PATIENT PROSTHESIS MISMATCH IN PREGNANCY

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The 3rd International Congress on Cardiac Problems in Pregnancy

Venice, Italy

February 21, 2014
Case Presentation

• 34yo G4P3 at 16 weeks gestation presents for consultation regarding recommendations for anticoagulation

• History of aortic valve replacement with 19 mm St. Jude valve due to bacterial endocarditis following uncomplicated repeat cesarean delivery in 2010

• Echocardiogram in 2012 demonstrated aortic valve area of $2.6 \text{ cm}^2$ with normal gradient
Case Presentation

• TEE demonstrates severe aortic stenosis with valve area of $0.27\, \text{cm}^2$, peak systolic gradient of $120\, \text{mmHg}$, LVEF of 65%

• NYHA class I

• Patient admitted to the CCU for further workup
  • Differential Diagnosis included:
    • Valve thrombosis
    • Valve malfunction
Trans-esophageal echocardiogram
Fluoroscopy
Level 1 Treadmill Stress Test

1mm ST segment depressions noted at 10 minutes
A multidisciplinary conference with:
  • Cardiology
  • Cardiothoracic surgery
  • Anesthesia
  • Maternal Fetal Medicine

Diagnosis: Patient-Prosthetic Mismatch (PPM)
COUNSELING AND MANAGEMENT

- Expectant management with the risk of potential decompensation later in pregnancy

- Predictors of primary cardiac events in pregnancy:
  1. NHYA Class II or greater or cyanosis
  2. Left heart obstruction
  3. Prior cardiac event
  4. LVEF < 40%

Each predictor assigned a value of 1
  - Score of 0 conferred a 5% risk of cardiac event
  - Score of 1 conferred a 27% risk of cardiac event
  - Score of >1 conferred a 75% risk of cardiac event
Aortic valve replacement in the pre-viable period

- 20 – 30% risk of fetal demise
- 1-2% risk of maternal mortality
At 20 1/7 weeks gestation:
- Replacement of 19mm St Jude valve with 23 mm valve
- Enlargement of aortic annulus and root with Dacron patch
- Tolerated procedure well without need for inotropic support
- Procedure complicated by immediate intra-uterine fetal demise diagnosed at completion of procedure
- Underwent induction of labor and spontaneous vaginal delivery
- Discharged to home on therapeutic Warfarin
PATIENT-PROSTHETIC MISMATCH

- Refers to abnormally high post-operative gradients created by placement of a prosthetic valve that is physiologically too small for a patient's body size and cardiovascular requirements\(^1\)\(^-\)\(^2\)

- **Mild PPM defined as an indexed orifice area of < 0.85cm\(^2\)/m\(^2\)**
  - Affects approximately 20 – 70% of patients undergoing aortic/mitral valve replacements and is usually well tolerated

- **Severe PPM defined as an indexed orifice area of < 0.65cm\(^2\)/m\(^2\)**
  - Affects approximately 2 – 11% of patients post-operatively
  - Associated with less improvement in symptoms, less regression of LVH, worse hemodynamics at rest and during exercise, increased rates of reoperation and significant mortality
PREVENTION OF PPM

• BSA x 0.85 = minimum iEOA

<table>
<thead>
<tr>
<th>Aortic Mechanical Prostheses (mm)</th>
<th>19</th>
<th>21</th>
<th>23</th>
<th>25</th>
<th>27</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medtronic-Hall</td>
<td>1.2 +/- 0.2</td>
<td>1.3 +/- 0.2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>St Jude Medical standard</td>
<td>1.0 +/- 0.2</td>
<td>1.4 +/- 0.2</td>
<td>1.5 +/- 0.5</td>
<td>2.1 +/- 0.4</td>
<td>2.7 +/- 0.6</td>
</tr>
<tr>
<td>St Jude Medical regent</td>
<td>1.6 +/- 0.4</td>
<td>2.0 +/- 0.7</td>
<td>2.2 +/- 0.9</td>
<td>2.5 +/- 0.9</td>
<td>3.6 +/- 1.3</td>
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More recent data suggest no difference in maternal mortality compared to non-pregnant patients\textsuperscript{7-9}.

Factors associated with worse outcomes\textsuperscript{7-9}:
- Prolonged operative times
- Extreme emergency
- Advanced maternal age

<table>
<thead>
<tr>
<th>Timing of Surgery\textsuperscript{5}</th>
<th>Fetal/Neonatal Morbidity</th>
<th>Fetal/Neonatal Mortality</th>
<th>Maternal Morbidity</th>
<th>Maternal Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antepartum</td>
<td>9% (4/45)</td>
<td>29% (16/55)</td>
<td>24% (17/70)</td>
<td>5% (3/59)</td>
</tr>
<tr>
<td>Immediately postpartum</td>
<td>23% (9/40)</td>
<td>3% (1/35)</td>
<td>29% (12/41)</td>
<td>11% (4/36)</td>
</tr>
<tr>
<td>Delayed postpartum</td>
<td>12% (6/49)</td>
<td>0</td>
<td>38% (19/50)</td>
<td>12% (5/42)</td>
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</table>
CONCLUSIONS

- PPM should be considered in the differential diagnosis in women with prosthetic heart valves in pregnancy presenting with high gradients.
- Multidisciplinary care involving cardiology, cardiothoracic surgery, anesthesiology and maternal fetal medicine is indicated.
- A thorough counseling including review of management options should be undertaken.
- Ideally cardiac surgery should either be performed in the pre-viable period or late second – early third trimester to optimize fetal and maternal outcomes.
- Rates of fetal demise remain high despite advances in cardiopulmonary bypass techniques.
Thank You

Dr. Morgan Swank
Dr Vineet Shrivastava
Dr. Afshan Hameed
REFERENCES