Atherosclerosis – A Spectrum of Disease:
February 12, 2019
Richard Cameron Padgett, MD
Executive Medical Director Oregon Heart & Vascular Institute
Angina or “Heart Pain”
Well described 600 BCE

- From a cemetery in Cambridge
Classic Heart Attack Symptoms

- Chest Pain
- Shortness of Breath
- Nausea
- Anxiety
- Vomiting
- Wheezing
- Sweating
- Light Headedness
- Cough
Chest Pain Variants

- Localized just under breastbone, or in larger area of mid-chest, or entire under chest.
- Common combination mid-chest, neck and jaw.
- Mid-chest and inside arms. Left arm and shoulder more frequent than right.
- Upper abdomen where most often mistaken for indigestion.
- Larger area of chest, neck, jaw and inside arms.
- Lower center neck, to both sides of upper neck, and jaw from ear to ear.
- Inside right arm from armpit to below elbow; inside left arm to waist. Left arm and shoulder more frequent than right.
- Between shoulder blades.
Do you know your heart attack symptoms?
Heart Attack Warning Signs

**Women**
- Lightheadedness or dizziness
- Upper back pressure
- Chest pressure
- Shortness of breath
- Pain in one or both arms, the back, neck, jaw or stomach
- Fainting or extreme fatigue

Women might not experience the chest pain that is often noted as the most common sign of heart attack. Some women who have had heart attacks say they thought they had the symptoms associated with the flu.

**Men**
- Cold sweat or nausea
- Chest pressure or pain
- Shortness of breath
- Pain in one or both arms, the back, neck, jaw or stomach

If you have any of these symptoms for more than 5 minutes and are unsure of the cause, call 9-1-1.

Treatments work best if given within 1 hour of when heart attack symptoms begin.

Marshfield Clinic®
Figure A is an overview of a heart and coronary artery showing damage (dead heart muscle) caused by a heart attack. Figure B is a cross-section of the coronary artery with plaque buildup and a blood clot.
Coronary Angio Suite
All roads lead to Rome
Coronary Catheters

QuickPass™ PTFE inner liner and lined tip

2 x 2 braid pattern
Pt RB

Age 38
1ppd Smoker
Father had MI @ Age 46
Total Chol 189
LDL 138
HDL 25
Death is Chasing Them
New technology to treat Aortic Stenosis

Richard C. Padgett, MD
Executive Medical Director
Aortic Stenosis
An Increasing Burden

Burden of Valve Diseases in the US

<table>
<thead>
<tr>
<th>Year</th>
<th>Disease</th>
<th>2000</th>
<th>2030</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>AS</td>
<td>2.5</td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td>MR</td>
<td>2.7</td>
<td>4.8</td>
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</tbody>
</table>
Aortic Stenosis: Natural History
## Aortic Stenosis

<table>
<thead>
<tr>
<th>Symptom/Sign</th>
<th>Live expectancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angina</td>
<td>5 years</td>
</tr>
<tr>
<td>Syncope</td>
<td>2-3 years</td>
</tr>
<tr>
<td>Congestive Heart Failure</td>
<td>1-2 years</td>
</tr>
</tbody>
</table>

**Therapy:** Valve replacement for severe aortic stenosis  
Operative mortality (elderly) ~ 4-24% / Morbidity ~ 3-11%  
Event rate in asymptomatic severe AS ~ 1%/year
Standard Therapies are Inadequate

Despite frequent BAV, **standard therapy did not alter the dismal course of disease for inoperable patients** in The PARTNER Trial:

- 50% died within 1 year
- 68% died within 2 years
Worse Prognosis than Many Metastatic Cancers

5-Year Survival (Distant Metastasis)

- Breast Cancer: 23%
- Lung Cancer: 4%
- Colorectal Cancer: 12%
- Prostate Cancer: 30%
- Ovarian Cancer: 28%
- Severe Inoperable AS*: 3%

*Using constant hazard ratio. Data on file, Edwards Lifesciences LLC. Analysis courtesy of Murat Tuczu, MD, Cleveland Clinic

- 5 year survival of breast cancer, lung cancer, prostate cancer, ovarian cancer and severe inoperable aortic stenosis
Absolute Reduction in Mortality in Inoperable Patients

The Edwards SAPIEN valve significantly improves survival.

24.7% absolute reduction in mortality

Despite expert care and frequent BAV, standard therapy failed to alter the dismal natural course of disease.
ANIMATION
Transfemoral Deployment of Edwards SAPIEN Transcatheter Heart Valve in Calcified Aortic Valve
Multidisciplinary Cardiovascular Team

- To ensure the success of the hybrid approach, the multidisciplinary team approach has developed
  - Facilitates joint pre-operative decision-making and intra-operative collaboration between surgery and cardiology

Reference: Maisano 20120
A Dedicated Heart Team

Requires marriage of OR & Cath Lab staff

- Cardiothoracic Surgeon Learns: Large bore catheter technology and wire techniques
- Interventional Cardiologist Learns: Structural heart & aortic stenosis
- OR and Cath Lab staff both have to learn new equipment and processes
Summary JS

- 85 y.o. male
- STS 10%
- EuroSCORE 3%
- NYHA III

Clinical History

- Increasing fatigue and exercise intolerance
- Work-up for total knee replacement; echocardiogram shows progression of aortic stenosis, now severe.
- Alzheimer's dementia.
- CAD - moderate
- Chronic kidney disease.
- Creatinine 1.2
- BUN 14
- Hgb 12.9
- PLT 130
- BNP 422

- Hypertension
- Hyperlipidemia,
- Diabetes/ Diabetic neuropathy.
- Obesity.
- History of osteomyelitis of the ankle/ foot.
- BPH./ prostate cancer
- Arthritis.
- Gout.
- Suspected carrier of methicillin-resistant Staph aureus.
- Creatinine 1.2
- BUN 14
- Hgb 12.9
- PLT 130
- BNP 422

In Affiliation with Sacred Heart Medical Center
JS  EKG
Echocardiography – JS

- TTE performed on 6/12/2015

### Required Measurements

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Peak Velocity</td>
<td>4.29 m/s</td>
</tr>
<tr>
<td>Mean Gradient</td>
<td>44.4 mmHg</td>
</tr>
<tr>
<td>Annulus Diameter</td>
<td>21 mm</td>
</tr>
<tr>
<td>AVA</td>
<td>0.80 cm</td>
</tr>
<tr>
<td>Ejection Fraction</td>
<td>65 %</td>
</tr>
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</table>

### Findings

- Severe aortic stenosis
  - Mild aortic regurgitation.
  - Trace mitral regurgitation
  - Trace tricuspid regurgitation
PROCEDURE: Attempted TEE

DISCUSSION: Patient underwent an attempted TEE. Because of an obstruction just distal to the pharynx, we were unable to pass the probe. The patient tolerated the procedure poorly. If in the future, a TEE is required, then consideration of a GI endoscopy to confirm patency and perhaps even general anesthesia.
3Mensio – area 473.0 (26 Valve)
Ostial heights  
Lt: 12.5  
Rt: 13.6
3D access
Deployment angle  RAO 3  Cranial 2
<table>
<thead>
<tr>
<th></th>
<th>Right</th>
<th></th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Iliac</td>
<td>8.0 mm</td>
<td>Common Iliac</td>
<td>6.9 mm</td>
</tr>
<tr>
<td>Prox external Iliac</td>
<td>8.8 mm</td>
<td>Prox external Iliac</td>
<td>8.6 mm</td>
</tr>
<tr>
<td>Mid external iliac</td>
<td>9.0 mm</td>
<td>Mid external iliac</td>
<td>8.5 mm</td>
</tr>
<tr>
<td>Common Femoral</td>
<td>8.8 mm</td>
<td>Common Femoral</td>
<td>8.2 mm</td>
</tr>
</tbody>
</table>
This patient is suitable for transfemoral TAVR with Sapien XT

- Concern of calcium extending into LVOT
- Plan B - Dr. Koh – support only

<table>
<thead>
<tr>
<th>Annulus Diameter Measurement</th>
<th>THV Valve Size Proposed</th>
<th>Femoral Access Side Proposed</th>
<th>Smallest Vessel Diameter Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.7 cm</td>
<td>26 mm</td>
<td>Right</td>
<td>8.0 mm</td>
</tr>
</tbody>
</table>
First TAVR @ OHVI  Sept 12th 2012
Sacred Heart Medical Center Riverbend
Oregon Heart & Vascular Institute, Springfield OR
Percutaneous treatment of Mitral Regurgitation

THE MITRA CLIP PROCEDURE
The four chambers of the Heart