A Novel Annular Downsizing Technique for Secure Perceval Valve Implantation in Large Aortic Annuli via Right Mini-Thoracotomy

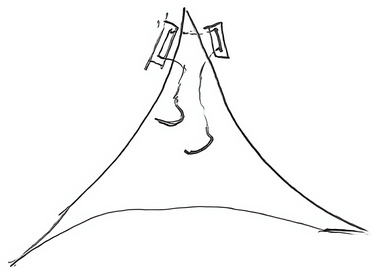
Junlong HU, Baocai WANG, Zhaoyun CHENG
Fuwai Central China Cardiovascular Hospital, Zhengzhou, China.

Background: Patients with large aortic annuli represent a relative contraindication for Perceval sutureless valve implantation, as valve migration or dislodgement may occur even when the largest available XL prosthesis is selected. This anatomical limitation restricts the use of sutureless valves, particularly in minimally invasive aortic valve replacement. We developed an innovative annular downsizing technique to facilitate secure Perceval valve implantation in this challenging patient population and to expand its clinical indications.

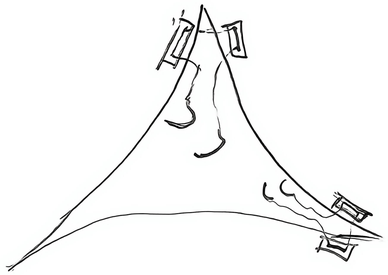
Method: Between 2023 and 2025, 10 patients with severe aortic valve disease and large aortic annuli, in whom standard sizing indicated a high risk of prosthesis instability despite selection of an XL Perceval valve, underwent minimally invasive aortic valve replacement through a right anterior mini-thoracotomy at the second intercostal space. Following native valve excision and annular decalcification, a novel commissural annular downsizing technique was applied to reduce the effective annular diameter and enhance prosthesis anchoring. The Perceval XL valve was subsequently implanted using standard deployment techniques. Procedural success, intraoperative valve stability, early clinical outcomes, and echocardiographic parameters were recorded. Clinical and echocardiographic follow-up was performed for up to 1 year.

Results: All procedures were successfully completed via the minimally invasive approach without conversion to full sternotomy. Secure valve implantation was achieved in all 10 patients, with no intraoperative valve migration or early prosthesis dislodgement. Postoperative echocardiography demonstrated satisfactory valve function, characterized by low transvalvular gradients and absence of moderate or severe paravalvular leakage. There were no procedure-related deaths, strokes, or valve-related complications. During 1-year follow-up, all patients remained clinically stable, with preserved prosthesis position, sustained hemodynamic performance, and no late valve migration or need for reintervention.

Conclusions: The described annular downsizing technique allows safe and effective implantation of the Perceval sutureless valve in patients with large aortic annuli who would otherwise be considered at increased risk for valve instability. Combined with a minimally invasive right mini-thoracotomy approach, this strategy expands the indications for Perceval valve implantation while maintaining excellent early and mid-term outcomes.



Single Commissural Annuloplasty



Double Commissural Annuloplasty