

Case Report

Sutureless Aortic Valve-A Case Series of Four Surgically Challenging Patients

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Abstract

High risk patients of aortic stenosis with multiple comorbidities who are not amenable for conventional aortic valve replacement surgeries have led to open new vistas like minimal access surgeries and Trans catheter aortic valve replacements. Recent technological developments have led to an alternative option which avoids the placement and tying of sutures, known as “sutureless” or rapid deployment aortic valves. We are presenting a case series of four patients who underwent successful sutureless aortic valve implantation which were high risk surgical patients and yet got benefitted with all the features of surgical AVR, like complete excision of the diseased valve and easier im-plantation technique with minimal access approaches in combined procedures with lesser CPB and across clamp timings. All of the patients had an uncomplicated procedure and did well in intra-op, peri-op and post-op phases and outcome was same as in conventional AVR patients.

Introduction

Aortic valve stenosis is the most frequent cardiac valve pathology in the western world, with a prevalence of 3% for individuals over the age of 75 years [1]. The incidence of aortic valve stenosis is growing, a reflection of the rapid ageing of the population [2]. The prosthetic aortic valve has come a long way since Hufnagel developed a ball valve prosthesis in 1951 and after more than 60 years, an ideal valve for all circumstances should have emerged. This is not the case. The surgeon chooses from a wide array of mechanical and tissue valves-choice usually based on patient-surgeon preferences, handling characteristics availability and cost. Yet in challenging patients-octogenarians, morbidly obese comorbid conditions and in combined procedures, there was little choice. The use of sutureless aortic valves through minimal access surgery has opened up new vistas in this particular field.

Case Series

We present here 4 patients operated over the period of 4 months, all surgically challenging.

First, was a 65 years old lady of foreign origin [Ht-161cms, Wt-122kgs] of BMI-47.16, BSA=2.34 suffering from severe

Aortic stenosis. Apart from being morbidly obese, she was also hypertensive and diabetic. She underwent Sutureless Aortic valve through Minimal access surgery via Hemi-sternotomy, CPB time=64 min, Cross Clamp time= 45 min and was discharged uneventfully on POD-5.

Second case was a 79-year-old lady with severe Aortic stenosis, LVEF=30%, DM, Coronary artery disease and Bronchial Asthma for which a combined procedure [CABG+AVR] was mandated. She underwent CABG x 3 with sutureless AVR, CPB time=112 min Cross Clamp time=85 min and was discharged on POD-6.

Third patient was 57 years old female of foreign origin, 161cms and 108kgs [BMI=41.5, BSA-2.19] to which sutureless aortic valve was implanted. CPB time=56 min, Cross Clamp time=39 min.

Fourth patient was an 83 years old gentleman who had undergone CABG in the past (9 years back) and now requiring AVR for severe aortic stenosis. Coronary angiography revealed all of the grafts to be patent. Patient had severe LV dysfunction, LVEF=35%. Patient underwent Redo Cardiac Surgery and received a Suture aortic valve. CPB time=156 min, Cross Clamp time=130 min.

All of the above patients had an uncomplicated procedure and did well in intra-operative, pre-operative and post-operative phases and outcome were same as in conventional AVR patients. We have used Sorin-Perceval Sutureless aortic prosthesis in all our subjects.

Discussion

The overall mortality of aortic valve replacement surgery is as low as 0.5%. However, a certain sub-set carries a very high inhospitable mortality when exposed to conventional AVR on CPB. For these, Trans-Catheter Aortic Valve Implantation (TAVI) is available. In between are those challenging patients with multiple comorbidities needing combined procedure who become suitable candidates for sutureless aortic valve by conventional or minimal access surgery. Conventional AVR in elderly patients gives excellent outcomes with lesser CPB time and are referred as gold standard in cases of aortic stenosis. Similarly, to the traditional approach, sutureless valves do not preclude the need for CPB and aortic cross-clamping. The nature of sutureless valves is that these do not require extensive placement and tying of sutures.

Subsequent to diseased valve excision, the sutureless and rapid deployment valve prostheses are sized and deployed requiring not more than three locking sutures to adequately attach to the aortic root orifice. This may translate into reduced operation duration, especially when a minimally invasive access is used to approach the aortic valve, the latter traditionally been thought to be associated with longer operative times due to complexity and learning curve [3-6]. The main advantage offered by SU-AVR is a reduction in cross-clamp and CPB duration, due to fewer placement and tying of sutures. The use of SU-AVR may be particularly reasonable in higher risk patients who need to undergo AVR with concomitant cardiac surgery, complex operations with multiple interventions to minimize operational durations and improve outcomes [7-10]. In a recent meta-analysis, the pooled rates of paravalvular leaks were 2-4% at latest follow-up. This study also showed that paravalvular leak complications appeared to be a function of the SU-AVR learning curve, with significant reduction over time.

The advantages of these new generation sutureless valves combine those of open surgical Aortic Valve Replacement (AVR) and the facility of TAVI. They include:

- Complete excision of the diseased valve.
- Anatomical tailoring to individual patient anatomy.
- Atraumatic introduction with minimal or no crimping of the valve leaflets allowing more predictable long-term outcomes.

- Valves are self-anchoring (no need for sutures), self-expanding for easy implantation and good visibility.
- Shorter cardiopulmonary bypass.
- Bicuspid aortic valves Type 1 or 2 (Sievers) are now also suitable, gradients appear to be better than standard tissue valves and finally patients with small and or calcified roots may also benefit.
- Permits minimally invasive cardiac surgery procedures while delivering gold-standard surgical outcome.

However, there may be several caveats associated with the sutureless aortic prosthesis like the learning curve for new surgeons, requirement for CPB and hence detrimental effects of surgical trauma, 'stent fatigue' leading to paravalvar leak as a long term complication and there have been also reports of post-operative conduction disturbances. The lack of robust data prevents the development of high-quality evidence based guidelines. As this is a short case series, a larger number of patients must be observed to understand the actual subset of patient in whom benefit of sutureless aortic valve are optimally elicited.

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References

1. Nkomo VT, Gardin JM, Skelton TN, Gottdiener JS, Scott CG, et al. (2006) Burden of valvular heart diseases: a population-based study. *Lancet* 368: 1005-1011.
2. Vahanian A, Otto CM (2010) Risk stratification of patients with aortic stenosis. *Eur Heart J* 31: 416-423.
3. Christiansen S, Stypmann J, Tjan TD, Wichter T, Van Aken H, et al. (1999) Minimally-invasive versus conventional aortic valve replacement--perioperative course and mid-term results. *Eur J Cardiothorac Surg* 16: 647-652.
4. Leshnower BG, Trace CS, Boova RS (2006) Port-access-assisted aortic valve replacement: a comparison of minimally invasive and conventional techniques. *Heart Surg Forum* 9: E560-E564.
5. Lee JW, Lee SK, Choo SJ, Song H, Song MG (2000) Routine minimally invasive aortic valve procedures. *Cardiovasc Surg* 8: 484-490.
6. Farhat F, Lu Z, Lefevre M, Montagna P, Mikaeloff P, et al. (2003) Prospective comparison between total sternotomy and ministernotomy for aortic valve replacement. *J Card Surg* 18: 396-401.
7. Concistrè G, Farneti P, Miceli A, Glauber M (2012) Sutureless aortic bioprostheses in severe aortic root calcification: an innovative approach. *Interact Cardiovasc Thorac Surg* 14: 670-672.
8. Shrestha M, Folliguet TA, Pfeiffer S, Meuris B, Carrel T, et al. (2014) Aortic valve replacement and concomitant procedures with the

Perceval valve: results of European trials. *Ann Thorac Surg* 98: 1294-1300.

9. Minh TH, Mazine A, Bouhout I, El-Hamamsy I, Carrier M, et al. (2014) Expanding the indication for sutureless aortic valve re-placement to patients with mitral disease. *J Thorac Cardiovasc Surg* 148: 1354-1359.

10. Pollari F, Santarpino G, Pfeiffer S, Fischlein T (2014) Double mitro-aortic valve replacement in a high-risk patient: the sutureless way. *G Ital Cardiol (Rome)* 15: 128-129.