Management and Evaluation of Stillbirth

Maternal-Fetal Medicine
UKSM-Wichita
Objectives:

- Definition
- Frequency
- Potential causes
- Risk factors
- Evaluation
- Delivery

Maternal-Fetal Medicine
UKSM-Wichita
Fetus showing no signs of life as indicated by the absence of the following:

- Breathing
- Heart beat
- Pulsation of umbilical cord
- Definite movement of voluntary muscles

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WHO Definition of Stillbirth

• Loss after 20 weeks’ gestation

• If unknown GA: BW of 500 g or more

• ACOG: as above except BW ≥ 350 g

• Doesn’t include termination of pregnancy for lethal anomalies or for inductions for previable pPROM
Figure 1  Infant death rates, fetal death rates, and neonatal death rates.⁶
Since 2002, stillbirth rate was decreased from 6.4/1000 to 6.2/1000 in 2004.

Since the 1990s, the early stillbirth rate (20-27 weeks) stable at 3.2/1000.

Rate of late stillbirth decreased from 4.3 to 3.1/1000.

Causes of Stillbirth

Fetal

Maternal conditions

Placental
Fetal Causes: 25%
Most Frequent Types of Stillbirth According to Gestational Age

24-27 weeks
- Infection (19%)
- Anomalies (14%)
- Abruption (14%)

28-36 weeks
- Unexplained (26%)
- IUGR (19%)
- Abruption (18%)

37+ weeks
- Unexplained (40%)
- IUGR (14%)
- Abruption (12%)

Genetic Disorders

- Multifactorial gene disorders
- Single gene disorder
- Microdeletions?
- Chromosomal abnormalities
Chromosomal Abnormalities

- **Abnormal karyotype:** 8-13% of stillbirths

- **Most common:** monosomy X (23%), trisomy 21 (23%), trisomy 18 (21%) and trisomy 13 (8%)

- **If IUGR or anomalies:** 20%

- **Normally formed fetuses:** 4.6%

Anomalies with Normal Karyotype

Renal Agenesis

Pentalogy of Cantrell

Thanatophoric dwarf
Placental Causes
Placental Causes: 25-30%

- Abruption: 10-12%
- Placental insufficiency: up to 14%
- Fetomaternal hemorrhage: up to 5%
- Cord accident/abnormality: 2-4%

Placental Abruption

Rate of abruption increasing: RR 1.23 (95% CI, 1.22, 1.25)

Increased with GDM, PTL, and short umbilical cord

Smoking and cocaine use declined in the mid 1990s

Intrauterine Growth Restriction

Cumulative risk for stillbirth:

- EFW < 10%: 1.5%
- EFW < 5%: 2.5%
**Fetomaternal Hemorrhage: 3%-14%**

- Associated with obstetric procedures
- Can occur with abruption or trauma
- Perform Kliehauер-Betke before induction
- Hypoxia and anemia should be confirmed at autopsy
Cord Abnormalities: 2-4%

Nuchal cords present in ~30% normal births

True knot

Cord Occlusion
Infection

• Cause of 19% of stillbirth < 28 wk. GA; but only 2% of term stillbirths

• In developed countries: ascending bacterial infection most common cause of stillbirth

• Syphilis in endemic areas

• Malaria in developing countries

Viral Infection

• Parvo B19 has strongest association

• Infects erythropoietic cells

• May also directly attack cardiac tissue

• Risk of stillbirth greater if infection occurs <20 weeks gestation

Counseling Parents on Evaluation of Fetus

- 8-13% will have a chromosomal abnormality

- Autopsy will identify that 25-35% of stillbirths will have an anomaly

- Single malformation: 40%

- Multiple malformations: 40%

- Dysplasias: 20%
Counseling Parents

1. Autopsy provides new information in 26%-51%

2. Histologic evaluation of the placenta, membranes and cord

3. Karyotype

Maternal Factors
Obesity: BMI $> 30$

- Most prevalent risk factor: 20%
- Risk of stillbirth with BMI 30-39.9: 8/1000
- Risk with BMI $> 40.0$: 11/1000
- Remains a risk factor after controlling for confounders


Advanced Maternal Age

Lethal congenital & chromosomosmal anomalies

Increased risk persists after controlling for confounders

Increase of late unexplained stillbirths

Racial Factors

- Hispanic, Asian, Native Americans and non-Hispanic white women risk of stillbirth: <6/1000

- Non-Hispanic black women: 11.25/1000

- Blacks were 3.3x more likely not to receive prenatal care

- Higher rate persisted with prenatal care: 4.2 vs 2.4/1000


Comorbidities

Chronic hypertension
- Prevalence: 6%-10%
- Est. rate of stillbirth: 6-25/1000
- OR: 1.5-2.7

Preeclampsia
- Prevalence: 5.8%-7.7%
- Est. rate of stillbirth: 9-51/1000
- OR: 1.2-4.0

Preeclampsia with severe features
- Prevalence: 1.3%-3.3%
- Est. rate of stillbirth: 12-29/1000
- OR: 1.8-4.4

Comorbidities

Diabetes

Prevalence

Est. rate of stillbirth

OR

Treated with diet

2.5%-5%

6-10/1000

1.2-2.2

Treated with insulin

2.4%

6-35/1000

1.7-7.0

Comorbidities

Prevalence 2% or less

Cholestasis

OR: 1.8-30

Antiphospholipid syndrome work-up

Thrombophilia work-up if personal or family history of DVT

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Inherited Thrombophilias in Pregnancy
Exposures Associated with Stillbirth

Cocaine: 6x increased risk

Cigarette smoking: OR 1.6 (95% CI, 1.2-2.3)

Alcohol?

Methamphetamines?

Caffeine?

Evaluation of Stillbirth
Fetal Karyotype

Amnio: 84%

Placenta or umbilical cord: 42.6%

Fascia lata: 29.5%

Cartilage: 24.2%

Microarray

- Doesn’t require live cells
- Detects copy-number variants
- More often yielded results than that from amnio: 87.4% vs 70.5%, P<.001

How Microarray Works

1. **Patient (Test) Sample**
   - Add fluorescent label
   - Mix

2. **Reference Sample**
   - Add fluorescent label

3. Hybridize samples on oligoarray slide

4. Interpretation:
   - **Test:reference ratio > 1** → Duplication
   - **Test:reference ratio = 1** → No change in copy number
   - **Test:reference ratio < 1** → Deletion
**Microarray vs Karyotype**

**Microarray:** identified more genetic abnormalities: 8.8% vs 6.5%, P=0.02

**Identified more genetic abnormalities with birth defects:** 29.9% vs 19.4%, P=.0008

Kleihauer-Betke

CBC

APS Work-Up

Syphilis & Parvo B19

TSH

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Selected Lab Tests

Toxicology Screen

Diabetes Screen

Indirect Coombs

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Unproven Benefit

ANA
- Often, incidental finding
- Can lead to unnecessary interventions

TORCH
- Rarely helpful
- Diagnosis made by exam

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Delivery

• Before 28 wks: vaginal misoprostol most effective means for induction

• Typical doses 200-400 mcg q 4-12 hours

• After 28 weeks: cervical ripening with transcervical foley catheter

Support Services

Physician & nursing support

Communication of test results

Referral to counselor or support group

Provide copy of diagnosis made or excluded

Evaluation of the Stillborn Measurements

Photographs of fetus and placenta

Autopsy

Whole-body X-ray

MRI

Costs of Comprehensive Stillbirth Assessment

- Nonselective analysis performed on 1477 consecutive stillborns
- New information concerning recurrence risks found in 51% of infants
- $1450/assessment or about $12/cared-for pregnancy

Risk of Recurrence

Specific risk known?

• Low-risk women with unexplained stillborn:
  After 20 wks: 7.8-10.5/1000
  After 37 wks: 1.8/1000

• Live-born with preterm IUGR: risk of stillborn: 21.8/1000

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Prepregnancy Consultation

Review evaluation of previous stillbirth and determine recurrence risk

Smoking cessation

Normalize BMI

Genetic counseling as indicated

First Trimester Management

Dating sono by CRL

Consider First Screen, PAPP-A

Diabetes screen

Thrombophilia work-up as indicated

Second Trimester Evaluation

Anatomy survey at 18-20 weeks gestation

Quad screen?
Third Trimester Evaluation

Serial sonos to evaluate growth beginning at 28 weeks gestation

Fetal movement counts at 28 weeks

Antepartum testing at 32 weeks, prn

Delivery

Elective delivery at 39 weeks gestation

• Thorough evaluation of stillbirth

• Assess recurrence risk

• If able, optimize/eliminate risk factors

• Evaluation by ultrasound, AP testing

• Deliver at 39 weeks gestation