EVALUATION OF PREGNANT PATIENTS WITH HEART DISEASE

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Seattle, WA
CASE PRESENTATION

24 year old woman with aortic regurgitation referred for evaluation prior to pregnancy

Lifelong murmur, short of breath after 3 flights of stairs

Exam notable for diastolic murmur and harsh systolic murmur radiating to carotids
CASE PRESENTATION

Moderate aortic regurgitation
Normal left ventricular size and function
CASE PRESENTATION

Moderate aortic regurgitation
Normal left ventricular size and function
Severe subaortic obstruction
CASE PRESENTATION

Moderate aortic regurgitation
Normal left ventricular size and function
Severe subaortic obstruction
QUESTIONS

WHAT ARE THE RELEVANT HEMODYNAMIC CHANGES OF PREGNANCY?

WHAT ADVERSE EVENTS ARE WE TRYING TO AVOID DURING PREGNANCY?

WHAT ARE RISK FACTORS AND HOW CAN WE ASSESS THEM?
PREGNANCY HEMODYNAMICS
# Cardiovascular Changes of Normal Pregnancy

## Hemodynamic

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>↑</td>
</tr>
<tr>
<td>SV</td>
<td>↑</td>
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<tr>
<td>HR</td>
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</tr>
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<td>BP</td>
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<tr>
<td>SVR</td>
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<td>PAP</td>
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<tr>
<td>LVEDP</td>
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## Anatomic

<table>
<thead>
<tr>
<th>Anatomic Feature</th>
<th>Change</th>
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<tr>
<td>Aortic root</td>
<td>sl ↑</td>
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CARDIOVASCULAR CHANGES OF NORMAL PREGNANCY

**HEMODYNAMIC**

- **CO** ↑
- **SV** ↑
- **HR** ↑
- **BP** ↔
- **SVR** ↓
- **PAP** ↔
- **LVEDP** ↔

**ANATOMIC**

- Aortic root sl ↑
- **LVEDDD** sl ↑
- **LVESD** sl ↓
- **LA** ↑
CARDIOVASCULAR CHANGES OF NORMAL PREGNANCY

HEMODYNAMIC

- CO ↑
- SV ↑
- HR ↑
- BP ↔
- SVR ↓
- PAP ↔
- LVEDP ↔

ANATOMIC

- Aortic root sl ↑
- LVEDD sl ↑
- LVESD sl ↓
- LA ↑
TIME COURSE OF HEMODYNAMIC CHANGES IN NORMAL PREGNANCY

WEEKS GESTATION

CARDIAC OUTPUT
HEART RATE
PLASMA VOLUME
Acute redistribution of ~500 cc to maternal circulation at delivery.
ADVERSE EVENTS DURING PREGNANCY
GLOBAL RISK ASSESSMENT
CARDIAC EVENTS IN PREGNANCY

**MATERNAL**
- Arrhythmias
- Heart failure
- Death

**FETAL**
- Small for gestational age
- Prematurity
PREDICTORS OF ADVERSE EVENTS IN PREGNANT WOMEN WITH HEART DISEASE

Cardiac event before pregnancy
   CHF, ARRHYTHMIA

Functional status
   NYHA Class > 2
   Cyanosis

Left heart obstruction
   MVA < 2.0 cm²
   AVA < 1.5 cm²
   HCM with LVOT \( \Delta P > 30 \text{ mm Hg} \)

Systemic ventricular dysfunction
   EF < 40%
FREQUENCY OF ADVERSE EVENTS BASED ON RISK SCORE

- 5% for 0 predictors
- 27% for 1 predictor
- 75% for > 1 predictor

Siu et al, Circulation 2001
FREQUENCY OF ADVERSE EVENTS BASED ON RISK SCORE

Siu et al, Circulation 2001

- Arrhythmia: 5%
- Heart failure: 27%
- Death: 75%

Number of Predictors

Percent

5% 27% 75%

Predicted Derived Validation

Siu et al, Circulation 2001
TYPES OF HEART DISEASE
# Types of Heart Disease Encountered During Pregnancy

## Acquired
- Rheumatic
- Cardiomyopathy
  - Dilated
  - Peripartum
- Coronary disease
  - Kawasaki
  - Atherosclerosis
  - Dissection

## Congenital
- Valvular
- Complex structural
- Cardiomyopathy
  - Hypertrophic
  - Familial
- Connective tissue disorder
  - Marfan
  - Loeys-Dietz
## Incidence of Congenital Heart Disease in Childhood and Pregnancy

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<tr>
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</tr>
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## INCIDENCE OF CONGENITAL HEART DISEASE IN CHILDHOOD AND PREGNANCY

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SPECIFIC LESIONS
CONGENITAL AORTIC STENOSIS

49 pregnancies, 39 women, mean follow-up 3.7 years

Cardiac complications during pregnancy

Mild or moderate AS
Severe AS

Cardiac surgery during follow-up

Silversides Am J Cardiol 2003
MITRAL STENOSIS

74 women, 80 pregnancies

89% NYHA 1  11% NYHA 2

MATERNAL EVENTS
PULMONARY EDEMA
ARRHYTHMIA

FETAL EVENTS
PREMATURE
SMALL FOR
GESTATIONAL AGE

Silversides et al Am J Cardiol 2003
# MARFAN SYNDROME

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td><strong>Women</strong></td>
<td>84</td>
<td></td>
</tr>
<tr>
<td><strong>Pregnancies</strong></td>
<td>241</td>
<td></td>
</tr>
<tr>
<td><strong>Live births</strong></td>
<td>181</td>
<td>75%</td>
</tr>
<tr>
<td>Miscarriages</td>
<td>38</td>
<td>16%</td>
</tr>
<tr>
<td>Termination</td>
<td>17</td>
<td>7%</td>
</tr>
<tr>
<td>Fetal deaths</td>
<td>2</td>
<td>0.8%</td>
</tr>
<tr>
<td><strong>Aortic events</strong></td>
<td>8</td>
<td>4.3%</td>
</tr>
<tr>
<td>Dissection</td>
<td>6</td>
<td>3.3%</td>
</tr>
<tr>
<td>Rapid dilation</td>
<td>2</td>
<td>1.1%</td>
</tr>
<tr>
<td><strong>Death</strong></td>
<td>2</td>
<td>1.1%</td>
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All aortic events and deaths occurred with aortic roots >4 cm

PERIPARTUM CARDIOMYOPATHY

44 women, 35 completed pregnancies
ECHOCARDIOGRAPHIC EVALUATION
KEY CONCERNS

LESION & IMPACT
KEY CONCERNS

LESION & IMPACT

“PRIMARY’ ABNORMALITY

OTHER COEXISTANT LESIONS
KEY CONCERNS

LESION & IMPACT

SYMPTOMS
EXERCISE CAPACITY
ECHOCARDIOGRAPHIC FINDINGS
CONCLUSIONS

HEMEODYNAMIC CHANGES WITH PREGNANCY ARE PROGRESSIVE AND MAY CAUSE CARDIAC DECOMPENSATION

ECHOCARDIOGRAPHY IS AN IMPORTANT EVALUATION TOOL BEFORE, DURING AND AFTER PREGNANCY

ECHOCARDIOGRAPHY IS ONLY ONE PART OF OVERALL RISK ASSESSMENT