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Editorial Open Access

Indications for Surgical Aortic Valve Replacement

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The average survival rate was 3 years after the onset of angina pectoris in patients with severe Aortic Stenosis (AS) [1]. The average survival rate after the onset of syncope in patients with severe AS was 3 years [1]. The average survival rate after the onset of heart failure in patients with severe AS was 1.5 to 2 years [1]. Patients with symptomatic severe valvular AS have a poor prognosis [1-4]. At the National Institutes of Health, 52% of patients with symptomatic severe valvular AS not operated on were dead at 5 years [1]. At 10-year follow-up, 90% of these patients were dead.

At 4-year follow-up of patients aged 75 to 86 years in the Helsinki Aging Study, the incidence of cardiovascular mortality was 62% in patients with severe AS [2]. At 4-year follow-up, the incidence of total mortality was 76% in patients with severe AS [2].

In a prospective study, at 19-month follow-up (range 2 to 36 months), 90% of 30 patients with heart failure associated with unoperated severe AS and a normal left ventricular ejection fraction were dead [3]. At 13-month follow-up (range 2 to 24 months), 100% of 18 patients with heart failure associated with unoperated severe AS and an abnormal left ventricular ejection fraction were dead [3]. In a prospective study, at 20-month follow-up of 40 elderly patients with severe AS, heart failure, syncope, or angina pectoris was present in 36 of 37 patients (97%) who developed new coronary events and in none of 3 patients (0%) without new coronary events [4].

Surgical Aortic Valve Replacement (AVR) is the procedure of choice for symptomatic patients with severe AS (an aortic valve area less than 1.0 cm^2) with a Class I indication [5]. Other Class I indications for AVR in patients with severe AS include 2) patients undergoing coronary artery bypass graft surgery, 3) patients undergoing surgery on the aorta or other heart valves, and 4) patients with a left ventricular ejection fraction less than 50% [5]. Patients with moderate AS undergoing coronary artery bypass graft surgery or surgery on the aorta or other heart valves have a Class IIa indication for AVR [5].

Although the American College of Cardiology/American Heart Association guidelines does not recommend AVR in patients with asymptomatic severe AS and normal left ventricular ejection fraction, there are data suggesting otherwise [6-10]. Pai et al. [6] found in their database that 99 of 338 patients (29%) mean age 71 years, with asymptomatic severe AS had AVR during 3.5-year follow-up. Survival at 1, 2, and 5 years was 67%, 56%, and 38%, respectively for nonoperated patients and 94%, 93%, and 90%, respectively for those who had AVR. In the unoperated group, beta blocker use significantly reduced mortality by 48%, and statin use significantly reduced mortality by 48% [6].

Severe asymptomatic AS was present in 622 patients, mean age 72 years, at the Mayo Clinic [7]. Of the 622 patients, 166 (27%) developed symptoms and had AVR. Another 97 patients (16%) had AVR in the absence of symptoms. At 3-year follow-up, 52% of the 622 patients had had symptoms develop, underwent AVR, or died. The most important risk factor for 10-year mortality was absence of AVR (hazard ratio = 3.53, $p<0.001$) [7].

Of 197 consecutive patients with asymptomatic severe AS, early AVR was performed in 102 patients (52%) [8]. The estimated actuarial 6-year all-cause mortality rates were 2% for AVR and 32% for the conventional treatment group ($p<0.001$) [8]. Despite being asymptomatic, patients with very severe AS have a poor prognosis [9]. Early elective AVR should be considered in these patients [9].

Of 73 patients with severe AS who did not undergo AVR, 15 (14%) died at 15-month follow-up [10]. Of these 73 patients, symptoms were thought to be unrelated to the AS in 31 patients. Exercise stress tests for symptoms were performed in only 4% of the 42 asymptomatic patients [10].

Of 248 patients with severe AS and a normal left ventricular ejection fraction, 94 had a low-gradient (<30 mm Hg mean gradient) (group 1), 87 had a moderate gradient (30-40 mmHg mean gradient) (group 2), and 67 had a severe gradient (>40 mmHg mean gradient) (group 3) [11]. Symptoms were present in 49% of group 1 patients, in 55% of group 2 patients, and in 60% of group 3 patients (p not significant). At 45-60- month follow-up, the incidence of AVR or death was 71% for group 1, 77% for group 2, and 76% for group 3 (p not significant). Kaplan-Meier survival curves for time to death in all 3 groups were significantly better for patients with AVR versus no AVR [11]. $E/E^{1}_{lateral}$ was an independent predictor of time to death in patients who did not receive AVR [12].

The European Society of Cardiology/European Association for Cardio-Thoracic Surgery 2012 guidelines state that Class I indications for AVR include 1) symptomatic severe AS, 2) asymptomatic patients with severe AS undergoing coronary artery bypass graft surgery , surgery of the ascending aorta, or surgery of another valve, 3) asymptomatic severe AS with a left ventricular ejection fraction less than 50%, and 4) asymptomatic severe AS with an abnormal exercise test showing symptoms on exercise clearly related to AS [13]. Class IIa indications for AVR include 1) high-risk patients with severe symptomatic AS suitable for transapical aortic valve replacement but in whom AVR is favored by a heart team based on the risk profile and anatomic suitability , 2) asymptomatic severe AS and an abnormal exercise test showing a fall in blood pressure below the baseline, 3) moderate AS in patients undergoing coronary artery bypass graft surgery , surgery of the ascending aorta, or surgery of another valve, 4) symptomatic patients with severe AS, a normal left ventricular ejection fraction , and a low gradient (less than 40 mmHg), 5) symptomatic patients with severe AS, a reduced left ventricular ejection fraction , a low gradient , and evidence of flow reserve, and 6) asymptomatic severe AS with none of the above if the surgical risk is low, and the peak transvalvular

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velocity is greater than 5.5 m/s (very severe AS) or there is severe aortic valve calcification and a rate of peak transvalvular velocity progression ≥ 0.3 m/s per year [13]. Transapical aortic valve replacement should be considered in patients with severe symptomatic AS who are considered unsuitable for surgical AVR because of severe comorbidities [13].

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