



## 78 Year Old Woman with Aortic Stenosis

Case Presentation



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## Disclosures

Relevant Financial Relationship(s)

None

Off Label Usage

None

## Grading Severity of Aortic Stenosis

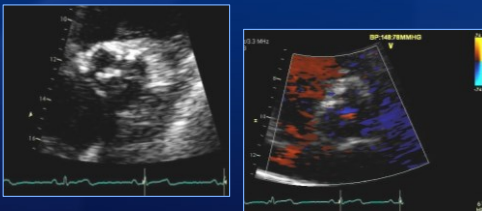
	Valve Area cm <sup>2</sup>	Mean Gradient mmHg	Velocity m/sec
<b>Mild</b>	>1.5	<25	<3.0
<b>Moderate</b>	1.0-1.5	25-40	3.0-4.0
<b>Severe</b>	<1.0	>40	>4.0

ACC/AHA Guidelines; Bonow RO; Circ 114; 2006

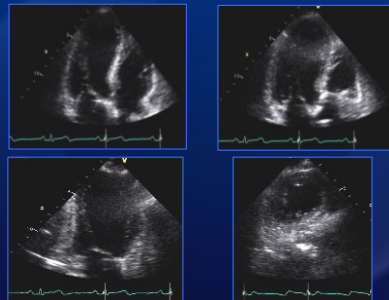
## 78 Year Old Woman

- Scheduled for left hip arthroplasty revision
- Prior revision arthroplasty unsuccessful
- Harsh 3/6 murmur on pre anesthesia exam
- Walks with crutches
- No cardiac symptoms

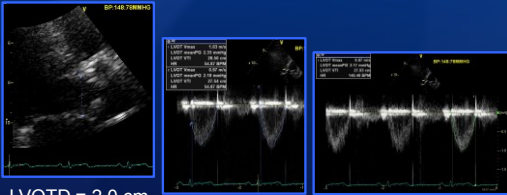
## 78 Year Old Woman with Aortic Stenosis



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Stroke Volume = 89 cc

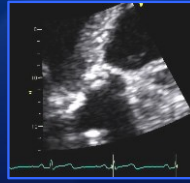


LVOTD = 2.0 cm

Avg LVOT TVI = 28 cm

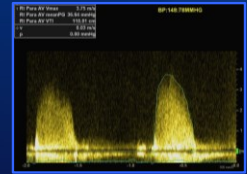


AVA = 0.81 cm<sup>2</sup> MG = 37 mmHg



SV = 89 cc  
SVI = 55 cc/m<sup>2</sup>

Right Para



AV V = 3.8 m/sec  
AV MG = 37 mmHg  
TVI = 110 cm



How Severe is Her Aortic Stenosis?

1. Mild
2. Moderate
3. Severe
4. Very severe

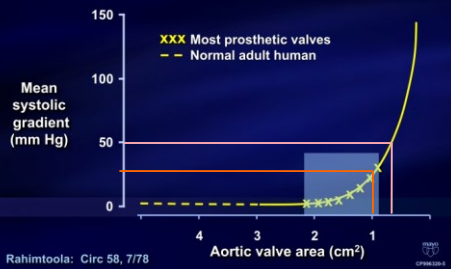


I. Classification of Aortic Stenosis with valve area  $\leq 1.0$  cm<sup>2</sup> and stroke volume index  $\geq 35$  cc/m<sup>2</sup> (Normal Flow)

Classification	Velocity	Mean Gradient mmHg	LVEF %
Severe	$\geq 4.0$ and $< 5.0$	$\geq 40$ and $< 60$	$\geq 50$ or $< 50\%$
Very Severe	$\geq 5.0$	$\geq 60$	$\geq 50$ or $< 50\%$
Moderate	$< 4.0$	$< 40$	$\geq 50$



Aortic Mean Gradient vs Valve Area



78 Year Old Woman

- Underwent revision of left total hip arthroplasty
- Uncomplicated operative and postoperative course



## Example

AVA 0.8 cm<sup>2</sup>; MG = 37 mmHg

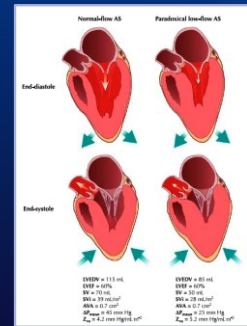
Possible Explanations for Low Output

- Decreased LVEF
- Severe MR, severe TR
- Small LV cavity
- Decreased LV longitudinal systolic strain
- Increased valvulo-arterial impedance



## Paradoxical Low Flow Low Gradient AS

- Small LV
- Normal LVEF
- Small LV SV
- Low AS gradient despite small AVA



Pibarot P and Dumesnil J  
Curr Cardiol Rep 12; 2010



## Valvulo-Arterial Impedance (Z<sub>VA</sub>)

Valvular and arterial factors that oppose ventricular ejection by absorption of mechanical energy developed by the left ventricle

Pibarot P; Circulation 115; June 2007



## Valvulo-Arterial Impedance (Z<sub>VA</sub>)

$$Z_{VA} = \frac{SAP + MG}{SVI}$$

- SAP = Systolic arterial pressure
- MG = AV mean gradient
- SVI = Stroke volume index
- Z<sub>VA</sub> units = mmHg / mL · m<sup>-2</sup>

Pibarot P; Circulation 115; June 2007



### I. Classification of Aortic Stenosis with valve area ≤ 1.0 cm<sup>2</sup> and stroke volume index ≥ 35 cc/m<sup>2</sup> (Normal Flow)

Classification	Velocity m/sec	Mean Gradient mmHg	LVEF %
Severe	≥ 4.0 and < 5.0	≥ 40 and < 60	≥ 50 or < 50%
Very Severe	≥ 5.0	≥ 60	≥ 50 or < 50%
Moderate	< 4.0	< 40	≥ 50



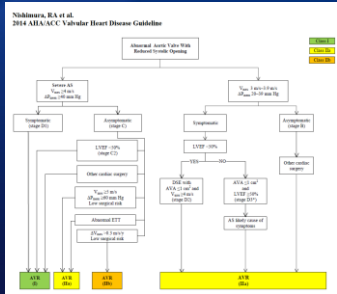
### II. Classification of Aortic Stenosis with Valve Area ≤ 1.0 cm<sup>2</sup> and Stroke Volume Index < 35 cc/m<sup>2</sup> (Low Flow)

Classification	Velocity At rest m/sec	Mean Gradient At Rest mmHg	LVEF %	SVI with DSE cc/m <sup>2</sup>	Velocity with DSE m/sec	Mean Gradient with DSE mmHg	AVA with DSE cm <sup>2</sup> /m <sup>2</sup>
Severe	< 4.0	< 40	< 50	Increase ≥ 20%	≥ 4.0	≥ 40	≤ 1.0
Pseudosevere	< 4.0	< 40	< 50	Increase ≥ 20%	< 4.0	< 40	> 1.0
Cannot Classify	< 4.0	< 40	< 50	Increase < 20%	< 4.0	< 40	≤ 1.0
Moderate	< 3.0	< 30	≥ 50	-----	-----	-----	-----
Probably Severe*	≥ 3.0 and < 4.0	≥ 20 and < 40	≥ 50	-----	-----	-----	-----

\* Check for explanation for low flow, such as small LV cavity, severe MR or TR, cardiac constriction and significantly decreased LV GLPSS



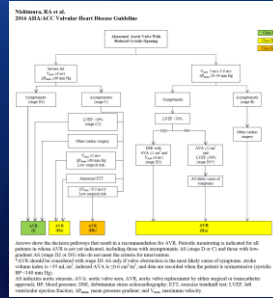
# ACC/AHA Valve Guidelines 2014



Nishimura, R; Circulation; March 3, 2014



# ACC/AHA Valve Guidelines 2014



Nishimura, R; Circulation; March 3, 2014



# Mayo Clinic Locations

