



Will mechanical valves become limited for treating severe aortic stenosis patients with prior lifelong indication for anticoagulation?

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The results of this systematic review and meta-analysis, which has now been published in the *British Medical Journal (BMJ)*, provide important data on outcomes after bioprosthetic valve replacement in low to intermediate risk patients with symptomatic severe aortic stenosis (1). We briefly discuss the implications of these pooled data on the decision between do not intervene or surgical replacement using mechanical versus biological prosthesis.

This contemporary review is part of the *BMJ* 'Rapid Recommendations' series, developed to guide clinicians in the management of patients until the traditional guidelines are published, and, consequently, reducing the gap between studies' release and their incorporation into clinical practice (2-4). The multidisciplinary workforce, composed of biostatisticians, epidemiologists, content clinical experts and, interestingly, of patients who underwent aortic valve replacement, searched for all the available literature until 30 June, 2016, opportunely, after the publication of the results of the Placement of Aortic Transcatheter Valves (PARTNER) 2 trial (5); 93 observational studies, following a total of 53,884 patients for at least 2 years after surgery, were assessed to provide absolute risks on patients' age-specific survival, risk of stroke, atrial fibrillation and valvular structural deterioration, as well as length of hospital stay and postoperative pain.

What we found remarkable in this review was that bioprosthetic valve replacement, apparently, allows severe aortic stenosis patients to live almost as long as those

without the disease, particularly in the eldest group. Using life expectancy of general US population as a reference, years of life lost due to severe aortic stenosis after aortic valve replacement were 5 years in patients aged 65 or fewer years, but none in those older than 75 years, and in patients older than 85 years the surgery actually improved their life-expectancy. These findings might reflect the benefits of considerable innovations in progressively better and less invasive surgical techniques and extracorporeal circulatory systems. Even though the causes of death were not discriminated by patient's age at the time of treatment, valve degeneration could have a significant impact on the survival of younger patients (<65 years); the rate of valve deterioration (severe stenosis or regurgitation) increases rapidly after the first decade and particularly after 15 years, with a cumulative incidence of 48% at 20-year follow-up meaning that almost half of patients treated with a bioprosthesis at the age of 65 or less would manifest signs of valve degeneration.

In this regard, some caution should be paid to the marked decrease in the age at which aortic bioprostheses are currently being considered. Moreover, the option of a transcatheter valve-in-valve intervention, in the event of a degenerated surgical bioprosthesis, is increasingly being weighted by both surgeons and patients when choosing between mechanical or biological valve prosthesis, which might further increase the ratio of patients with a biological prosthesis, even if at the present moment there is lack of

data with regard to the results of such strategy (6).

The recent technological advances that we have witnessed in transcatheter aortic valve replacement, such as thinner strut frame, reduced profile delivery catheter, along with smaller and larger size options, have also been followed by modern bioprosthetic valves design which led to a better hemodynamic profile. The implantation of stentless or sutureless valves, or more frequent aortic root enlargement, would almost certainly have resulted in an improvement in valve areas when compared with the older stented bioprostheses. In this review, a subgroup analysis according to valve type could possibly have helped in discerning if the rate of structural deterioration has changed over time, and to which degree do the current bioprostheses differ from the previous ones in terms of their durability. However, the impact of their potential advantages in tissue degeneration prevention is limited to less than a decade of follow-up.

Another striking aspect in this review is the mean length of hospital stay of 13 days; it seems to be longer than it would be expectable for low to intermediate risk patients. Indeed, in the PARTNER 2 the median length of index hospitalization for surgical replacement was 9 days (versus 6 days with transcatheter aortic valve replacement) (5). As the authors stated, this may reflect an upward skewed distribution of the duration of hospitalization which would result in an overestimation of the mean.

All in all, when deciding between intervene or do not intervene, aortic valve replacement undoubtedly improves patients' survival to levels similar than that of general population without the disease, however making an informed choice tailored to each patient remains challenging. This review suggests that mechanical valve replacement is the best option for patients aged 65 or less years without absolute contraindications for oral anticoagulation, which is in accordance with the better survival and lower risk of cardiac reoperation reported in the Swedish Web-system for Enhancement and Development of Evidence-based care in Heart disease Evaluated According to Recommended Therapies (SWEDEHEART) registry (7).

Continuing efforts have been made by industry companies in order to develop the ideal valve prosthesis: a mechanical valve that does not require anticoagulant therapy or a bioprosthesis that does not degenerate. We look forward to starting first-in-human clinical trials with these new valves.

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