Cardiology in the Young

cambridge.org/cty

Alterra adaptive prestent system implanted via transjugular approach

Micol Rebonato, Mara Pilati, Enrico Piccinelli and Gianfranco Butera

Cardiology, Cardiac Surgery and Heart Lung Transplantation; Bambino Gesù Children's Hospital, IRCCS, Rome, Italy

Case Report

Cite this article: Rebonato M, Pilati M, Piccinelli E, and Butera G (2025) Alterra adaptive prestent system implanted via transjugular approach. *Cardiology in the Young* **35**: 2585–2587. doi: 10.1017/S1047951125111013

Received: 12 October 2025
Revised: 2 November 2025
Accepted: 25 December 2025
First published online: 16 January 2026

Keywords:
Alterra; RVOT dysfunction; interventional; jugular vein

Corresponding author:
Micol Rebonato;
Email: micol.rebonato@opbg.net

Abstract

We report the case of a 15-year-old male patient with severe pulmonary regurgitation who successfully underwent Alterra Adaptive Prestent implantation through the right jugular vein because of bilateral femoral vein occlusion.

Introduction

Severe pulmonary regurgitation often requires intervention to prevent right ventricular dilation and dysfunction. Percutaneous pulmonary valve implantation has emerged as an alternative to open-heart surgery. The native right ventricular outflow tract, usually characterised by a variable and dynamic morphology, large diameter, and unpredictable compliance, often precludes transcatheter valve replacement with existing devices. Current balloon expandable transcatheter valves have limited applicability to patients with native right ventricular outflow tracts, especially in those with large, compliant, irregular pulmonary trunks. The Alterra Adaptive Prestent system, designed to provide a landing zone for Edwards transcatheter valves, has been predominantly implanted via the femoral vein[1]. We describe the first reported case of transjugular Alterra implantation in a paediatric patient with severe pulmonary regurgitation.

Case report

A 15-year-old boy who was born with pulmonary atresia with an intact ventricular septum, underwent radiofrequency perforation of the pulmonary valve as a newborn. He was followed with chronic severe pulmonary regurgitation and recently developed worsening of his functional capacity, documented by a cardiopulmonary test. Pre-procedural MRI revealed severe pulmonary regurgitation (regurgitant fraction 46%) without right ventricular outflow tract obstruction and a severely dilated right ventricle (RV end diastolic volume 152 mL/m2) with preserved systolic function (EF 51%). The patient was otherwise stable, with no contraindications to percutaneous valve implantation. CT scan and pre-procedural simulation were performed to determine candidacy for Alterra Adaptive Prestent and SAPIEN 3 valve (Edwards Lifesciences, USA) implantation. At that time, the Harmony valve did not yet have the CE mark, and the Venus P valve was considered to be too long for this patient. At CT scan, diameters of the main pulmonary trunk were, respectively, 43 × 33 mm distally and 31 × 34 mm proximally. Based on this virtual interaction, the patient was elected as a good candidate, and the procedure was deemed feasible according to the 3D model reconstruction. Given the patient's vascular anatomy with bilateral occlusion of the iliac-femoral axis secondary to previous interventions, a right transjugular approach for Alterra device implantation was opted as an alternative vascular access. After having obtained informed consent he underwent cardiac catheterisation under general anaesthesia. With ultrasound guidance a right internal jugular vein access was established, and the vein was pre-dilated with serial dilators up to accommodate a A 26F 33-cm Gore DrySeal sheath (W.L. Gore & Associates). Findings at catheterisation included a dilated right ventricular outflow tract with no obstruction, normal pulmonary and right ventricular pressures, maximal angiographic diameters in the lateral projection of the proximal and distal right ventricular outflow tract of 31 and 38 mm, respectively. Balloon sizing was performed with an Amplatzer 34 mm balloon (Abbott Medical, Australia Pty Ltd) to test both the maximal right ventricular outflow tract expansion and the presence of a landing zone and simultaneously, selective left coronary angiographies were obtained, showing no significant risk of coronary artery compression. The Alterra adaptive prestent device was then advanced over a 0.035 Lunderquist Extra-Stiff Wire Guide (CookMedical, Bloomington, IN) via the transjugular route into position in the right ventricular outflow tract. Serial angiograms were performed during deployment to optimise positioning using a pigtail catheter in the right ventricle inserted from the same jugular sheath. The device was deployed using a slow controlled turning of the deployment. Due to unsatisfactory position at the first attempt, the device was easily fully recaptured and then redeployed until it was fixed in the intended place.

© The Author(s), 2026. Published by Cambridge University Press.

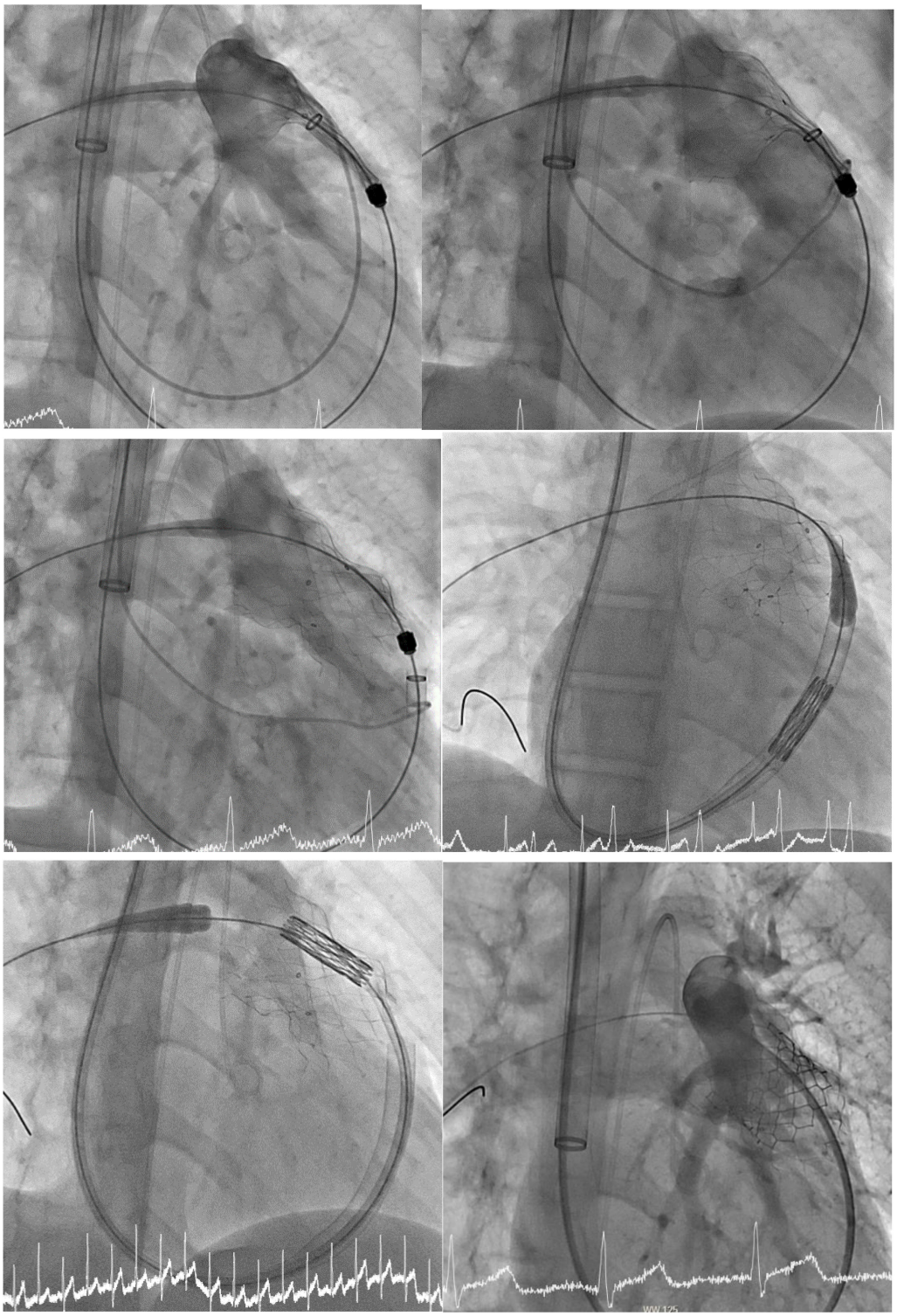


Figure 1. Step by step deployment of the Alterra Adaptive Present system with the Edwards 29 mm valve from the right internal jugular vein.

The delivery system was then removed, and angiography was performed, which confirmed good apposition of the device to the pulmonary trunk wall. Then, a 29 mm SAPIEN 3 THV was prepared and advanced using the Commander Delivery System through the same guidewire (Figure 1). The valve was deployed in the intended position within the Alterra Adaptive Prestent. Post-deployment haemodynamics showed normal right ventricular pressure with no gradient across the right ventricular outflow tract. Pulmonary angiography demonstrated good SAPIEN 3 valve function with no valvar regurgitation nor gradient. No haemostatic devices were used, and the internal jugular vein was manually compressed. The patient recovered uneventfully and was discharged home two days after receiving aspirin 100 mg and metoprolol 50 mg bid. Six months after implant, the patient reported symptomatic improvement in terms of exercise tolerance. Echocardiography demonstrated excellent pulmonary

https://doi.org/10.1017/S1047951125111013 Published online by Cambridge University Press

valve function with a peak Doppler estimated gradient of 12 mm Hg, and the CT scan showed normal prosthetic leaflet motions with no signs of HALT phenomenon.

Discussion

The present report describes the feasibility of the Alterra Adaptive Prestent system implantation via the jugular vein as an alternative to traditional approaches such as the femoral access. Our findings suggest that this strategy can provide a valid option for patients with anatomical limitations or contraindications to femoral access sites. The use of the jugular venous route for transcatheter pulmonary valve implantation has been reported in select cases where femoral access was not feasible. Although experience remains limited, several case reports and cohort studies support its feasibility. For example, transjugular implantation of the Harmony valve has been successfully performed in patients lacking femoral access,[2] and in a cohort of 87 patients undergoing TPV with the Harmony system, four required jugular access due to challenging femoral anatomy.[3] Self-expanding systems, such as the Venus P-valve, have similarly been deployed via the jugular route in isolated cases, particularly in patients with complex right ventricular outflow tract anatomy.[4,5] These reports demonstrate that the jugular venous route can serve as a possible alternative in anatomically complex cases, with outcomes highly dependent on detailed pre-procedural assessment. However, authors publishing Venus-P-valve and Harmony valve experience reported several challenges, including difficult navigation through tortuous or dilated right ventricular outflow tracts, limited repositionability, and a higher risk of valve malposition or migration. In this context, the Alterra adaptive prestent system, combined with the SAPIEN 3 valve, offers several potential advantages. The Alterra prestent features a nitinol frame with PET covering, and is delivered fully loaded with the option for recapture and repositioning during deployment. In fact, in our case, we had to recapture and redeploy it, and the process did not show major challenges. Furthermore, the system is designed to provide a stable landing zone within the right ventricular outflow tract, accommodating the SAPIEN 3 valve in a controlled and precise manner. The Commander system offers a front-loading system fully covered, which makes the implantation of the Sapien S3 valve quite easy. Sometimes, there could be some friction between the Alterra prestent and the Commander system. However, if the prestent is well positioned in the intended position this friction is not a major challenge, and it is possible to gently push and/or manage by tensioning the guidewire and the delivery system together. In general, so far, clinical experience suggests that the procedure is feasible and safe, with successful deployment in patients with complex right ventricular outflow tract anatomies by using a femoral approach[6] and no previous reports on the internal jugular vein have been reported so far. Compared with other systems, the Alterra /SAPIEN approach offers a low-profile, flexible prestent that can be repositioned or retrieved during deployment several times. Furthermore, the SAPIEN valve is pre-mounted and covered within the delivery system. These features may improve procedural control, reduce the risk of embolisation or malposition. The Alterra Adaptive ensures smooth deployment even when introduced through the internal jugular vein, expanding the population of patients eligible for transcatheter pulmonary valve therapy.

Acknowledgements. This work was supported by the Italian Ministry of Health with Current Research funds.

References

1. Zahn EM, Chang JC, Armer D, Garg R. First human implant of the Alterra Adaptive PrestentTM: a new self-expanding device designed to remodel the right ventricular outflow tract. Catheter Cardiovasc Interv 2018; 91: 1125–1129.
2. Agasthi P, et al. Harmony transcatheter pulmonary valve successfully implanted via transjugular approach. J Soc Cardiovasc Angiogr Interv 2023; 3: 101207. doi:10.1016/j.jscai.2023.101207.
3. Patel ND, Levi DS, Cheatham JP, Qureshi SA, Shahanavaz S, Zahn EM. Transcatheter pulmonary valve replacement: a review of current valve technologies. J Soc Cardiovasc Angiogr Interv 2022; 1: 100452.
4. Álvarez-Fuente M, Toledano M,HernÁndez I, et al. Initial experience with the new percutaneous pulmonary self-expandable Venus P-valve. REC Interv Cardiol 2023; 5: 263–269.
5. Callegari A, Bonnet D, Malekzadeh-Milani S. Simplified approach to Venus-P pulmonary valve implantation in a patient with complex cardiac anatomy: a simple solution for a difficult anatomy. Cardiol Young 2025; 13: 1–3.
6. Shahanavaz S, Balzer D, Babaliaros V, et al. Alterra adaptive prestent and SAPIEN 3 THV for congenital pulmonic valve dysfunction: an early feasibility study. JACC: Cardiovasc Interv 2020; 13: 2510–2524.

https://doi.org/10.1017/S1047951125111013 Published online by Cambridge University Press