

Sutureless aortic valve and mitral valve repair in redo cases – really an off-label approach?

Júlia Čanádiová, Aleš Mokráček, Vojtěch Kurfirst

Department of Cardiac Surgery, Hospital České Budějovice, České Budějovice, Czech Republic

Kardiochirurgia i Torakochirurgia Polska 2016; 13 (4): 366-367



Abstract

Sutureless aortic valve replacement (AVR) was developed as an alternative treatment option to conventional open-heart surgery and transcatheter aortic valve implantation for “gray zone” patients. The need for concurrent mitral valve surgery is generally viewed as a contraindication to sutureless AVR. The purpose of this brief paper is to report our experiences with sutureless valves in patients after previous cardiac procedures with degenerated aortic bioprostheses and concomitant mitral valve disease.

Key words: sutureless aortic valve, mitral valve surgery.

Streszczenie

Bezszwową wymianę zastawki aortalnej opracowano jako alternatywę dla tradycyjnej chirurgii otwartej i przezcewnikowej implantacji zastawki aortalnej dla pacjentów w tzw. szarej strefie. Konieczność wykonania jednoczesnej chirurgii zastawki mitralnej jest zazwyczaj postrzegana jako przeciwwskazanie do bezszwowej wymiany zastawki aortalnej. Celem tej krótkiej pracy jest przedstawienie naszych doświadczeń z bezszwowymi zastawkami u pacjentów po wcześniejszych zabiegach kardiochirurgicznych ze zdegenerowanymi bioprotezami aortalnymi i współwystępującą chorobą zastawki mitralnej.

Słowa kluczowe: bezszwowa zastawka aortalna, chirurgia zastawki mitralnej.

Introduction

Surgical aortic valve replacement (AVR) still represents the gold standard among the therapeutic options in patients with severe symptomatic aortic valve stenosis [1].

Currently, patients often have a heavily calcified valve, aortic root or diffuse atherosclerosis of the aortic wall and have already undergone a previous aortic valve replacement. In order to minimize periprocedural risks and to accelerate postoperative rehabilitation, less invasive therapeutic concepts, including transcatheter aortic valve implantation (TAVI) and sutureless bioprosthesis, have been developed and are increasingly used while maintaining quality and safety, especially in “gray zone” patients [2]. The need for concomitant mitral valve surgery is generally viewed as a contraindication to sutureless AVR because of the increased risk of interference between the two valves at the level of aorto-mitral continuity [3].

Case report

We present the case of a 71-year-old female patient with a combination of severe stenosis of the stentless bioprosthesis and regurgitation grade II/IV due to right coronary cusp separation. The peak transvalvular gradient was 56 mm Hg and the mean gradient was 30 mm Hg. Concomitant severe mitral valve insufficiency grade IV/IV was

present due to annulus dilatation. The logistic EuroSCORE was 19.64. The procedure was performed under general anesthesia through a median sternotomy. The ascending aorta and bicaval cannulation technique was used for initiating the cardiopulmonary bypass (CPB). Moderate hypothermia (32°C) was achieved. After aortic cross-clamping an antegrade infusion of cold blood cardioplegia was delivered. A transverse aortotomy was done 1 cm distal to the sino-tubular junction, so as to leave an edge free for closure of the aortotomy after implantation of the device and to prevent closure of the aortotomy.

The heavily calcified aortic stentless valve no. 23 was removed and the aortic annulus was decalcified. Because of a very small aortic annulus (free passage through the annulus with a 19 mm mechanical aortic valve sizer), the Perceval S (Sorin group, Milan, Italy) size small – “S” (19–21 mm) was chosen. Access to the mitral valve was performed through Sondergaard’s groove, and mitral valve repair was performed with a semi-rigid Medtronic CG Future COMPOSITE ring no. 28. This ring has a fully flexible anterior part. Once mitral valve repair was completed, the left atrium was closed. The selected aortic bioprosthesis Perceval S was loaded and collapsed into a delivery device. To ensure correct positioning of the prosthesis, three guiding threads are temporarily positioned in the lowest

Address for correspondence: Júlia Čanádiová MD, Department of Cardiac Surgery, Hospital České Budějovice, Boženy Němcové 54, 37001 České Budějovice, Czech Republic, phone: +42 0387874202, e-mail: canadyova.julia@gmail.com

Received: 27.01.2016, **accepted:** 20.09.2016.

part of the native leaflet insertion line for each valve sinus and the corresponding part of the bioprosthesis. Once the prosthesis was completely deployed, the guiding threads were removed. To optimize the area of contact between the prosthesis and the aortic annulus, post-dilatation was carried out with a balloon catheter at a pressure of 4 atm for 30 s. The aortic cross clamp time was 74 min. The control periprocedural transesophageal echocardiogram did not indicate any paravalvular aortic regurgitation; there was no evidence of interference between the aortic prosthesis and mitral valve ring and no evidence of mitral dysfunction. At 1-year follow-up the patient was doing well, was in NYHA class 0 and showed improved symptoms in comparison with her preoperative state. Transthoracic echocardiography (TTE) follow-up indicated mean and peak gradients of 15 and 25 mm Hg on the Perceval valve and no paravalvular regurgitation. The mean mitral transvalvular gradient was 4 mm Hg and mitral regurgitation grade I/IV was detected by TTE.

Discussion

The only effective treatment of symptomatic severe aortic valve stenosis is valve replacement. Similar to conventional surgical replacement of the valve, a sutureless bioprosthesis requires valve excision (a risk reduction of paravalvular insufficiency compared with TAVI) and annular decalcification, but permanent fixation sutures are not required.

The Perceval valve is designed for patients requiring an AVR procedure, including high-risk and complex patients. With the absence of a rigid sewing ring and its elastic stent, the Perceval optimizes the effective orifice area, resulting in excellent hemodynamics. The possibility to avoid placing and tying sutures may lead to shorter procedural times [2, 4].

In cardiac surgery, prolonged CPB and cross-clamp duration are strong independent risk factors for postoperative mortality and morbidity [5]. The advantages of this procedure could be of benefit to patients who have no fundamental contraindications for using cardiopulmonary bypass and are undergoing complex, combined procedures or re-operations. Patients with a small aortic annulus or heavy calcification of the annulus and aortic root, where positioning sutures may represent technical problems and complications, are another potential group that could benefit [2]. It is important to accept some technical considerations that arise in the proximity of the mitral and aortic annulus at the level of aorto-mitral continuity. The cut-off point in terms of

minimal aorto-mitral length for patients with a mechanical mitral prosthesis before TAVI is 9 mm and is probably lower for sutureless AVR, such as the Perceval prosthesis [3, 6]. In our patient we did not measure the aorto-mitral distance. At the time of mitral valve replacement, the commissural struts could be positioned away from the aortomitral continuity to minimize the risk of interference with the intra-annular portion of the sutureless aortic prosthesis. For mitral valve repair our preferred approach is the use of a semi-rigid mitral annuloplasty ring, which offers posterior remodeling while maintaining anterior flexibility due to the presence of only textile in this part and may also minimize the risk of interference with the subannular portion of the sutureless valve in the left ventricle outflow tract.

Conclusions

Our experience demonstrates that concomitant sutureless aortic bioprosthesis implantation and mitral valve repair is feasible and safe in high-risk patients undergoing a redo operation. Potential advantages include shorter aortic cross clamp times, fewer technical demands in the case of a heavily calcified and small aortic annulus, and the preservation of flexibility and movement of the mitral annulus during the cardiac cycle by using a semi-rigid annuloplasty ring.

Disclosure

Dr. Mokráček is a proctor for Perceval S valve implantation.

References

- Shrestha M, Folliguet TA, Pfeiffer S, Meuris B, Carrel T, Bechtel M, Flameng WJ, Fischlein T, Laborde F, Haverich A. Aortic valve replacement and concomitant procedures with the Perceval valve: results of European trials. *Ann Thorac Surg* 2014; 98: 1294-1300.
- Čanádyová J, Mokráček A. Calcified aortic homograft and sutureless valves. *Cor et Vasa* 2015; 57: e362-e365.
- Minh TH, Mazine A, Bouhout I, El-Hamamsy I, Carrier M, Bouchard D, Demers P. Expanding the indication for sutureless aortic valve replacement to patients with mitral disease. *J Thorac Cardiovasc Surg* 2014; 148: 1354-1359.
- Ranucci M, Frigiola A, Menicanti L, Castelvécchio S, de Vincentiis C, Pistuddi V. Aortic cross-clamp time, new prostheses, and outcome in aortic valve replacement. *J Heart Valve Dis* 2012; 21: 732-739.
- Al-Sarraf N, Thalib L, Hughes A, Houlihan M, Tolan M, Young V, McGovern E. Cross-clamp time is an independent predictor of mortality and morbidity in low- and high-risk cardiac patients. *Int J Surg* 2011; 9: 104-109.
- Beller CJ, Bekeredjian R, Krumsdorf U, Leipold R, Katus HA, Karck M, Rottbauer W, Kallenbach K. Transcatheter aortic valve implantation after previous mechanical mitral valve replacement: expanding indications? *Heart Surg Forum* 2011; 14: E166-E170.