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Percutaneous Pulmonary Valve Implantation after Endocarditis of Contegra® Valved Conduit: A Case Report

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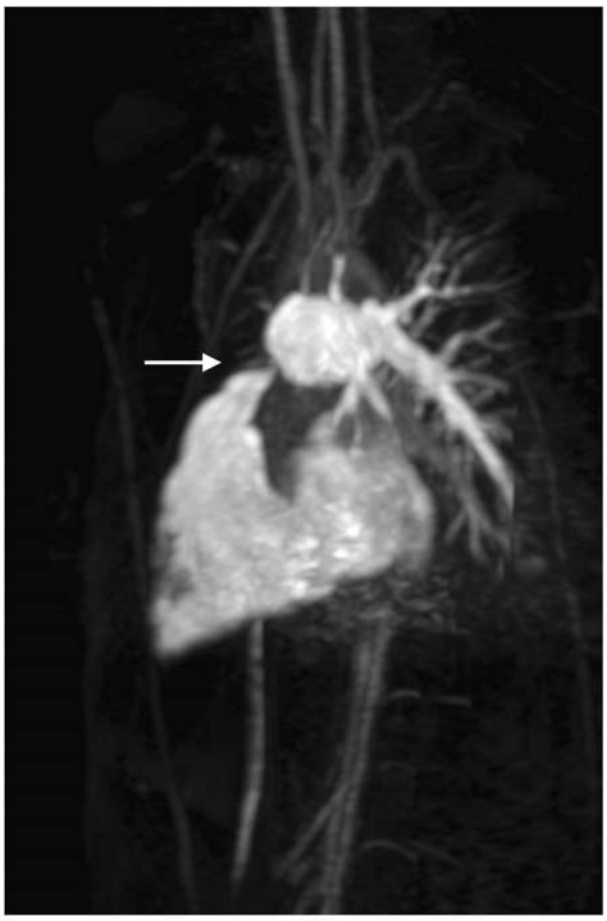

Fig. 1 MRI showing Contegra® conduit stenosis.

Abstract

This report describes the case of a 13-year-old boy with endocarditis of a Contegra® pulmonary valved conduit used for the correction of tetralogy of Fallot. He had severe pulmonary stenosis after endocarditis resolution. We performed percutaneous pulmonary valve implantation with resolution of the conduit dysfunction. The procedure was well tolerated by our patient and offered many advantages.

Key words

Heart valve surgery · cardiovascular surgery · heart disease

Intrroduction

A variety of prosthetic conduits and homografts for right ventricular outflow tract reconstruction have been developed in recent decades. The Contegra® valved bovine conduit (Medtronic Inc., Minneapolis, MN, USA) has demonstrated short-term success in experimental animal studies, as well as in humans [1]. However, these conduits can degenerate, leading to obstruction, pulmonary regurgitation, or both, and so require multiple surgical revisions. Recently, percutaneous pulmonary valve implantation (PPVI) has provided an option for nonsurgical management [2].
We describe the case of a young patient with acute endocarditis of a Contegra valved conduit.

Case Presentation

A 13-year-old male patient was admitted to our hospital for endocarditis. He had undergone correction of tetralogy of Fallot at the age of 1 year. One year previous to the current admission to hospital, he underwent correction of severe pulmonary regurgitation with the implantation of a Contegra® pulmonary valved conduit. After the operation he had excellent function of his neopulmonary valve and conduit.
At hospitalization he presented with a one-month history of malaise, weight loss, fever, chills, and leukocytosis.
Transthoracic echocardiography demonstrated the presence of large vegetation on the Contegra bovine valve. Continuous wave Doppler assessment of the Contegra valve showed an increased pressure gradient (maximal pressure gradient: 85 mmHg). The tricuspid valve presented with severe regurgitation. A high trans-tricuspid pressure gradient (95 mmHg) and enlarged right heart chambers were registered. Blood cultures showed a Streptococcus-like organism, identified as a Gemella species. After six weeks of specific antibiotic therapy, the patient's condition improved. Clinical signs of sepsis resolved completely and did not recur after antibiotic therapy; repeated blood cultures remained negative even in the absence of antibiotics. Echocardiography remained the same with evidence of severe pulmonary stenosis, right ventricular dilation and severe central tricuspid regurgitation. A magnetic resonance scan confirmed severe conduit stenosis (**Fig. 1**).

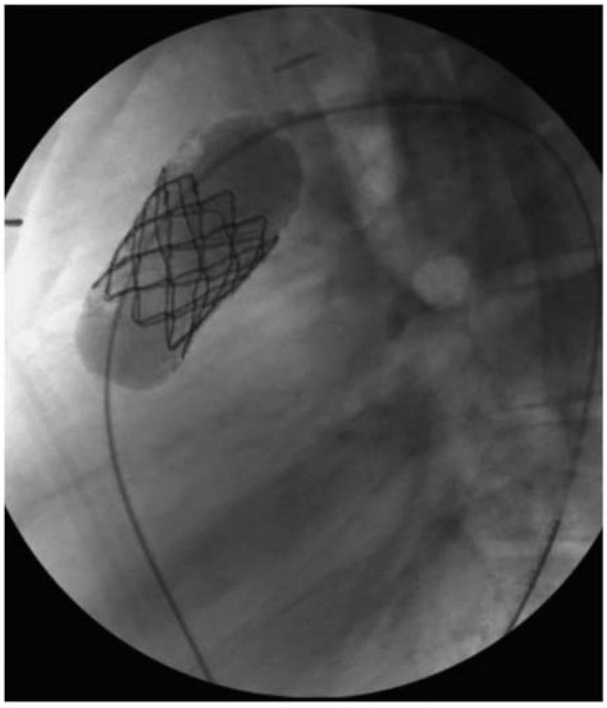

Fig. 2 Intraoperative view of Melody valve with balloon stent expansion.

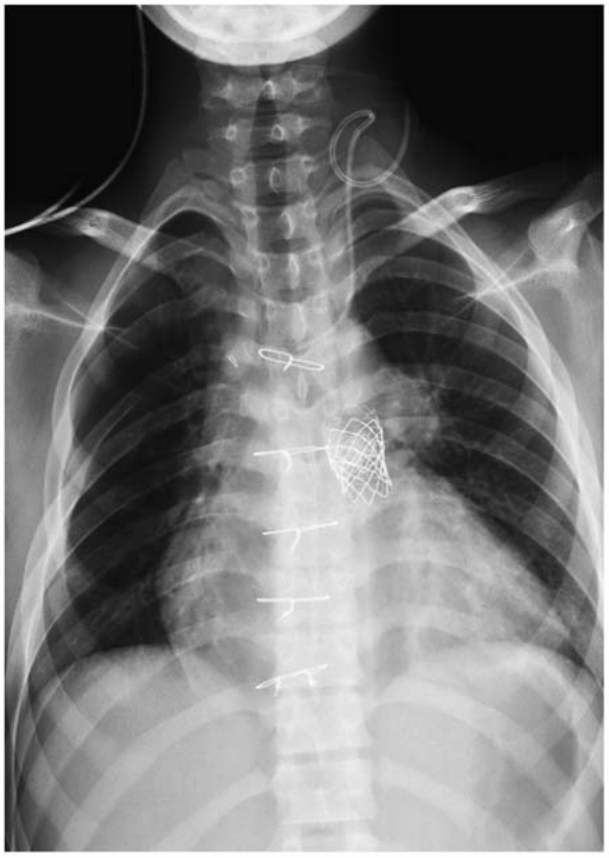

Fig. 3 Chest X-ray showing pulmonary valve position after implantation.

The Melody valve consists of a bovine jugular vein valve segment, mounted inside an expandable metal stent. The procedure was performed under general anesthesia. In the cardiac catheterization suite, intravascular contrast images confirmed a suitable anatomy for Melody valve placement. A 20-Fr introducer placed through the femoral vein was used to guide the stent into position over a guide-wire. An 18-mm Melody valve was then secured inside the pulmonary homograft with balloon stent expansion (**Figs. 2** and **3**). Following the procedure, contrast injections in the right ventricle and pulmonary artery revealed resolution of the stenosis (RVOT gradient: 15 mmHg) and competence of the pulmonary valve.

Echocardiogram in the operating room after PPVI revealed a significant reduction of the RVOT gradient, from 85 to 20 mmHg, no pulmonary regurgitation, and a reduction of tricuspid regurgitation from severe to mild.

The patient was discharged 2 days after the procedure without complications.

At follow-up after six months, the patient was completely asymptomatic; an echocardiogram revealed a reduction of right ventricular dimensions and trivial tricuspid regurgitation. The percutaneous valve had a peak Doppler gradient of 25 mmHg without regurgitation.

Discussion

Endocarditis of the Contegra conduit is very rare in the follow-up of these patients. Breymann et al. [1] followed up 71 patients who underwent this correction and did not report any case with endocarditis, nor did other researchers [3–4]. However, in a more recent paper, Boethig et al. [5] encountered several cases with endocarditis after Contegra implantations in adult patients.

The Melody percutaneous valve was developed for placement in the pulmonary position. Worldwide, more than 150 Melody valve implantations have been performed since 2000 for various pulmonary valve pathologies. The 5-year follow-up has demonstrated good results [2]. The pulmonary position is suitable for total percutaneous valved stent placement because of the ability of the femoral vein to accept large introducers, the absence of coronary ostea and the lower effect of incidental embolization from this position. But implanting Melody percutaneous valves into dilated or too soft pulmonary artery grafts has been shown to be a risk factor for severe complications. Potential complications such as pulmonary artery rupture, stent migration and compression of the coronary arteries still persist [2, 6, 7].

The success of PPVI has significant implications for the timing of interventions for RVOT dysfunction. In clinical practice, the timing of the operation is often biased by the patient's and physician's reluctance to commit to multiple open heart surgeries which expose the right ventricle (RV) to an increasing duration of abnormal loading conditions. Although a reduction of RV diastolic and systolic volumes can be achieved even when patients are treated late, studies have shown a lack of improvement in the RV ejection fraction and in exercise performance after surgical valve implantation [7]. The availability of PPVI might lead to better patient acceptance and promote earlier intervention before irreversible ventricular dysfunction occurs.

In our case, fortunately, the infection resolved completely with antibiotic therapy, allowing the patient to undergo percutaneous valve implantation into a presumably sterile Contegra® conduit.

The involved microorganism is known to be quite sensitive to antibiotic treatment whereas, with more resistant bacteria, it might be more risky to introduce so much foreign material. The procedure was well tolerated. The percutaneous approach was distinctly advantageous for our patient, allowing him to be discharged home only two days after the procedure.

In conclusion, PPVI improves RVOT hemodynamics and delays surgery by prolonging the conduit lifespan. Our experience demonstrates the impact of evolving technologies in medicine, with progressive improvements in clinical results due to device and technique modifications. PPVI should reduce the number of surgical operations and potentially improve the life expectancy of patients with congenital heart disease involving the RVOT.

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