

## Long-term follow-up after sutureless Perceval S valve implantation as bail-out strategy in a hostile environment

Mork Constantin, Koehlin Luca, Schaeffer Thibault, Eckstein Friedrich, Reuthebuch Oliver

Department of Cardiac Surgery, University Hospital Basel, Switzerland

### Summary

We report long-term results in a case of aortic valve replacement with a sutureless, rapid deployment valve in a degenerated aortic homograft. This technique allowed straightforward aortic valve replacement in a heavily calcified aortic root and was thus favourable for the redo procedure in a degenerated homograft.

**Keywords:** *degenerated aortic homograft, sutureless aortic valve, redo procedure*

### Introduction

Homograft implantation accounts for less than 1% of aortic valve replacements [1]. This technique is used for a variety of complex aortic valve and root diseases because of its various advantages, including an excellent haemodynamic profile, good perioperative haemostasis, a low risk for thromboembolism and a decreased risk for prosthesis infection [1]. Thus, homografts are preferentially implanted in cases of advanced endocarditis. On the other hand, re-operations of a homograft are considered to be challenging owing to potentially severe adhesions and calcifications. Hence, clamping and suturing may increase the risk of neurological complications [1]. The Perceval S prosthesis (fig. 1) is, as a result of its sutureless and rapid deployment design, a potential substitute for sewing the valve in a calcified setting. Its elastic nitinol stent securely anchors the valve without the need for any sutures [2, 3].

### Case report

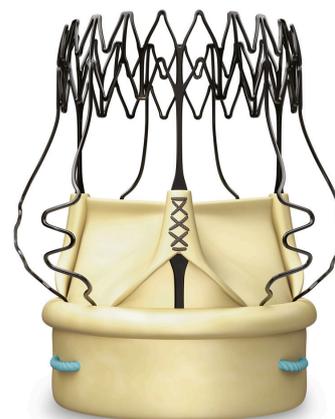
We report on a 47-year-old asymptomatic man who presented in July 2002 to the cardiac surgery department with a dilatation of the ascending aorta with a diameter of 55 mm. Transoesophageal echocardiography showed an ejection fraction of 66% with grade II–III aortic insufficiency and a bicuspid aortic valve. The patient underwent replacement of the ascending aorta with a Dacron prosthesis 30mm (Gelweave, Vascutek Ltd, Scotland), as well as reconstruction of the aortic valve. The patient was discharged from hospital 9 days after the operation in a good general condition. However, 4 months later he was re-hospitalised because of an infection of the prosthesis.

Transthoracic echocardiography showed recurrent aortic insufficiency (regurgitation fraction 40%) with a preserved ejection fraction (60%).

In November 2002, he underwent a re-operation. All prosthetic material in conjunction with the aortic valve was removed and finally replaced by a homograft. Owing to severe adhesions, the left coronary ostium had to be re-implanted with an 8 mm Goretex graft (W. L. Gore & Associates Inc., Newark, USA) in the form of a Cabrol anastomosis [4].

Post-surgically, the patient had regular echocardiographic follow-ups. He was asymptomatic and tolerated exercise well. Beginning in 2007, the homograft showed signs of moderate aortic valve regurgitation. In August 2014, the patient started complaining of a decreased general status combined with recurrent fever attacks, diffuse myalgia, intermittent headaches and paraesthesia of the face. The consequent echocardiography revealed severe aortic regurgitation (ejection fraction 40%, aortic valve  $V_{max}$  458.7 cm/s, maximum pressure gradient (PG) 84.2 mm Hg, mean PG 53.5 mm Hg) with adhering vegetations on the aortic

**Figure 1:** Perceval S sutureless bioprosthesis. Photo: LivaNova, used with kind permission.



**Correspondence:**  
Constantin Mork, Universitätsspital Basel, Spitalstrasse 21, CH-4031 Basel, constantin.mork[at]usb.ch

valve (fig. 2). Blood samples were positive for gram-positive streptococci. Antibiotic treatment was initiated for 6 weeks. However, the clinical course deteriorated, with dyspnoea, orthopnoea and peripheral oedema, suggesting the need for an advanced re-operation with valve replacement. Preoperative computed tomography (CT) (fig. 3) exposed a calcified and extensively destroyed homograft with additional calcification of the proximal left anterior descending artery adjacent to the Cabrol anastomosis. Thus, the decision within the heart team was to implant a sutureless, rapidly deployable and self-expandable valve rather than a conventional prosthetic valve (1) to avoid potentially impossible needle-piercing of diseased tissue, (2) to avoid reimplantation of the Cabrol anastomosis, and (3) to reduce the risk of neurological complications due to the calcification and extensive destruction of the homograft.

During surgery in December 2014, the aortic valve was found to be heavily calcified. The resection of the diseased valve was uneventful, but time-consuming. The deployment of the Perceval S size L valve prosthesis was without

complications. However, intraoperative transoesophageal echocardiography showed a jet in the area of the anterior mitral valve annulus into the atrium. To close the cleft in the mitral valve annulus, which probably occurred during resection, the Perceval S valve was carefully removed and the cleft closed. Afterwards, the Perceval S was re-collapsed and reinserted without incident. In total, the cross-clamp time extended to 134 min (78 + 56). The postoperative course was uneventful and echocardiography showed a functional Perceval S valve. The gradient over the valve was dP mean/peak 22/38 mm Hg. The left ventricle was slightly hypertrophic with a moderately reduced left ventricular ejection fraction (LVEF 42% biplane). There were no signs of paravalvular leakage. The patient was discharged from hospital after 8 days.

Four years later, he was seen in the outpatient clinic and presented in a general good condition without any signs of cardiac decompensation. Furthermore, the patient denied the presence of any symptoms such as dyspnoea, angina pectoris or syncope. He tolerated exercise well and was reclassified as New York Heart Association (NYHA) class I. The transthoracic echocardiography showed a well-functioning Sorin Perceval S valve with decreased pressure gradients and recovered ejection fraction (EF 55%, aortic valve area 2.3 cm<sup>2</sup>, mean gradient 15 mm Hg, peak gradient 24 mm Hg, without paravalvular or transvalvular regurgitation). There were no floating plaques visible in the aortic prosthesis.

## Comment

The use of sutureless, rapidly deployable valves appears to be an advantageous means in cases of a hostile environment. In the presented case, it prevented neurological complications and facilitated the operation by avoiding the need for suturing in calcified tissue, replacement of the homograft and the reinsertion of the Cabrol anastomosis.

Our handling of this complex situation resulted in a very good postoperative outcome. Long-term follow-up of the patient has proven a stable NYHA class I condition achieved by a well-performing Sorin Perceval S valve with gradients decreasing over time.

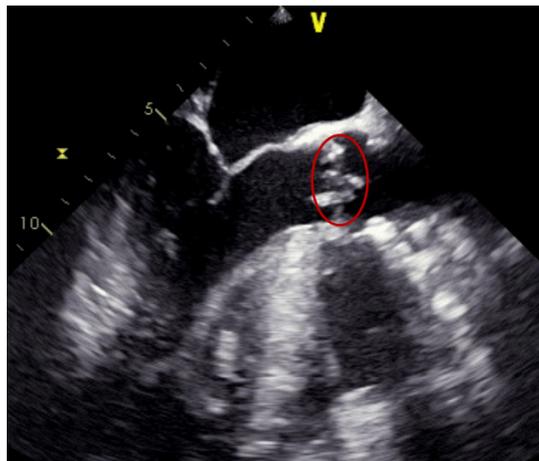
## Disclosure statement

No financial support and no other potential conflict of interest relevant to this article was reported.

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**Figure 2:** Pre-operative transthoracic echocardiography in August 2014 shows a severe aortic valve regurgitation with vegetations (red circle) on the aortic valve.



**Figure 3:** Computed tomography scan 22 August 2014 with calcification and degeneration of the homograft shown on the left side and the Cabrol anastomosis on the right side.

