Novel Edwards INTUITY Elite valve bioprosthesis implantation in a pediatric patient

Marcin Gładki[1], Aleksandra Sucharska[2], Paweł R Bednarek[2], Marek Jemielity[1, 3]

[1]Department of Pediatric Cardiac Surgery, Poznan University of Medical Sciences, Poznań, Poland
[2]Students' Scientific Group of Pediatric Cardiac Surgery, Department of Cardiothoracic Surgery, Poznan University of Medical Sciences, Poznań, Poland
[3]Department of Cardiac Surgery and Transplantology, Poznan University of Medical Sciences, Poznań, Poland

Correspondence to:
Marcin Gładki, MD, PhD,
Department of Pediatric Cardiac Surgery,
Karol Jonscher Clinical Hospital,
Poznan University
of Medical Sciences,
Szpitalna 27/33,
60–572 Poznań, Poland,
phone: +48 61 849 12 77,
e-mail: marcingladki@ump.edu.pl

DOI: 10.33963/KP.a2022.0214

Received:
July 6, 2022

Accepted:
September 10, 2022

Early publication date:
September 13, 2022

A 13-year-old male with congenital combined valvular disease of the bicuspid aortic valve (BAV) was admitted to our department for a surgical replacement of the aortic valve. He had previously undergone a commissurotomy at the age of 6.5 months.

Preoperative transthoracic echocardiography (TTE) showed moderate aortic insufficiency and stenosis (Figure 1A) with the maximum and mean gradient of 80 mm Hg and 40 mm Hg, respectively, and mean flow velocity (MFV) of 4.5 m/s in the ascending aorta (AoA) and 1.8 m/s in the descending aorta (AoD). Moreover, mild mitral and moderate tricuspid insufficiency were described. Left ventricular ejection fraction was 78%.

The procedure was performed from a re-sternotomy approach. After an anterograde del Nido cardioplegic solution was administered, an aortotomy was performed and a functional bicuspid valve was inspected. The thickened and completely degenerated valve cusps were removed entirely. After visualizing the aortic orifice with the measured internal diameter of 23 mm, three guiding sutures were attached and secured in the mid-commissural region of the native aortic annulus (Figure 1D). The 23 mm sutureless Edwards INTUITY Elite valve was delivered into the proper aortic position and maintained using tourniquets before expansion of the frame (Figure 1E). The valve prosthesis was expand-

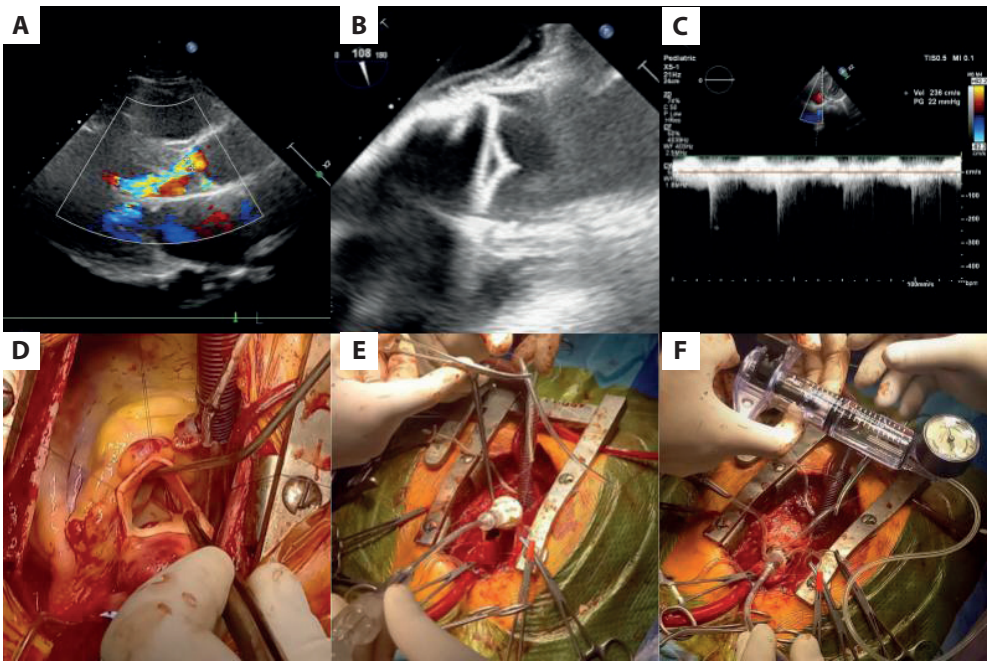

Figure 1. Echocardiography (**A** — preoperative, **B** — intraoperative, **C** — postoperative follow-up). The bioprosthesis implantation procedure, intraoperative review (**D** — guiding sutures placement, **E** — valve parachuting with the aid of the delivery system, **F** — the inflation device)

ed by inflating a balloon with a pressure of 5 atmospheres (Figure 1F). The implantation was completed after three guiding sutures were tied with correct position and tightness (Figure 1B). The aorta was sutured and declamped. The duration of aortic cross-clamp time was 39 min. After achieving reperfusion, extracorporeal circulation was stopped at 64 min without complications.

Intraoperative echocardiography showed a maximum gradient of 27 mm Hg and mean gradient of 11 mm Hg on the aortic valve with MFV of 2.6 m/s in the AoA. At discharge, postoperative TTE showed MFV in the AoA ranging from 1.6 to 2.0 m/s and MFV in the AoD reaching 1.8 m/s (Figure 1C). The postoperative period was uneventful, and the patient was discharged from the hospital on the twelfth day.

The choice of aortic prosthesis is challenging in the pediatric population. While mechanical prostheses seem to be more durable, bioprostheses do not require long-term anticoagulant treatment, especially in physically active children. Novel bioprostheses with good clinical outcomes and durability seem to be a compromise solution.

The Edwards INTUITY Elite valve is based on the PERIMOUNT Magna structure, built of three independent bovine pericardial leaflets on a metal stent. An expandable stainless-steel cloth-covered frame is incorporated into the inflow aspect of the valve and is implanted with the aid of a delivery system.

The 5-year outcomes of the TRITON trial demonstrated acceptable long-term safety and excellent hemodynamic performance of rapid deployment aortic valve replacement (RDAVR) with the Edwards INTUITY Elite valve system [1]. According to the TRANSFORM trial, using the Edwards INTUITY Elite valve may also lead to a relative reduction in aortic cross-clamp time and cardiopulmonary bypass time [2]. This appears to be due to a simplified implantation technique requiring placement of only three guiding sutures instead of the 12–15 sutures as in the case of traditional surgical valve replacements. As the duration of the implantation procedure may be radically shortened, the method seems to be preferable in high-risk patients, in whom shortening surgery time is of vital importance.

Article information

Acknowledgments: The authors would like to thank Anna Olasińska-Wiśniewska, MD, PhD, for her assistance in editing and proofreading the final version of the manuscript.

Conflict of interest: None declared.

Funding: None.

REFERENCES

1. Laufer G, Haverich A, Andreas M, et al. Long-term outcomes of a rapid deployment aortic valve: data up to 5 years. Eur J Cardiothorac Surg. 2017; 52(2): 281–287, doi: 10.1093/ejcts/ezx103, indexed in Pubmed: 28453629.
2. Barnhart GR, Accola KD, Grossi EA, et al. TRANSFORM (Multicenter Experience With Rapid Deployment Edwards INTUITY Valve System for Aortic Valve Replacement) US clinical trial: Performance of a rapid deployment aortic valve. J Thorac Cardiovasc Surg. 2017; 153(2): 241–251.e2, doi: 10.1016/j.jtcvs.2016.09.062, indexed in Pubmed: 27817951.