No disclosures
Aortic Stenosis - Management Challenges

1. True or a mistaken diagnosis?
2. The asymptomatic patient with severe AS
3. Low flow-low gradient aortic stenosis
4. Indications for TAVR
CASE #1

- 72 year white male with a cardiac murmur
- Recent onset of dyspnea
- Suspected severe valvular aortic stenosis
- Referred for AV surgery
- Echocardiogram was repeated
Hypertrophic Obstructive Cardiomyopathy

TREATMENT:

- No AVR
- Beta blockers
- Calcium channel blockers
- Avoid Hypovolemia
- Surgical Myectomy or Percuneous Alcohol
- Septal Ablation
Aortic Stenosis - Management Challenges

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The natural history of aortic stenosis, emphasizing a long presymptomatic period and the dismal outcome once symptoms begin.
Indications for AVR surgery

Symptomatic Patient with severe AS

Class 1 Indication

...if it is likely that the symptoms are cardiac in origin
Case #2

- A 52 year white male with known aortic stenosis asymptomatic
Adult Echo
D2cwc
24.0 cm

CW
2.0 MHz
Gn 56
12.0 cm
Fitr 400Hz
75 mm/s

AV VTI 86.0 cm
AV Vmax 368 cm/s
AV Max PG 54.1 mmHg
AV Vmean 303 cm/s
AV Mean PG 38.8 mmHg
AV Vmax 368 cm/s
AV Max PG 54.1 mmHg
AV VTI 89.6 cm
AV Vmax 364 cm/s
AV Max PG 53.1 mmHg
AV Vmean 293 cm/s
AV Mean PG 36.4 mmHg
AV Vmax 364 cm/s
AV Max PG 53.1 mmHg
AVA (VTI) 1.47 cm²
AVA (Vmax) 1.36 cm²
The Asymptomatic Patient with Severe AS

What are we waiting for?
Case #2

- Presented with Sudden Cardiac Death (Unity Hospital)
- Successfully resuscitated
- Coronary angiography; Normal coronaries
- EPS; Negative
- Underwent AVR surgery
Kaplan-Meier life-table analysis showing survival without valve replacement for 123 subjects with initially asymptomatic valvular aortic stenosis.
Aortic jet velocity (top) and aortic valve area (bottom) in subjects who developed symptoms requiring aortic valve replacement or died (AVR/Died) are compared with those who remained asymptomatic for the baseline and final studies (P<.001 for asymptomatic vs those with an end

Cox regression analysis showing event-free survival in groups defined by aortic jet velocity at entry (P<.0001 by log-rank test).

Asymptomatic Aortic Stenosis
Indications for AVR

ACC/AHA

Very severe AS (Vmax >/= 5 m/s) **Class 2a**
Rapid progression (low surgical risk) **Class 2b**

ESC

Very severe AS (Vmax >5 m/s) **Class 2a**

Very severe calcification with rapid progression .(0.3 m/s per year) **Class 2a**

Markedly elevated BNP and exercise induced rise in gradient >20 mmHg **Class 2b**

Excessive LVH **Class 2b**
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Case#3

- An 83 old male with asymptomatic severe aortic stenosis
- Routine follow up 6 months ago
- Echocardiogram was repeated
Low flow, Low Gradient Aortic Stenosis

◆ The symptomatic patient with LV dysfunction and low gradient stenosis.

◆ The symptomatic patient with normal LV function and paradoxical low flow, low gradient stenosis.
Paradoxical Low Flow Low Gradient AS (PLFLG)

- A recently described entity
- Pronounced LV concentric remodeling
- Small LV cavity size
- Restrictive physiology leading to impaired LV filling
- Altered myocardial function
- Worse prognosis
- Proper diagnosis often require other diagnostic tests
Low Flow, Low Gradient AS with Normal and Depressed LV Function

(Pibarot and Dumesnil, Quebec City
JACC 2012; 60; 1850)

- Underestimation of transaortic flow by Doppler echocardiography,
- Inconsistency of grading criteria,
- A small body size must be carefully excluded.
- MRI and Cardiac Catheterization
Low Gradient Aortic Stenosis Management Algorithm

Symptomatic Low Output, Low Gradient Severe Aortic Stenosis
AVA < 1 cm²
Mean gradient < 40 mmHg
SVI ≤ 35 ml/m²

Exclude Measurement Error

EF ≥ 50%

Yes

No

Paradoxical Low Flow Low Gradient Severe AS

Untreated Hypertension Present?

No

Yes

Aortic Valve Replacement

Medical Management

Classical Low Flow Low Gradient Severe AS

DSE or Hemodynamic Catheterization

“Pseudosevere” Aortic Stenosis: SVI increase ≥ 20%
Minimal change in gradient
Increase in valve area

Yes

No

Flow Reserve Present?
SVI increase ≥ 20%

Yes

No

* In cases where aortic stenosis severity remains unclear after these steps are taken, consider CT aortic valve calcium scoring and/or hemodynamic cardiac catheterization

Aortic Valve Replacement

Consider High Risk Aortic Valve Replacement
Survival in Low flow, Low gradient AS with preserved LV function.

Circulation, Ozkan 2013; 128

Adjusted all-cause mortality (%) vs. follow-up (months)

- High-Gradient Aortic Stenosis
- Low-Gradient/Normal-Flow Aortic Stenosis
- Moderate Aortic Stenosis
- Low-Gradient/Low-Flow Aortic Stenosis

High-Gradient vs. Moderate Aortic Stenosis p = 0.032
Low-Gradient/Low-Flow vs. Moderate Aortic Stenosis p = ns

Low Flow, Low Gradient Aortic Stenosis
Indications for surgery

ACC and AHA
Normal LV Function and Severe AS
If clinical, hemodynamic anatomic date support severe AS – Class 2a

ECA
Normal LV function, Only after careful confirmation of severe AS Class 2a
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Figure 1: The Edwards Sapien (A), Sapien XT (B) and Medtronic CoreValve (C)
Indications for TAVR vs Surgical AVR

ACC/AHA

Evaluation by a surgical team Class 1
Surgical AVR for patients with low to intermediate risk Class 1
TAVR for patients with prohibitive surgical risk and life expectancy >12 months Class 1

ESC

TAVR alternative for surgical high risk. Class 2a
Balloon valvotomy as a bridge to TAVR or surgical AVR Class 2b
Clinical outcomes at 1 year following TAVR

JAMA 2015 313,1019

David Holmes Mayo Clinic

Cumulative Incidence Rate, %

Months Since Index Procedure

No. at risk
Stroke 12182 9508 7585 6063 4681
Heart failure 12182 9051 7007 5510 4220
Cumulative Incidence of Outcomes Over Time

AVRI indicates aortic valve reintervention. A, Composite is the combination of mortality and stroke outcomes. B, Composite is the combination of stroke, heart failure, and AVRI outcomes. C, Composite is the combination of mortality, stroke, heart failure, and AVRI outcomes.
TAVR for severe AS
Balancing Benefits, Risks and Expectations.

- TAVR represents a transformative technology with enormous potential
- Clinical efficacy and safety must temper with consumer expectations.
- Surgical AVR represents proven standard with safety, efficacy and durability for majority of patients
- Broad application of TAVR presents challenges in patient selection, cost effectiveness and need for dedicated heart valve centers.
Challenges in management of aortic stenosis; Have the Guidelines Filled the Gap?

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary

- Aortic stenosis is increasing in prevalence
- Clinical, echo and hemodynamic assessments are essential
- Improving outcomes of TAVR and AVR

Outcome data discussions with patients undergoing TAVR.
Thank You
Medicine of the Highest Order