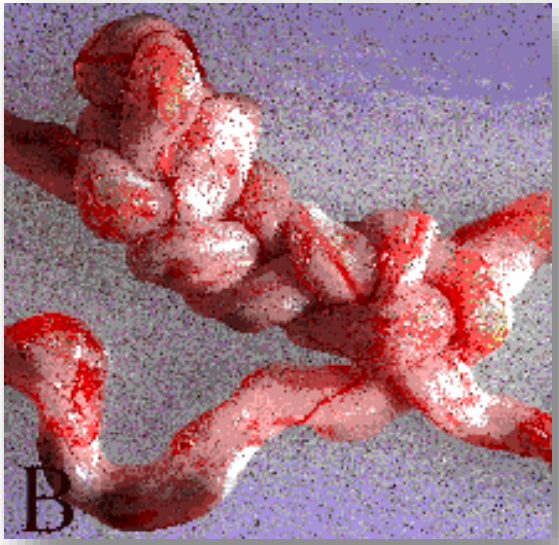
No treatment	Serial amnioreduction	Laser photocoagulation	Fetal cord occlusion

• 80-90% mortality	• Easy
	• Widely available
	• Less successful
	  • 50% survival
	• Septostomy
		• Fetoscopy
		• Select centers
		  • Selective
		  • 62-77%
		  • Nonselective
		  • 53-56%
			• 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





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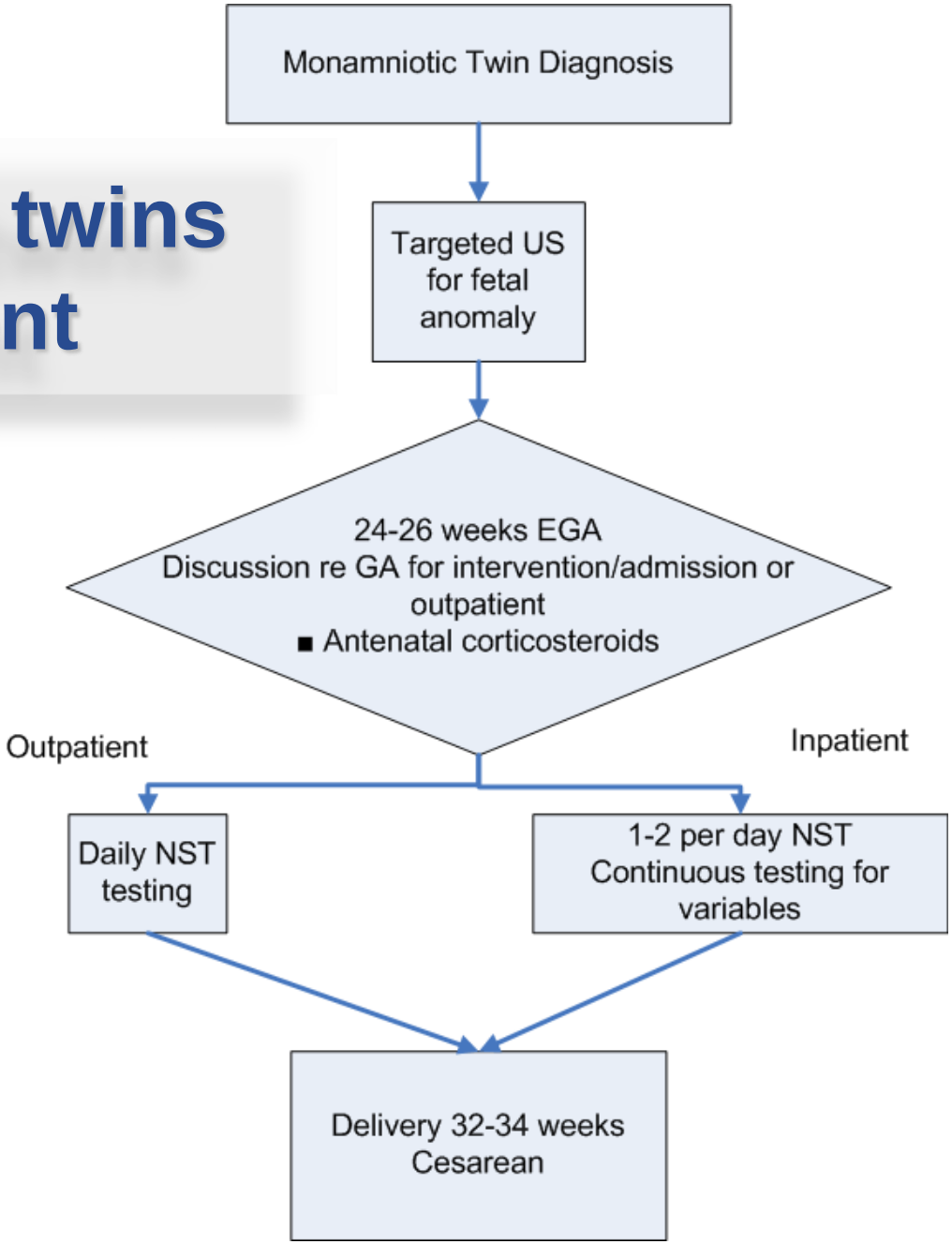
Monoamniotic twins Management



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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

	32 weeks	34 weeks	37 weeks
PTB	7%	13%	41%

Martin JA, Hamilton BE, Osterman MJK, Curtin SC, Mathews TJ. National vital statistics reports. Births: final data for 2013. 2015

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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

American Journal of Obstetrics and Gynecology (2006) **194**, 13

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

ACOG Practice Bulletin No. 144: Multifetal Gestations: Twin, Triplet, and Higher-Order Multifetal Pregnancies. Obstet Gynecol 123.5 (2014): 1118-32.
Rafael, T. J., V. Berghella, and Z. Alfirevic. Cochrane Database Syst Rev 9 (2014): Cd009166.
Rouse, et al. N Engl J Med 2007;357:454-61.
Combs CA, Garite T, Maurel K, et al. Am J Obstet Gynecol 2011;204:221

Twin Preterm Birth Prevention

Current twin with prior preterm birth

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

ACOG Practice Bulletin No. 144: Multifetal Gestations: Twin, Triplet, and Higher-Order Multifetal Pregnancies. Obstet Gynecol 123.5 (2014): 1118-32.

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)

- Goya, M., et al. Cervical Pessary to Prevent Preterm Birth in Women with Twin Gestation and Sonographic Short Cervix: A Multicenter Randomized Controlled Trial (Pecep-Twins). Am J Obstet Gynecol 214.2 (2016): 145-52.
- Romero, R., et al. Vaginal Progesterone in Women with an Asymptomatic Sonographic Short Cervix in the Midtrimester Decreases Preterm Delivery and Neonatal Morbidity: A Systematic Review and Metaanalysis of Individual Patient Data. Am J Obstet Gynecol 206.2 (2012): 124.e1-1

Twin Preterm Birth Prevention

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

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

Roman A, et al. Cerclage in twin pregnancy with dilated cervix between16 to 24 weeks of gestation: retrospective cohort study. Am J Obstet Gynecol 2016;212

PROSPECT

Eunice Kennedy Shriver
National Institute of Child Health and Human Development
Maternal-Fetal Medicine Units Network

- 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

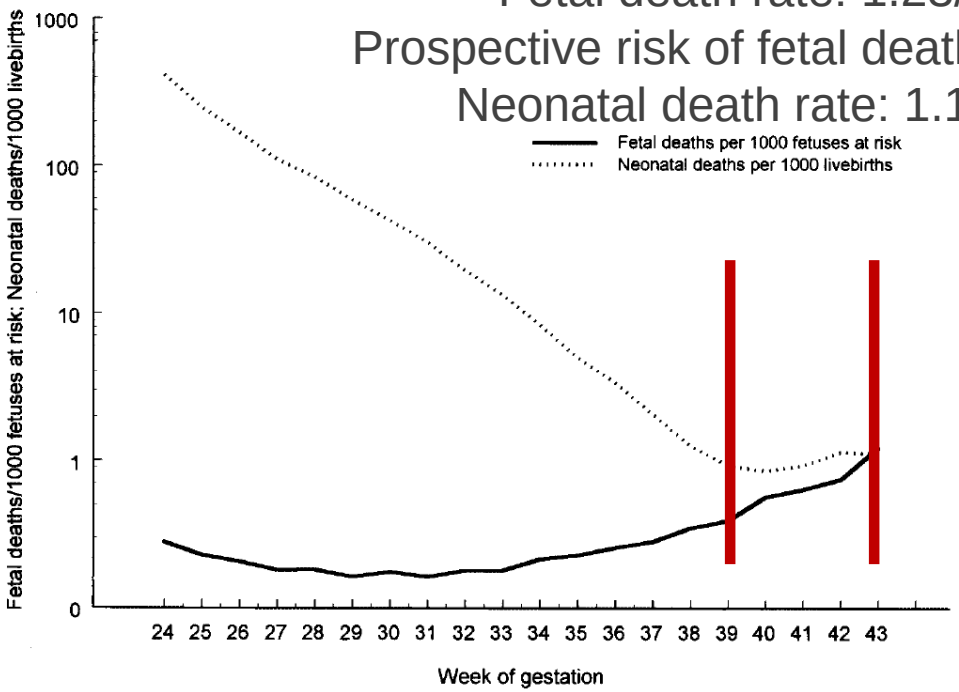


Figure 1. Fetal death rate and prospective risk of fetal death for singletons.
Kahn. Prospective Risk of Fetal Death in Multiples. Obstet Gynecol 2003.

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

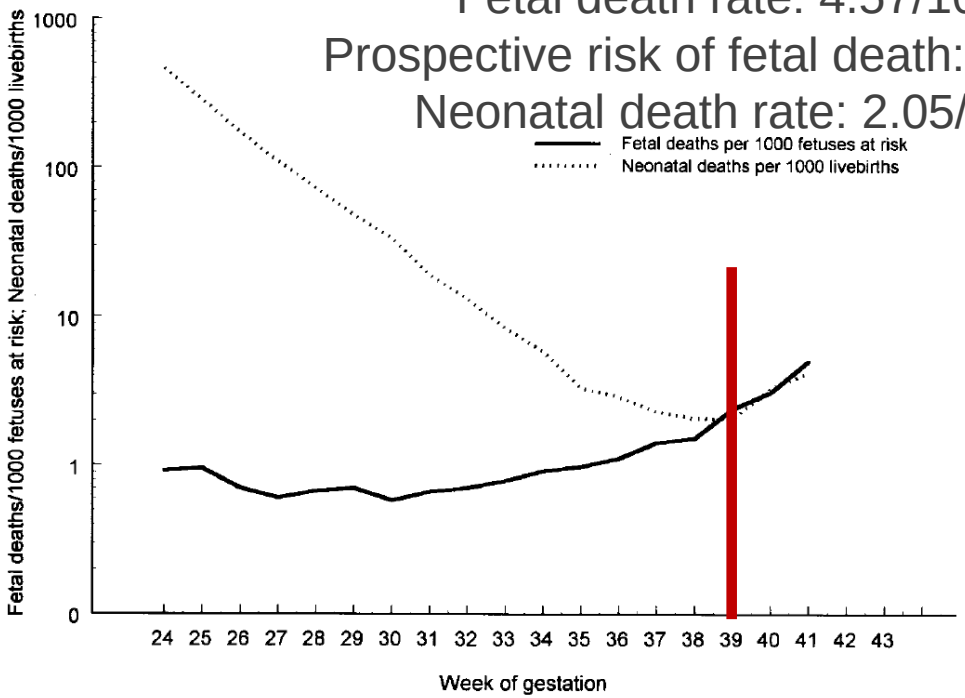


Figure 2. Fetal death rate and prospective risk of fetal death for twins.
Kahn. Prospective Risk of Fetal Death in Multiples. Obstet Gynecol 2003.

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

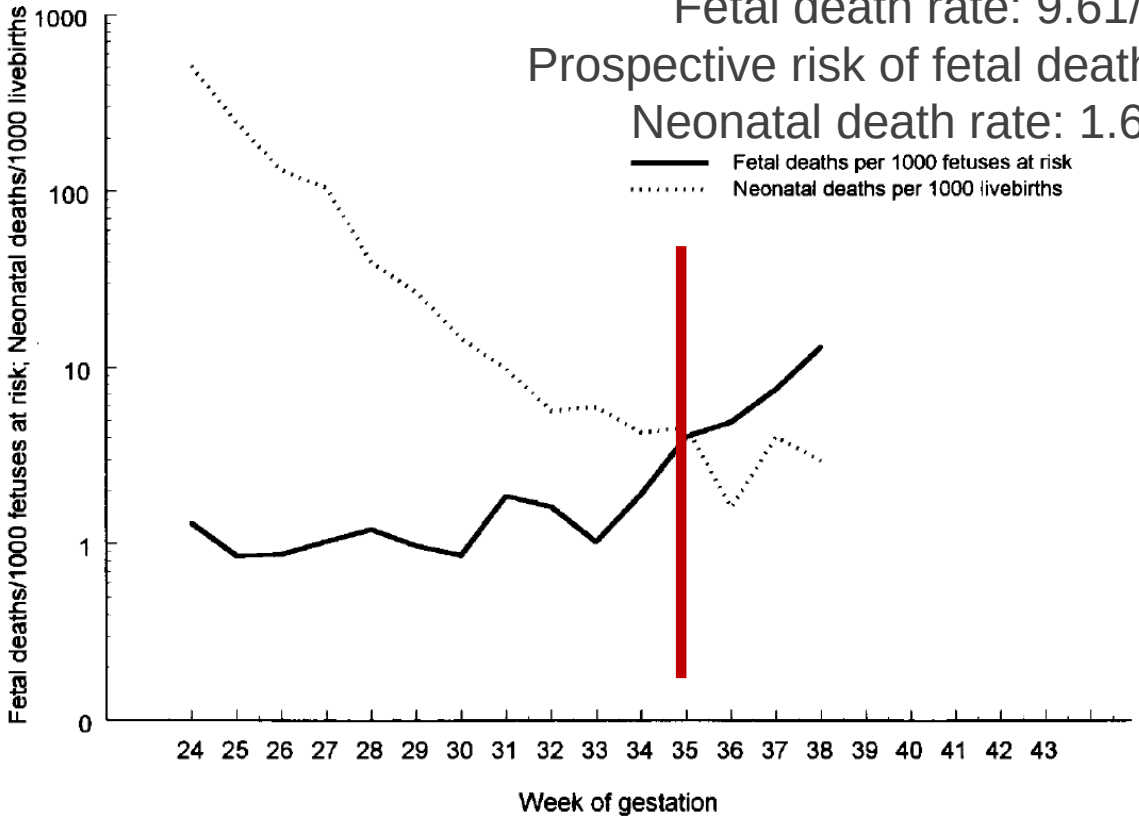


Figure 3. Fetal death rate and prospective risk of fetal death for triplets.
Kahn. Prospective Risk of Fetal Death. Obstet Gynecol 2003.

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

	RR combined cesarean
Twin B vertex	0.782 (0.631-0.968)
Epidural	0.46 (0.375-0.566)
BW < 25% discord	0.695 (0.524-0.922)

Acta Obstet Gynecol Scand 2003; 82: 241–245

- 32-38 weeks, A vertex, 1500-4000grams
- 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

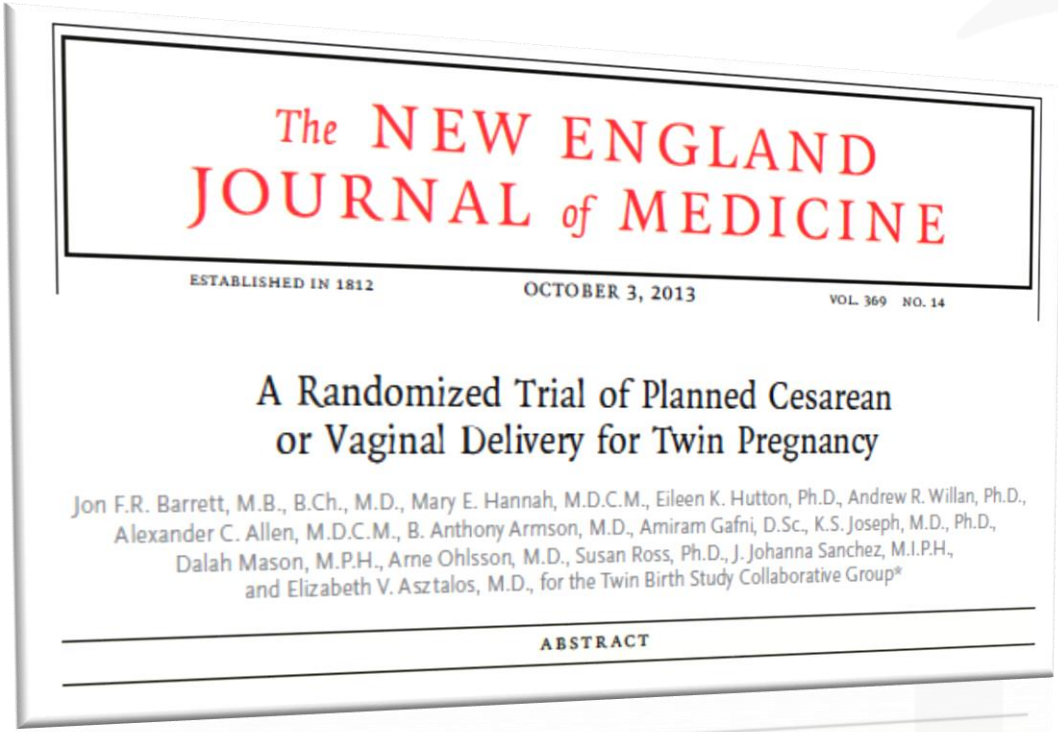
1392 planned vaginal delivery

↓

43.8 % cesarean
56.2 % vaginal
4.2 % combined

↓

1.9% composite neonatal outcome
8.5% composite maternal outcome



The NEW ENGLAND JOURNAL of MEDICINE

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A Randomized Trial of Planned Cesarean or Vaginal Delivery for Twin Pregnancy

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ABSTRACT

Outcome: neonatal death or serious neonatal morbidity

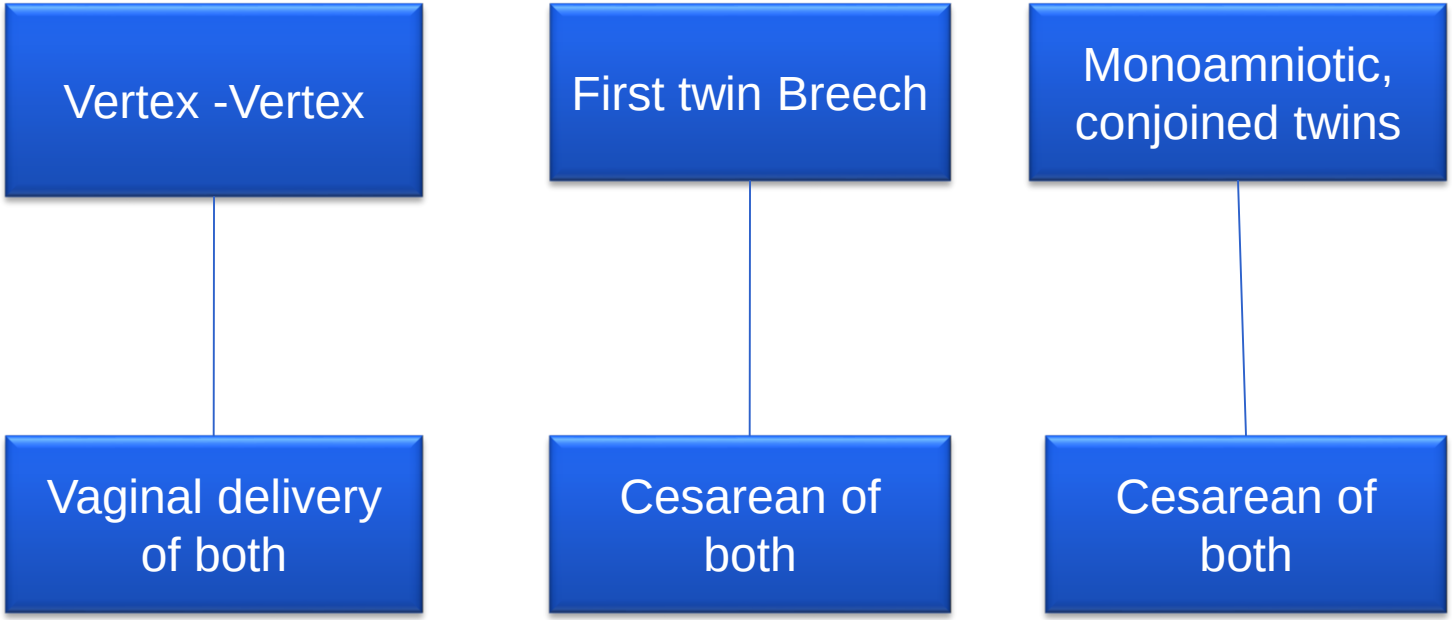
No difference in primary outcome OR 1.16 (95% CI 0.77, 1.74)

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



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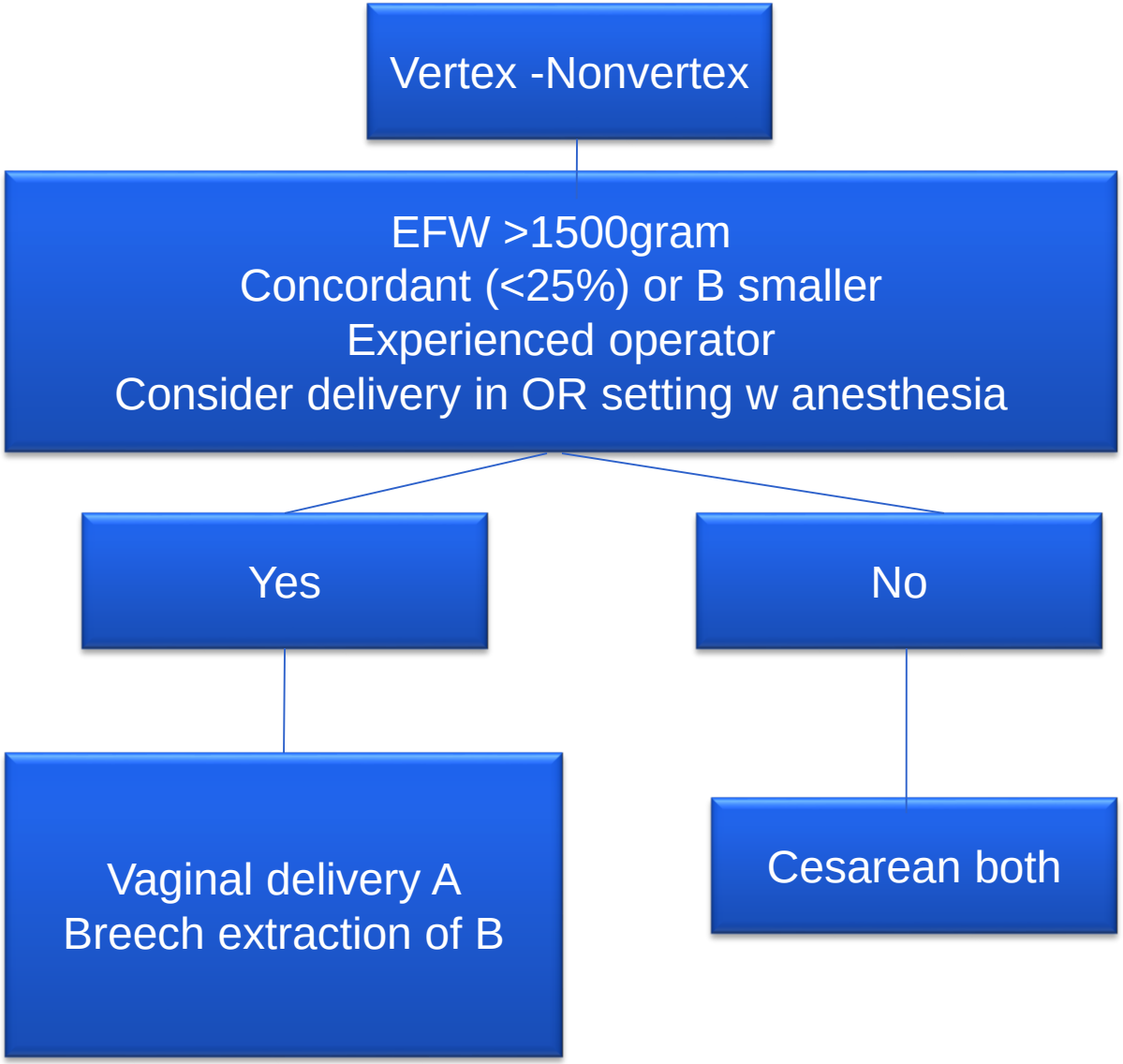
Route of Delivery



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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*

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