Sutureless technology for aortic valve replacement: Looking beyond crossclamp time

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We read with great interest the recent article by Forcillo and colleagues.¹ Aortic valve stenosis is emerging as the most common valve disease in Western countries because of a rapidly aging population.² To reduce operative morbidity and mortality and to expand the indication of treatment for high-risk patients, innovative technologies recently have emerged, such as sutureless prostheses. Sutureless valves have shown excellent clinical and hemodynamic outcomes, no structural valve deterioration, and high freedom from valve reoperation as late as 5 years.³⁻⁵

Sutureless technology maintains the advantage of removing the diseased valve and reduces the need for sutures after annular decalcification, reducing aortic cross-clamp and cardiopulmonary bypass (CPB) times. Ranucci and colleagues⁶ reported that the aortic crossclamp time is an independent predictor of severe cardiovascular morbidity, with an increased risk of 1.4% per 1-minute increase. Although there are many data supporting reduced surgical operative times with sutureless valves in patients undergoing aortic valve replacement (AVR), whether the use of this technology results in improved outcomes is still debated. In their work, Forcillo and colleagues,¹ comparing sutureless and stented valves in a population aged more than 80 years, did not find any difference between groups in terms of mortality and morbidities.

In our opinion, in cases of short duration of cardiac arrest ischemic time (<60 minutes), such as isolated AVR, benefits of a further reduction with sutureless valves implantation might not be evident when a good myocardial protection could be achieved. Conversely, in the presence of concomitant procedures with expected long CPB and crossclamp times, sutureless technology has the potential to reduce the complications and morbidity of long surgical times.^{7,8} Moreover, the use of sutureless prostheses may be recommended in high-risk procedures, such as patients with prior implantation of aortic homograft and stentless valves, in redo procedures, or in the presence of calcified root or porcelain aorta, when possible technical problems in myocardial protection may coexist.⁹⁻¹¹

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Central Message

Sutureless valves could represent the new gold standard for AVR and the first treatment choice in intermediate- to high-risk patients.

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Sutureless valves also may enhance minimally invasive AVR (MIAVR). The main limitation of MIAVR is represented by the longer CPB and crossclamp times compared with conventional surgery because of the reduced working space. The adoption of sutureless technology might remove the drawback of increased surgical times. In their work, Forcillo and colleagues¹ have found a significant increase of MIAVR with sutureless valves ($P = .034$), but a comparison with AVR through full sternotomy with stented bioprostheses was not performed. In a large series of 515 AVRs through a right minithoracotomy, we have found that sutureless valve implantation was associated with a shorter duration of mechanical ventilation (7 vs 6 hours, $P = .001$). Moreover, in elderly patients (aged >82 years) selected from the propensity-matched population, there was a significant survival benefit in the sutureless group (100% vs 50% $P = .02$), also selecting patients with a follow-up restricted to 40 months or less (78.6% vs 97%, $P = .002$).¹² Another field of interest for sutureless technology is represented by patients with small or critically small aortic annuli, in whom implantation of this new device allows maximization of the bioprosthetic diameter.¹³ In the largest series of sutureless valves, Shrestha and colleagues⁴ showed that in patients with a small aortic annulus, the postoperative transvalvular gradients were low and remained stable over time up to the 5-year follow-up. These

data have been confirmed by a recent prospective cohort study, in which these valves reduced the risk of patient–prosthesis mismatch after AVR.¹⁴

Concern exists about the increased risk of postoperative conduction disorders with the use of sutureless prostheses.^{15,16} Forcillo and colleagues¹ reported a rate of pacemaker implantation of 17%, which is higher than reported in the literature.^{4,17,18} Pacemaker implantation after AVR depends on several factors, such as variability among cardiologists for the indication, and so it is difficult to define the real incidence. However, a recent meta-analysis has shown that the pooled estimates of pacemaker implantation for sutureless prostheses were comparable to pooled estimates for conventional AVR.¹⁷ Vogt and colleagues,¹⁹ trying to identify the risk factors of postoperative conduction disorders in patients undergoing sutureless AVR, found preoperative right bundle branch block and surgeon's learning curve as independent predictors. By gaining familiarity with these new devices, we have found a lower incidence of pacemaker implantation that is comparable to conventional stented valves.^{10,12,18}

The excellent results reported in the literature and the increase in minimally invasive procedures associated with this new technology place sutureless prostheses as the potential new gold standard for AVR and the first treatment choice in intermediate- to high-risk patients, filling the gap between transcatheter aortic valve implantation and traditional AVR.

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