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Case Report

Implantation of Perceval in Trifecta ring: A new perspective

Tamer Owais (MD PhD)[a,b,*], Mohammad El Garhy (MD PhD)[a,c], Maria-Anna Secknus (MD)[a], Thomas Kuntze (MD)[a]

[a] Heart Centre, Zentralklinik Bad Berka, Bad Berka, Germany
[b] Department of Cardiothoracic Surgery, Cairo University, Cairo, Egypt
[c] Department of Cardiology, Minia University, Minia, Egypt

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ABSTRACT

We report a case of a 67-year-old woman who underwent an aortic valve replacement with a 23-mm Trifecta prosthesis (St. Jude Medical, St. Paul, MN, USA). We implanted Perceval S (LenoNova, London, UK) after resecting the degenerated leaflets three years later after the first operation. This strategy enabled us to reduce the ischemic time and hence simplify the surgical procedure in addition to providing excellent postoperative hemodynamics.

<**Learning objective:** The Perceval sutureless valve implantation in Trifecta ring is a feasible alternative to transcatheter aortic valve implantation in specific situations.>

Introduction

The Trifecta valve (St. Jude Medical, St. Paul, MN, USA) is a biological prosthesis which has an advantage in patients with small annuli [1]. However, early degeneration is a matter of discussion [2]. Due to valve characteristics few attempts were made and published as valve in Trifecta valve procedures with suboptimal results [3]. Here we report a case of early failure of a Trifecta valve, treated with a surgical sutureless Perceval prosthesis (LenoNova, London, UK) in a valve-in-ring technique as a new prospective.

Case description

We report the case of a 67-year-old woman who underwent an aortic valve replacement with a 23-mm Trifecta prosthesis in October 2015. The patient presented with decompensated heart failure [New York Heart Association (NYHA) class IV]. Transthoracic and transesophageal echocardiography (TEE) showed a heavily degenerated biological aortic valve prosthesis (peak gradient/mean gradient 90/60 mmHg and valve area 0.5 cm^2) without any signs of endocarditis; the left ventricular ejection fraction was 50%. She had a logistic Euroscore of 36.75% and STS score of 14.6%. Transcatheter aortic valve implantation (TAVI) was dismissed by the heart team because of the high risk of coronary obstruction as the coronary ostia distances of the left main and right coronary artery were 0.8 cm and 0.6 cm, respectively and the supra-annular position of the Trifecta valve. An urgent redo surgical procedure was scheduled in December 2018. Femorofemoral cardiopulmonary bypass was instituted then full resternotomy was achieved. Inspection of the aortic bioprosthesis showed completely degenerated calcified three leaflets of the Trifecta valve without any morphological signs of endocarditis (Fig. 1A).

The three leaflets were completely removed and the Trifecta ring and struts pannus tissue was completely debrided which is normally used to decalcify the natively calcified aortic cusps and annulus (Fig. 1B). The sewing ring and the struts of the Trifecta prosthesis were left in place (Fig. 1C). The orifice admitted a Perceval S sizer. Three prolene 3/0 sutures were taken in the middle point between each strut of the Trifecta prosthesis and the other (Fig. 1D). Each prolene suture emerging from the sewing ring was consequently taken in the adjacent green guiding suture of the Perceval S prosthesis. Careful introduction of the prosthesis in the annular plan as in the known manner was achieved. Cautious release of the self-expandable Perceval S prosthesis was done (Fig. 1E).

The Perceval prosthesis was implanted with expanded valve frame and un-folded valve leaflets. We could implant the prosthesis in 24 min cross-clamp time and in 88 min cardiopulmonary bypass time. Immediate postoperative TEE control excluded paravalvular leakage and showed a satisfactory positioned prosthesis with peak and mean gradient of 20/13 mmHg. On the subsequent day, the patient was extubated. Later, we were able also to stop the dialysis. Dyspnea was improved to NYHA class II on

* Corresponding author at: Department of Cardiac Surgery, Central Clinic Bad Berka, Robert-Koch Allee 9, 99437 Bad Berka, Germany.
E-mail address: TamerAhmed.Owais@zentralklinik.de (T. Owais).

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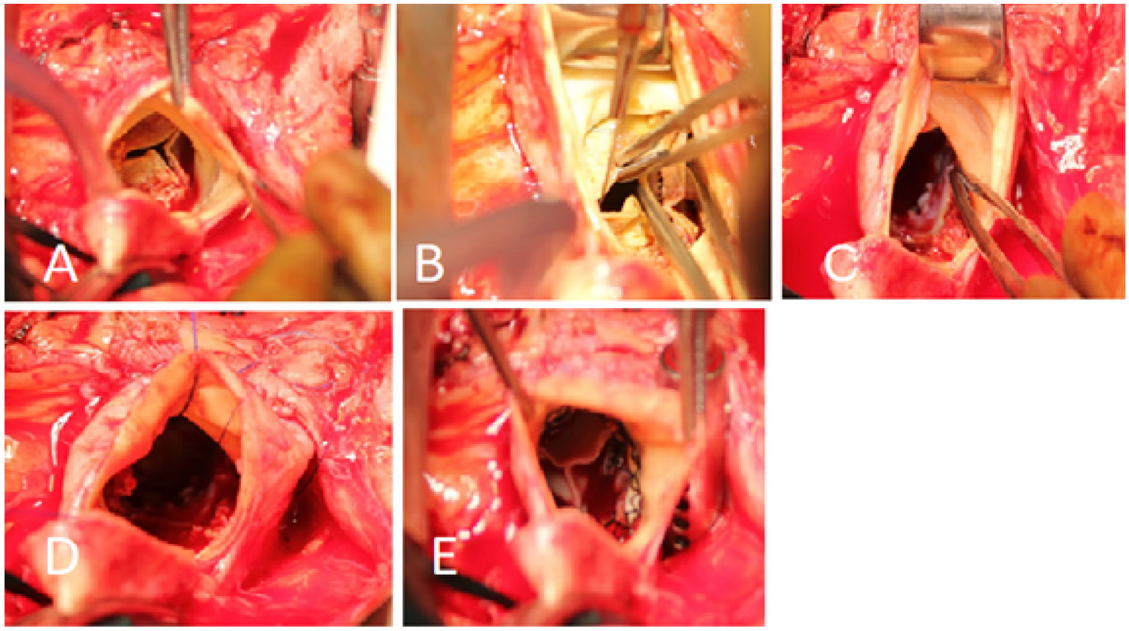

Fig. 1. (A) Degenerated Trifecta prosthesis; (B) excision of the degenerated leaflets; (C) only the Trifecta ring and struts; (D) prolene 3\0 guiding sutures; (E) implanted Perceval in Trifecta ring.

discharge. At 4 weeks, echocardiography showed no paravalvular leakage and peak\mean gradient was 35\18 mmHg.

Discussion

To our knowledge this is the first report of successful implantation of a Perceval prosthesis in a Trifecta ring being preserved intraoperatively. In Trifecta valve, extremely mounted leaflet, taller valve struts, and supra-annular position shorten the distance between the valve and coronary ostia, which is a limitation for TAVI valve-in-valve procedure [3]. Open conventional surgery carries high risk of morbidity and mortality because of the expected prolonged ischemic time especially in an emergency setting as in our case [4].

After detailed technical research, we decided to resect the leaflets of the Trifecta prosthesis and to preserve the ring and the struts. The three struts served as a reference for us to be able to define the middle point of each nadir of the previous valve sinuses. The configuration of the Perceval itself is of advantage in this case precisely because of its belly-form stents which could help us to push the coronary ostia sinuses away and hence abolishes the possibility of obstruction of the coronary ostia.

The short cross clamping time encouraged this strategy compared to the use of a sutured valve which would have resulted in the implantation of a prosthesis of lower diameter and consequently patient–prosthesis mismatch. A valid alternative would have been implanting a TAVI prostheses (Edwards Sapien, Edwards Lifesciences, Irvine, CA, USA) under direct vision and this would have shown a lower mean gradient but still carries the risk of encroaching on the coronary ostia. The presence of the valve-in-valve application of Dr Vinayak could be so helpful in selecting the appropriate size of Perceval to be implanted.

Theoretically, the implantation of Perceval valve in ring could be associated with greater rates of paravalvular leaks. Our plan was to assess the paravalvular regurgitation intraoperatively and to switch to the conventional implantation technique if we observed a moderate to severe aortic regurgitation. Alternatively, interventional closure of paravalvular leak could be an option. However, it could be difficult to cross the residual leak because of the design of Perceval ring and the supraannular position of the leaflet.

Conclusion

Despite the continuous progress of the valve-in-valve TAVI procedures, the Perceval sutureless valve implantation in Trifecta ring seems to be a feasible alternative in specific situations.

Authors' contributions

Author 1: the planning of the procedure and was the main operator.

Author 2: wote the manuscript.

Author 3: did the echocardiography and clinical follow up.

Author 4: critical review of the manuscript.

Conflict of interest

All authors have no conflict of interest.

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