Implantation of a large self-expanding pulmonary valve using the jugular vein approach in a teenage patient

Sebastian Góreczny[1, 2], Judyta Szeliga[1], Maksym Lazu[1], Reinhardt Becht[3], Tomasz Mroczek[4], Shakeel Qureshi[5]

[1]Department of Pediatric Cardiology, University Children's Hospital, Jagiellonian University Medical College, Kraków, Poland
[2]Department of Cardiology, Polish Mother's Memorial Hospital, Research Institute, Łódź Poland
[3]Venus Medtech Europe, Amsterdam, The Netherlands
[4]Department of Pediatric Cardiac Surgery, University Children's Hospital, Jagiellonian University Medical College, Kraków, Poland
[5]Department of Pediatric and Adult Congenital Heart Disease, Evelina London Children's Hospital, Guy's and St. Thomas' NHS Foundation Trust, London, United Kingdom

Correspondence to:
Sebastian Góreczny MD, PhD, Department of Paediatric Cardiology, University Children's Hospital, Faculty of Medicine, Jagiellonian University Medical College, Wielicka 265, 30–669 Kraków, Poland, phone: +48 12 333 90 50, e-mail: sebastian.goreczny@uj.edu.pl

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Percutaneous valve implantation in the pulmonary position is a well-established treatment for right ventricular outflow tract (RVOT) dysfunction [1]. Improvements in valve design have provided new options for percutaneous treatment of large outflow tracts [2, 3]. Our recent experience demonstrates successful self-expanding valve implantation in pediatric patients *via* the standard femoral vein (FV) approach [4]. However, in selected patients, alternative vascular access may be necessary [5].

A 16-year-old male patient weighing 45 kg with tetralogy of Fallot, following previous correction with a transannular patch, was referred to our Department due to worsening exercise tolerance. Echocardiography and computed tomography scans revealed a significantly enlarged right ventricle and a dilated RVOT with severe pulmonary regurgitation.

During cardiac catheterization, contrast injection into the right FV demonstrated occlusion of the ipsilateral iliac vein with collateral vessels (Supplementary material, *Figure S1A*, *Video S1*). Angiography from the left FV showed a significantly narrowed iliac vein with collateral vessels (Supplementary material, *Figure S1B*). Given limited FV access, a decision was made to attempt valve implantation *via* the right internal jugular vein (RIJV). Access to the left FV was used to introduce a 5 Fr sheath and a diagnostic catheter for the initial angiography (Supplementary material, *Figure S1C*) and intra-procedural angiographic guidance. A compliant sizing balloon was inflated in the RVOT for measurements (Supplementary material, *Figure S1D–E*) and evaluation of potential coronary compression. Flattening of the right coronary sinus, without causing aortic regurgitation, was noticed (Supplementary material, *Figure S1F*). Considering measurements on the initial angiography and the inflated balloon, a 36–25 mm Venus-P valve (Venus MedTech) was selected for implantation from the RIJV. Over a 0.035" Lunderquist guidewire (Cook) anchored in the distal branch of the right pulmonary artery, a 26Fr DrySeal sheath (Gore) was introduced from the RIJV to the proximal right pulmonary artery (Figure 1A). The valve was gradually exposed to allow the distal flare to sit in the distal main pulmonary artery and slowly deployed fully (Figure 1B–C). The final angiography confirmed satisfactory valve position and function, with unobstructed pulmonary artery flow, trace pulmonary regurgitation, and no coronary artery compression (Figure 1D–E). Pre-discharge and 6-month follow-up echocardiograms showed good valve function with trivial central pulmonary regurgitation. No arrhythmias were detected on follow-up routine electrocardiograms.

The transjugular approach for balloon-expanding valves has several applications including when there is no femoral venous access or interrupted inferior vena cava [5]. There are limited data on the utilization of this route for the implantation of self-expanding valves, especially in smaller patients. One of the crucial parts of the procedure is to accurately puncture the jugular vein, using ultrasound guidance. Subsequent introduction of a large delivery sheath and the valve is similar to when valve implantation is performed *via*

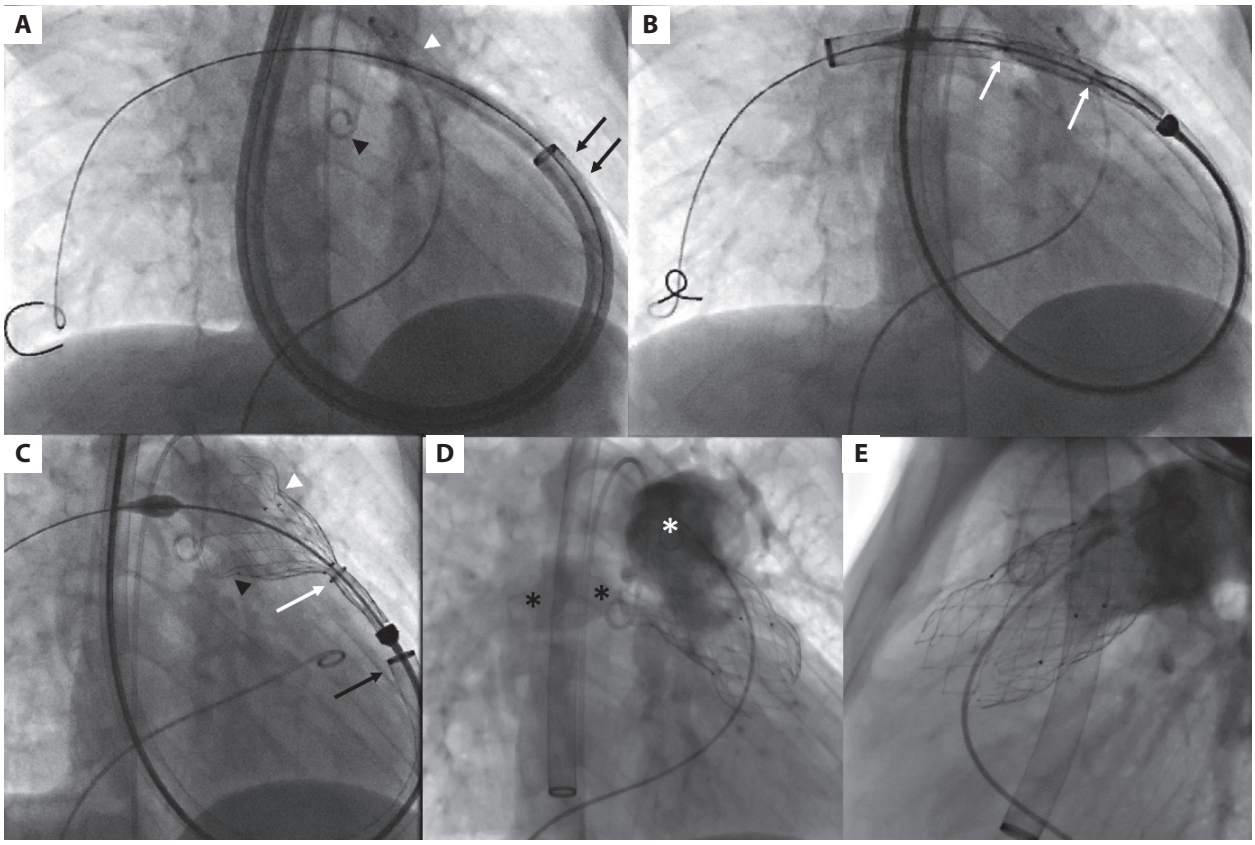

Figure 1. Implantation of a self-expanding valve using the internal jugular vein approach in a teenager with a severe pulmonary regurgitation after patch repair of tetralogy of Fallot. **A.** Over a Lunderquist wire (Cook) placed in the distal branch of the right pulmonary artery, a 26 DrySeal sheath (Gore, black arrows) is being introduced from the right internal jugular vein to the proximal right pulmonary artery. A pigtail catheter (black arrowhead) placed in the ascending aorta projects over the origin of the right pulmonary artery. Another pigtail catheter, introduced through the narrow right femoral vein, is placed in the proximal left pulmonary artery (white arrowhead). **B.** A 36–25 mm Venus-P valve (MedTech, white arrows) was introduced through the sheath to the proximal right pulmonary artery. **C.** After the withdrawal of the sheath (black arrow) to the proximal right ventricular outflow tract, the valve was gradually exposed so that the distal flare would land in the proximal right (black arrowhead) and left (white arrowhead) pulmonary artery. **D, E.** Control angiography in two projections after valve implantation confirms the proper position of the completely expanded, competent valve with unobstructed flow to the right (black asterisk) and the left (asterisk) pulmonary artery

the usual femoral route. No hemodynamic compromise or arrhythmia was encountered with slow introduction of the large-caliber equipment. The course of the sheath in the right ventricle gave stable support during exposure of the valve leading to the accurate final position. Therefore, consideration should be given to using this approach in patients with limited femoral venous access.

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/polish_heart_journal.

Article information

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