VALVULAR HEART DISEASE
AORTIC VALVE STENOSIS
TAVR PROCEDURE

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Cardiac Cath Lab Director
Memorial Regional Hospital
86 yr old CABG 1995. LIMA to LAD and SVG to OM. Presented CHF in February 2011. Cath’d: Severe AS. Stabilized well on lasix. EKG in Feb shown.
PMHX

- CABG 1995: Mt. Sinai Hospital in Miami
- Diabetes type 2
- Hypertension and dyslipidemia
- Anemia, iron def. Hg 9-11
- Bladder tumor, urology following
- PVD and claudication
- CKD stage III: Creat 1.4-1.7

MEDS:
- Lasix 20 mg/d
- Crestor 10 mg/d
- ASA and Plavix
- Nifediac 60 mg/d
- Losartan 100 mg/d
- Januvia 25 mg/d
- Metoprolol succinate 50 mg/d
EF 55%

MP gradient: 80 mmHg

Mean gradient: 50 mmHg

Mild AR and MR

LVOT diameter: 20 mm

LVOT peak velocity: 110 cm/sec

AV velocity: 448 cm/s

AVA: 0.78 cm²
OK for a few months
Developed increasing SOB in Sept 2011
Referred to Memorial Valve Clinic for AVR/TAVR.

VALVE CLINIC:
Cardiac Surgeons declared him inoperable due to prior serious sternal problems during original CABG
CANDIDATE FOR AORTIC VALVE REPLACEMENT

SURGICAL CANDIDATE

STANDARD AVR

TAVR

ACCESS OK

PALIATIVE CARE

NOT SURGICAL CANDIDATE

TRANSCATHETER AVR OPTION

TEE: Measure VALVE SIZE
ABDOM CTA: ACCESS
CARDIAC CT IF POSSIBLE

PALLIATIVE CARE

NO ACCESS
CARDIAC CATH
Sep 2011
LAD: 99% stenosis
POST STENT
Xience 2.25 x 15 mm
HEMODYNAMICS

Echo-Doppler has become the gold standard in functional evaluation of Valvular heart disease
GRADIENT IN CATH LAB.

LV

AO
$V_{\text{max}} = 5.06 \text{ m/sec}$

Maximal Instantaneous Pressure Gradient:
100 mmHg

$4 \times V_{\text{max}}^2 = 102 \text{ mmHg}$

Peak-to-Peak Pressure Gradient:
70 mmHg
Tele NURSE: “Uh? Max Gradient was 100 mm Hg”

CCL NURSE: “Peak-to-Peak Gradient 70 mmHg”

Mean Gradient: 65 mmHg

Mean Gradient: 65 mmHg
Mean Gradient

Area (red) or TVI (Doppler)

Ejection Period

Mean Gradient: 65 mmHg

CATH LAB

ECHO LAB

Hakki formula

\[ AVA = \frac{CO}{\sqrt{\text{mean grad}}} \]
Langston Dual Lumen Tip Configurations

- Straight Selective with radiopaque marker band* 7.9cm
- Multipurpose A2 with bumper tip 7.9cm
- 145° Pigtail 7.9cm (6F) 8.9cm (7F)
- Angled 10.8cm

*Marker band location 1cm distal to outer lumen sideholes
Crossing the Aortic Valve: Is it safe?

Risk of Cerebral Embolism With Retrograde Catheterization in AS

N = 152 consecutive AS patients randomized to cath with (n=101) or without (n=51) crossing the aortic valve assessed by cranial MRI 48 hours before and after crossing the aortic valve:

- Clinically Silent: 22%
- Acute Clinical Event: 3%
Cardiac catheterization for hemodynamic measurements is **not** recommended for the assessment of severity of AS before AVR **when noninvasive tests are adequate and concordant with clinical findings.** (Level of Evidence: C)

Mr. G. WAS SYMPTOMATIC AND UNDERWENT A BALLOON VALVULOPLASTY AS A BRIDGE THERAPY FOR TAVR (ABOUT TO BE APPROVED)
Tyshak Balloon 22 mm x 6 mm
BEFORE
AVA : 0.6

AFTER
AVA : 0.9
## AS SEVERITY

<table>
<thead>
<tr>
<th></th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doppler Velocity</td>
<td>&lt; 3.0 m/sec</td>
<td>3.0-4.0 m/sec</td>
<td>&gt; 4.0 m/sec</td>
</tr>
<tr>
<td>Mean Gradient</td>
<td>&lt; 25 mmHg</td>
<td>25-40 mmHg</td>
<td>&gt; 40 mmHg</td>
</tr>
<tr>
<td>AVA</td>
<td>1.5 cm²</td>
<td>1-1.5 cm²</td>
<td>&lt; 1.0 cm²</td>
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</tbody>
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### Diagram

- **Normal**
- **Aortic sclerosis**
- **Mild-to-moderate aortic stenosis**
- **Severe aortic stenosis**

### Doppler Aortic-Jet Velocity

- **Normal**
- **Aortic sclerosis** < 2.5 m/sec
- **Mild-to-moderate aortic stenosis** 2.5–4.0 m/sec
- **Severe aortic stenosis** > 4 m/sec
Survival in Severe Aortic Stenosis

TAKE HOME MESSAGE:

WHEN TO OPERATE PATIENTS WITH Aortic Stenosis?

When patient develops symptoms!
COMMENTS:

1. IS PATIENT TRULY ASYMPTOMATIC?
   ROLE STRESS TESTING

2. LOW GRADIENT BUT SEVERE STENOSIS:

   LOW FLOW THROUGH THE VALVE

   LV SYSTOLIC DYSF. (LOW EF)  SMALL LV CAVITY (NORMAL OR HIGH EF)
Edwards-SAPIEN THV

- Stainless Steel Frame
- Bovine T-Leaflet
- Thermafix Treatment
- 23mm & 26mm valves
- 22F & 24F Delivery Systems

Approved by FDA in October 2011
Animation

EDWARDS SAPIEN VALVE
WHAT ARE WE TRYING TO MEASURE?
WHAT TECHNIQUE: TTE? TEE? CTA?

Sinotubular junction
Aortic leaflets
Aortic Annulus

Aortic Annular Diameter

Leipsic et al JACC Img April 2011
CHOOSING A VALVE SIZE:
ANNULAR MEASUREMENT

18-22 mm annulus → 23 mm THV
21-25 mm annulus → 26 mm THV
SHEATH DIMENSIONS

22F RetroFlex 3 Sheath
For 23 mm SAPIEN valve

- 8.4 mm
- Requires minimum vessel diameter ≥ 7 mm
- 35 cm

24F RetroFlex 3 Sheath
For 26 mm SAPIEN valve

- 9.2 mm
- Requires minimum vessel diameter ≥ 8 mm
- 35 cm
Annulus 2.0 mm

Smaller 23 mm valve

Need at least a 7 mm iliac artery
Direct intra-arterial contrast injection 10 cc of iodixanol mixed with 25 cc of saline injected at 4 cc/sec

Common iliac

NORMAL APPROACH

VASC SURGEON

“Retroperitonal access for Mr. G”
Procedure done by a TEAM
INTENDED POSITION

50-60% Ventricular
Post op course:

Cardiac wise did very well

Slow recovery of bowel function due to ileus

Currently doing very well.
Percutaneous Transcatheter Implantation of an Aortic Valve Prosthesis for Calcific Aortic Stenosis

First Human Case Description

Alain Cribier, MD; Helene Eltchaninoff, MD; Assaf Bash, PhD; Nicolas Borenstein, MD; Christophe Tron, MD; Fabrice Bauer, MD; Genevieve Derumeaux, MD; Frederic Anselme, MD; François Laborde, MD; Martin B. Leon, MD

AHA; Nov, 2002

April 16, 2002
AORTIC STENT VALVE IMPLANTED

Coronary ostium
Original leaflet
Stent struts
Stent-valve leaflets
TRANSCATHETER AORTIC VALVE REPLACEMENT (TAVR)

THE FUTURE IS HERE!

TAVR is the MOST EXCITING new procedure in Interventional Cardiology!!!
Transcatheter AVR
Femoral and Trans-apical Access
CANDIDATE FOR AORTIC VALVE REPLACEMENT

OCT 2012

SURGICAL CANDIDATE

STANDARD AVR

HIGH RISK

TRANSCATHETER AVR

NOT SURGICAL CANDIDATE

TRANSFEMORAL

TEE: Measure VALVE SIZE
ABDOM CTA: ACCESS
CARDIAC CT IF POSSIBLE

APICAL APPROACH OTHER

MEMORIAL VALVE CLINIC
NOV 2012 Protocol
NEXT....EDWARDS SAPIEN XT THV

Cobalt Frame & New Leaflet Geometry

Tissue Attachment

Sapien XT
Sapien XT + NovaFlex Delivery System

18 Fr profile!
CoreValve Self-Expanding Aortic Bioprosthesis

• **HIGHER PART:** low radial force area axes the system and increases quality of anchoring

• **MIDDLE PART:** functional valve area with three leaflets and constrained to avoid coronaries (convexo-concave) – avoids need for rotational positioning

• **LOWER PART:** high radial force of the frame pushes aside the native calcified leaflets for secure anchoring and avoids recoil and para-valvular leaks

A porcine pericardial tissue valve fixed to the frame with PTFE sutures
NEW TAVI TECHNOLOGIES

- Direct Flow
- Sadra
- AorTx
- Jena Valve
- HLT
- ABPS PercValve
- EndoTech
- Ventor Embracer
- Symetis
- others.............
THANK YOU!

QUESTIONS?