Aortic stenosis in octogenarians and comorbidities

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Decision to operate according to age range

- **75-80 years**: 73% not to operate, 27% to operate
- **80-85 years**: 64% not to operate, 36% to operate
- **85-90 years**: 55% not to operate, 45% to operate
- **>90 years**: 0% not to operate, 100% to operate

European Heart Journal (2005) 26, 2714–2720
Intervention for severe AS in octagenerians
-The Concept-
Fitness & Health

Fit & Healthy
Frailty Score: 0 - 1
No Major organ compromise

with comorbidities
Frailty Score: ≥ 2
Major organ compromise
Procedure at risk
Risk assessment for Intervention

- Frailty
- Comorbidity
- Procedure at risk
Comorbidities in the Elderly

<table>
<thead>
<tr>
<th>Condition</th>
<th>Severe AS patients</th>
<th>People without Severe AS who are 65+ years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischaemic heart disease</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>30%</td>
<td>10%</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>20%</td>
<td>5%</td>
</tr>
<tr>
<td>Gout</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Stroke</td>
<td>15%</td>
<td>5%</td>
</tr>
<tr>
<td>Heart failure</td>
<td>10%</td>
<td>3%</td>
</tr>
<tr>
<td>Mood or anxiety disorder</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>Dementia</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Any cancer</td>
<td>5%</td>
<td>2%</td>
</tr>
</tbody>
</table>
Charlson Comorbidity Scoring System

One Point
MI, HF, PVD, Dementia, CORD, Peptic ulcer, Mild liver disease, DM

Two Points
Hemiplegia, Moderate or severe renal disease, DM with end-organ damage, Tumor without metastasis, Leukemia, Lymphoma

Three Points
Moderate or severe liver disease

Six Points
Metastatic solid tumor
AIDS (not just HIV positive)
Comorbidity & severe AS in octogenarians
PEGASO Registry

Comorbidity & severe AS in Nonagenarians
Frailty

- Aging-associated
- Decline in reserve and function across multiple physiologic systems
Frailty Score

- Independence in feeding, bathing, dressing, transferring, toileting, urinary continence
- Measurements of gait speed, grip strength, and muscle mass
Frailty Score

No frailty
Able to perform all activities of daily living and perform a 5-meter walk in <6 seconds

Mild degree of frailty
Unable to perform 1 activity of daily living

Moderate-to-severe degree of frailty
Unable to perform ≥2 activities of daily living.
Frailty score > 5
Frailty score ≤ 5
Log rank p = 0.01

No. at risk
Score > 5 76
Score ≤ 5 83

Days
0 150 300
Survival Probability
1.0 0.8 0.6 0.4
Frail (Score > 5), n=76
Not frail (score ≤ 5), n=83

Rate

30-day mortality  In-hospital life threatening bleeding  In-hospital life threatening or major bleed  In-hospital major vascular complications  In-hospital acute kidney injury  In-hospital stroke  1-year mortality

P=0.9  P=0.4  P=0.2  P=0.5  P=0.9  P=0.01

4  4  5  26  3  3  3  0  1  17  7

Risk scale for non-frail and frail patients
Procedures at risk:

- Chest radiation
- Chest deformity
- Porcelain Aorta
- LIMA adherent to chest
Severe AS
Octogenarians with comorbidities
Risk Stratification
Step 1

Intervention (AVR & TAVR) is futile in:

1) a life expectancy of <1 year, even with a successful procedure

2) chance of “survival with benefit”. In symptoms

Frailty

Comorbidities

In quality of life
Survival with benefit:

- Improvement by at least 1 New York Heart Association (NYHA) class in heart failure (HF)
- Improvement in angina symptoms
- Improvement in quality of life
- Improvement in life expectancy.
## Risk Stratification Step 2

<table>
<thead>
<tr>
<th>Category</th>
<th>Low Risk (All Criteria)</th>
<th>Intermediate Risk (Any 1 Cr.)</th>
<th>High Risk (Any 1 Cr.)</th>
<th>Prohibitive Risk (Any 1 Criterion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STS PROM</td>
<td>&lt; 4 % AND</td>
<td>4-8 % OR</td>
<td>&gt; 8 % OR</td>
<td>Predicted risk with surgery of death &gt; 50 % at 1 year</td>
</tr>
<tr>
<td>Frailty</td>
<td>None AND</td>
<td>1 Index(mild) OR</td>
<td>≥ 2 Indicies</td>
<td></td>
</tr>
<tr>
<td>Major organ compromise</td>
<td>None AND</td>
<td>1 Organ OR</td>
<td>2 Organs OR</td>
<td></td>
</tr>
<tr>
<td>Procedure-specific impediment</td>
<td>None</td>
<td>Possible</td>
<td>Possible</td>
<td>Severe Procedure-specific impediment</td>
</tr>
<tr>
<td>Type of Procedure</td>
<td>Surgery</td>
<td>Surgery or TAVI</td>
<td>Surgery or TAVI</td>
<td>TAVI</td>
</tr>
</tbody>
</table>
Preoperative Assessment of Comorbidities
Non Cardiac Comorbidities

- Hypertension: 82.9%, 199 pts
- Dyslipidemia: 60%, 144 pts
- COPD: 25.4%, 61 pts
- Diabetes: 30%, 72 pts
- Anemia: 48.75%, 117 pts
- Carbovasc. Disease: 30.8%, 73 pts
- Peripheral Art. Dis.: 11.6%, 28 pts
- Cancer: 26.6%, 64 pts
Prognosis in AS patients with Moderate to Severe CKD

Management & Outcomes in severe AS patients with Cancer

![Graph showing probability of overall survival with AVR and Medical therapy over follow-up months.]

<table>
<thead>
<tr>
<th>Number at risk</th>
<th>0</th>
<th>12</th>
<th>24</th>
<th>36</th>
<th>48</th>
<th>60</th>
<th>72</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVR</td>
<td>13</td>
<td>13</td>
<td>10</td>
<td>8</td>
<td>7</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Medical Therapy</td>
<td>35</td>
<td>19</td>
<td>12</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Prognosis of anemic pts undergoing TAVI

Eurointervention 2011; 7: 184
Cardiac Comorbidities

- Coronary diseases: 105 pts, 43.7%
- LVMI > 125 g/m²: 224 pts, 93%
- Left ventricular dysfunction: 69 pts, 28.7%
- Mitral regurgitation: 161 pts, 67%
- Aortic regurgitation: 78 pts, 32.5%
- Mitral stenosis: 41 pts, 17%
- Porcelain aorta: 35 pts, 8%
- Ascending aorta dilatation: 85 pts, 35.4%
- Atrial fibrillation: 30 pts, 12.5%
- LBB: 44 pts, 18.3%
Revascularisation & TAVI

Wenaweser P et al. Eurointervention 2011;7:541
Revascularization & TAVI

Not all patients with significant CAD require revascularization before TAVR

Revascularization for patients with a large area of myocardium at risk

- Proximal stenoses in large epicardial arteries
- Fractional flow reserve-guided PCI or multi-vessel CAD
Pulmonary hypertension & Severe AS
Effect of AVR for AS on Severity of MR

Eynden et Al. Ann Thor Surgery 2007; 83: 1279-1284
Functional MR

TAVI

Organic MR

Double Valve Intervention (Sutureless AV)
Combined AS & MR : TAVI & MitralClip
Causes of Death among Octogenarians with severe AS

LOW-LVEF
"CLASSICAL"
LOW-FLOW
LOW-GRADIENT
5-10%
Low-Flow, Low-Gradient Severe(?) AS

True-Severe AS

AVAc

ΔP

Gradient = $\frac{Q^2}{K \times AVA^2}$

Pseudo-Severe AS
Low-Flow, Low-Gradient Severe(?) AS

Dobutamine-Stress Echo

↑ SV ≥ 20%

Contractile (Flow) Reserve

ΔP≥40
AVA<1.0

True-Severe AS
SAVR ± CABG
TAVR ± PCI

ΔP<40
AVA ≥1.0

Pseudo-Severe AS
HF Therapy

↑ SV < 20%

No Contractile (Flow) Reserve

AS Severity: Indeterminate

MSCT: AoV Ca Score >1200

No

>2000
Yes

True-Severe AS
SAVR (High Op. Risk)
TAVR?
Calculation of the Projected AVA

AVA_projected = 0.70 + 0.0021 \times (250 - 130) = 0.96 \text{ cm}^2

Simplified method:
VC = 0.15 / 70 = 0.0021

Blais et al, Circulation 2006;113:711-721
Clavel et al. JASE; 23:380-6, 2010
92 years old patient

Symptoms: Shortness of breath

Medical history: Known benign AS AF, RBBB
True Severe or Pseudo-Severe AS?
V_{\text{max}}: 2 \text{ /m/sec} \rightarrow 3 \text{ m/sec}

AVA: 0.9 \text{ cm}^2 \rightarrow 0.9 \text{ cm}^2

SV: 40 \text{ ml} \rightarrow 60 \text{ ml}

(16\% \text{ αύξηση})?
New Dob Stress
(Referral Center for TAVI)

Study for flow reserve: dobutamine dose up to 20 μg/kgr/min

Results

Without flow reserve: Increase of SV < 20 %
DECISION FOR BALLOON AORTIC VALVULOPLASTY
After Valvuloplasty

- Remarquable improvement of symptoms (NYHA I)
- Decrease of diuretic dose
Vmax : 2 /m/sec → 3 m/sec
AVA: 0.9 cm² → 0.9 cm²

SV: 40 ml → 60 ml
(16% αύξηση)

AVA projected = 0.8 cm²

Stress Echocardiography
Comorbidities in the elderly with severe AS are basic components in risk stratification. Clinical evaluation and sophisticated echo techniques allow to find the role of these comorbidities in decision making.