

**Case Report**

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# Implantation of Sutureless Aortic Valve in a High-Risk Patient with Active Infective Endocarditis TAVI



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## Abstract

Active infective endocarditis (AIE) is major problem especially for patients with prior valve intervention or device implantation. We present a 77-year-old patient suffering from AIE 14 months after transcatheter-implanted aortic valve (TAVI). The heart team considered TAVI by increased operative risk, Euro SCORE of 10.42%, including severe pulmonary hypertension, chronic obstructive pulmonary disease, insulin depending diabetes mellitus, chronic renal failure and polyneuropathy. Post-interventional, the patient suffered from an aneurysm spurium. During follow-up, the patient underwent dental treatment and afterwards developed 39°C fever and blood culture showed repeatedly *Escherichia Coli*. Echocardiographic examination showed a new paravalvular leakage with limited vegetation at the TAVI. The heart team decided, although a Euro SCORE of 63.57%, appropriate antimicrobial therapy in combination with surgery. A sutureless aortic valve was embedded after annulus patch reconstruction. The postoperative course was uneventful. This case demonstrated that sutureless valves may be a valuable option for AIE-TAVI treatment.

**Keywords:** Minimally invasive aortic valve reconstruction; Sutureless heart valve; Infective prosthetic valve endocarditis

## Introduction

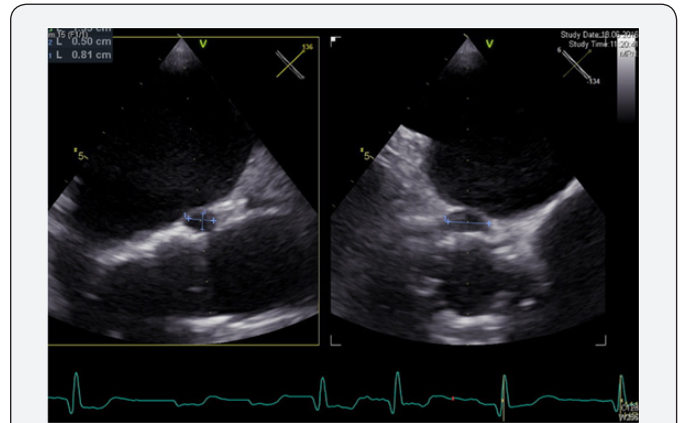
Active infective endocarditis (AIE) is a serious septic risk for all patients, especially if prostheses in conventional aortic valve replacements (AVR) or transcatheter aortic valve implantation (TAVI) are afflicted [1]. Indications for urgent operative debridement and valve replacement in complicated cases of AIE that cannot always be managed with conventional appropriate antibiotic therapy such as embolisms, multi-resistant- or atypical pathogens, including methicillin-resistant staphylococcus aureus (MRSA) and fungi, recurring IE and acute heart failure [2,3]. However, this is in conflict with a fraction of the patient population at high or very high operative risk according to Euro SCORE II [4]. In fact, with increasing age and multi-morbidity, operative risk profiles are increasing over time [5]. A strategy to circumvent this dilemma has been the introduction of TAVI systems for high-risk or inoperable patients [6,7]. However, also TAVI valves are at risk of AIE, leaving patients at a dead end concerning operative endocarditis treatment, as complicated courses of AIE need surgical decontamination and debridement before implanting

a new valve [8-10]. Sutureless heart valves can decrease the operative risk by reduction of cross-clamp-, cardio pulmonary bypass, and thus overall operative time [11]. This is not only beneficial regarding peri-operative- and short-term mortality, but also reduces the risk for additional inflammation in these already septic patients [12,13]. We report the successful use of a sutureless aortic valve in a patient with AIE-TAVI.

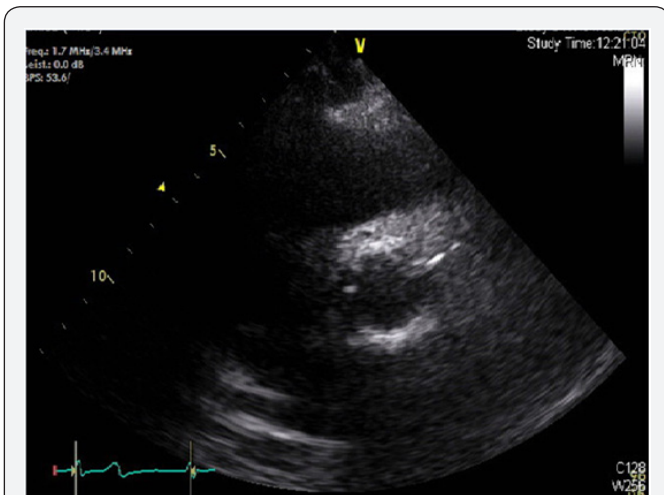
## Case Report

We present a 77-year-old patient, who was admitted to our cardiology unit due to progressive dyspnea and tightness of the chest. Symptoms at admission were graded as New-York-Heart-Association (NYHA) Class III. Fourteen months ago, the patient was admitted for symptomatic aortic valve stenosis. The heart team considered TAVI by increased operative risk, Euro SCORE of 10.42%, due to severe pulmonary hypertension, chronic obstructive pulmonary disease, insulin depending diabetes mellitus, polyneuropathy, Morbus Bechterew and chronic renal failure. A transfemoral TAVI application was performed, using a 29mm SAPIEN 3 (Edwards Lifesciences Inc.,

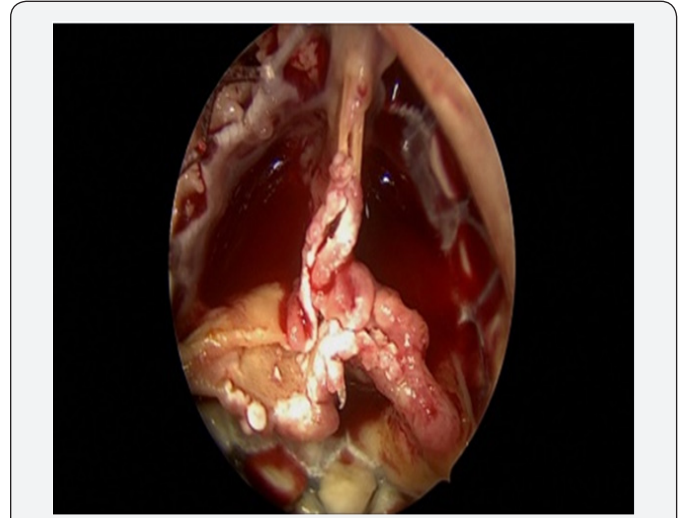
Irvine, California). Post-interventional, the patient suffered from an aneurysm spurium, which was treated conservative. Echocardiography showed a paravalvular leakage, grade I-II, and a mean flow velocity of 1.47m/s. There was no cave seen at the aorto-mitral curtain (Figure 1a, 1b & 1c). During follow-up, the patient needed dental treatment, which was successfully performed. Some weeks later, however the patient developed fever (39°C) and several blood cultures were taken, showing to be repeatedly positive for *Escherichia Coli*. Echocardiographic examination showed an increase of the paravalvular leakage with limited vegetation at the TAVI, however a cave developed at the aorto-mitral curtain (Figure 2). A new heart team conference was performed and decided, desperate the very high Euro SCORE of 63.57%, surgery in combination with appropriate antimicrobial therapy. The AIE-TAVI was explanted (Figure 3). A Perceval L (SorinBiomedica Cardio Srl, Saluggia, Italy) sutureless aortic valve was embed after annulus patch reconstruction in a standard fashion (ref) (Figure 4 & 5). Cross-clamping time was 30 minutes and cardiopulmonary bypass time was 52 minutes. The postoperative course was uneventful. The patient was extubated 7 hours after surgery and a 2-day stay at the intensive care unit was needed.



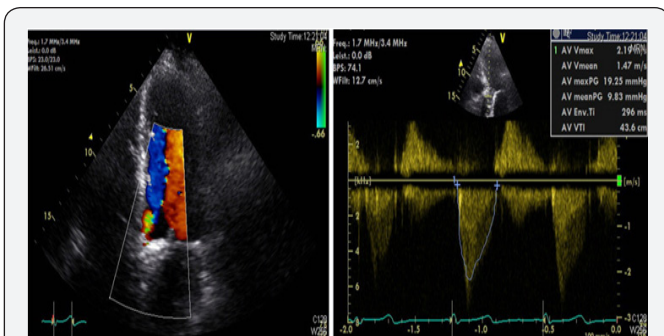
**Figure 2:** Long axis view shows 14 months after TAVI a new cave at the aorto-mitral curtain measured (0.81 x 0.5cm) and central vegetation and the leaflet (left side). Short axis view shows a maximum length of the cave at the aorto-mitral curtain of 1.33cm (right side).



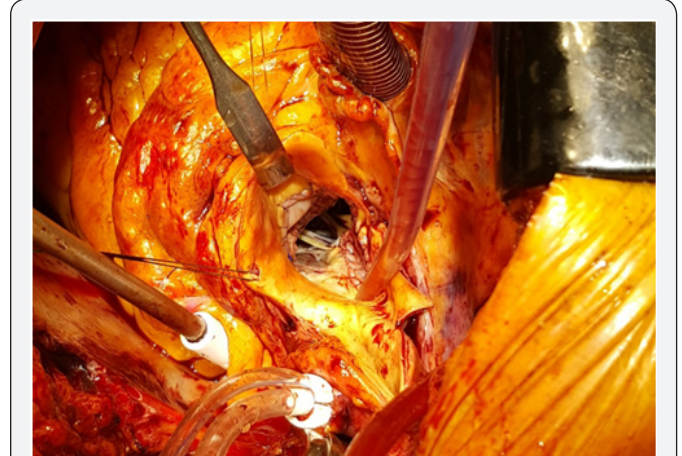
**Figure 1a:** Short axis view after TAVI, showing no cave at the aorto-mitral curtain.



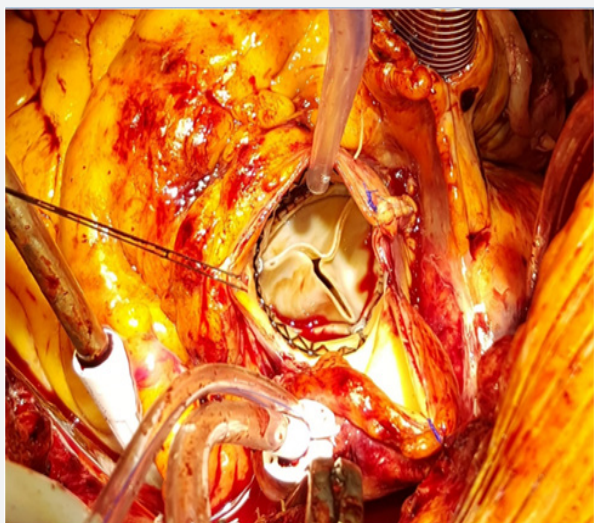
**Figure 3:** Intraoperative view of the TAVI with central vegetations due to active infective endocarditis.



**Figure 1b & 1c:** Deep transgastric long axis view shows a paravalvular leakage of the implanted TAVI.



**Figure 4:** Operative situs with pericardial reconstruction of the aortic annulus.



**Figure 5:** Final aortic valve implantation, using a Perceval sutureless aortic valve.

## Discussion

Cribier et al. [14] introduced the transcatheter aortic valve implantation (TAVI) for high-risk or inoperable patients suffering from severe aortic valve stenosis. Today more than 150,000 patients worldwide received TAVI treatment and growing at a rate of 40% annually [15], however in Germany the rate in 2015 extended 50% [16]. As many patients benefit of TAVI, new challenging complications occur which needs to be addressed. Olsen et al. [17] investigated different risk factors in patient undergoing TAVI which included low transcatheter valve implantation ( $p=0.03$ ), paravalvular leak grade 2+ ( $p=0.006$ ), TAVI-in-TAVI ( $p=0.009$ ) and vascular complications ( $p=0.005$ ).

During the last decade of AIE treatment has been stable accept after introduction of the so-called “the endocarditis team”, in which a standardized multidisciplinary approach for patient with AIE were introduced [18]. Botelho-Nevers et al. [19] could significantly decrease the 1-year mortality from 18.5% to 8.2% (HR, 0.41; 95% CI, 0.21-0.79;  $p=0.008$ ). Indications for early surgical treatment of prosthesis AIE together with appropriate antibiotic therapy has been clearly stated in the current guidelines [20], which includes persistent congestive heart failure signs of poor hemodynamics tolerance, periannular extension or abscess and staphylococci or Gram-negative microbes. [21] This strategy increases survival, showed by Chu et al. [22] as well as Kang et al. [23], who also showed to positive effect of embolism prevention in these patients.

A serious dilemma was found in patients, who received TAVI due to high-risk or being inoperable and appropriate antibiotic therapy is not able to control AIE. The incidence in a recent study of Olsen et al. [17] showed an incidence of AIE-TAVI

of 2.1-2.99% per patient-year. Pericas et al. [24] showed a trend towards surgery compared with non-surgical treatment in survival respectively 90% (1/10) versus 61.9% (8/21;  $p=0.221$ ) in AIE-TAVI. This study, however also showed that in case of heart failure all patient survival in the surgical treated group and 88.9% in the non-surgical treated group will die which was highly significant ( $p<0.001$ ). Therefore, patient suffering from AIE-TAVI should not be left at a dead-end concerning operative endocarditis treatment, as complicated courses of AIE need surgical decontamination and debridement.

New surgical strategies needs to be explored, such as sutureless heart valves can also decrease the operative risk in AIE-TAVI patients by reduction of cardio pulmonary bypass-, cross-clamp- and thus overall operative time [25,26]. These bioprostheses have been evaluated in propensity-matched study to compare with TAVI in high-risk patient with excellent results [27,28]. We have been used sutureless heart valves in the past to treat AIE of the native aortic valve with excellent results [29,30]. We should also not forget that surgically reoperation for AIE-TAVI in high-risk or inoperable patients suffering from native aortic valve stenosis are as a primary intervention without previous sternotomy.

## Conclusion

This case demonstrated that a sutureless aortic valves maybe a valuable option for AIE-TAVI treatment in high-risk patients.

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