Feasibility of Aortic VIV Procedure with Portico Self Expandable Transcatheter Aortic Valve for a Failing Sutureless Perceval S valve

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Abstract

Transcatheter valve-in-valve implantation may be considered in patients with failing surgical bioprosthesis caused by severe regurgitation or stenosis, regardless of sur¬gical valve position. This case report presents a 70-years-old woman presenting with worsening dyspnea, according to New York Heart Association (NYHA) Class III, after she had received a Sorin Perceval® S sutureless valve due to severe aortic valve stenosis one year ago. Echocardiography revealed severe valvular aortic regurgitation and stenosis. Instead of reoperation, the transcatheter valve in the valve procedure was planned. Here we present the first case of the trans-femoral implant of a self-expandable (Portico) aortic valve in a leaking sutureless self-expandable valve.

Key words:

Transcatheter Aortic Valve Implantation, Suturless Aortic Valve, Valve in Valve Implantation

INTRODUCTION

In patients with aortic stenosis, sutureless aortic valves are a relatively novel method of surgical aortic valve replacement (SAVR), and due to less potential invasive nature, these valves are increasingly preferred in patients with significant comorbidities. Likewise, transcatheter aortic valve implantation (TAVI) is a less invasive method of aortic valve replacement for patients with high surgical risk (1). An emerging and less invasive indication of TAVI is bioprosthetic valve failure instead of re-do surgical valve replacement (2). Although numerous reports and series of the successful valve in valve (VIV) procedures have been published in patients with failing stented or stentless bioprosthetic valves, so far, only one case report is present regarding the feasibility of aortic VIV procedures for failing sutureless aortic valves with a balloon-expandable transcatheter valve. In this report, we present a case of the trans-femoral implant of a self-expandable (Portico) aortic valve in a failing sutureless self-expandable Sorin Perceval® S valve.

CASE REPORT

A 70-year-old woman presented with worsening dyspnea [NewYork Heart Association (NYHA) Class III] after she had received a Sorin Perceval S (21 mm) surgical bioprosthetic tissue valve due to severe aortic valve stenosis six year ago. She had also undergone VVI pacemaker implantation after SAVR due to postoperative permanent complete atrioventricular block. Transthoracic echocardiography (TTE) revealed severe valvular aortic regurgitation with associated stenosis (mean gradient: 35 mmHg). Both paravalvular and central components of aortic regurgitation and stenosis were detected during echocardiographic examination (Figure 1). Cardiac computed tomography (CT) scan fluoroscopic images demonstrated that some part of the Perceval® S valve collapsed and protruding into LV outflow. No prosthesis displacement was detected

(Figure 2). Because of the current status of the patient, a percutaneous VIV procedure was planned by the heart team instead of a re-do surgical procedure. Size selection was based on both computed tomography scan and the available information within the Valve-in-Valve Aortic application (version 2.0)

The procedure was performed using the right transfemoral approach under mild anesthesia. The first percutaneous ballooning of the sutureless prosthesis was performed with an 18 mm balloon. Aortic root angiography during balloon inflation did not show potential coronary obstruction risk before device implantation as the inflated balloon simulates the displacement of the leaflets of the sutureless prosthesis. Although sufficient expansion of the Perceval® S valve was obtained during the balloon inflation, immediate recoil with a similar pre-balloon appearance of the bioprosthesis was noted. Portico® 23 mm valve (St. Jude Medical Inc., St.Paul, MN, USA) was advanced to the surgical prosthesis level but failed to cross the bioprosthesis. Therefore, balloon dilatation with a larger balloon (20 mm) was performed. Then, the transcatheter valve was implanted adequately at the lowest visible margin of the Perceval® S valve stent (Figure 3). Since there was still significant paravalvular aortic regurgitation postimplant, a 22 mm balloon was inflated within the newly implanted transcatheter self-expandable valve. There was still mild to moderate aortic regurgitation with no significant aortic valve gradient (Figure 4). Two days later, a single-chamber ventricular pacemaker was upgraded to a dual-chamber pacemaker. The post-procedural course was uneventful, and symptoms and NYHA class improved significantly. TTE at discharge showed mild to moderate aortic valve regurgitation and no significant gradients across the aortic VIV. The patient was still in good condition without any complication after 1 year of follow up.

DISCUSSION

The current standard of treatment for failing or degenerated aortic bioprosthetic valves is re-do surgical operation. However, reoperation carries a significant higher risk of morbidity and mortality. An alternative and less invasive option is the transcatheter VIV operation. Sutureless aortic valve replacement has emerged as an innovative alternative for surgical treatment of aortic stenosis, particularly for patients with higher surgical risk (3). The sutureless design has the potential to improve surgical outcomes by providing a less invasive approach and by decreasing cross-clamp and cardiopulmonary bypass duration (3). However, in our case, the recently implanted Perceval valve was failing with significant regurgitation and stenosis. Inappropriately infolding of the surgical valve was the possible main reason for valve failure other than valve degeneration (4). Because of the small stature of our patient, we decided to implant one size larger valve at the index operation, and it resulted in inappropriate infolding of a sutureless valve stent. Eusanio MD. et al. described a similar case that was treated successfully with a balloon-expandable transcatheter valve (5). Shortly after implantation of the Sorin Perceval valve, significant regurgitation had been noted, and a partially collapsed inflow portion of the Sorin Perceval valve at the noncoronary annulus had been clearly demonstrated by cardiac CT in that case. Likewise, the similar infolded appearance of previously implanted Sorin Perceval valve causing valve regurgitation was detected in cardiac CT of our patient. Another issue worth mentioning is sutureless design of Sorin Perceval bioprosthetic valve. Although the absence of sutures may provide less traumatic surgical intervention and less damage to surrounding tissues, this feature has the potential to complicate transcatheter valve deployment and can cause paravalvular valve regurgitation or valve migration. In our case, more than moderate paravalvular leakage was present after our initial transcatheter valve implantation, and two additional balloon post-dilatations were required to mitigate the paravalvular leakage. Paravalvular aortic regurgitation of failing bioprosthetic tissue valves is generally considered to be inappropriate for VIV therapy. Although there was a significant paravalvular component of aortic insufficiency in our patient, unique deformed geometry of a recently implanted sutureless surgical valve was considered to be amenable to transcatheter VIV therapy with acceptable radial force and post-dilatation if necessary in this case and fortunately ended up with an excellent final result.

In the majority of aortic VIV procedures, balloon-expandable Edwards Sapien/Sapien XT (Edwards Lifesciences, Irvine, Cal.) or self-expandable Corevalve (Medtronic, Minn.) transcatheter valves have been used with favorable early results (6-8) and experience is limited with self-expandable Portico valve. However, in our case, we preferred the Portico valve because of its small size and the unique characteristics of retrievability

and respectability.

In conclusion, transcatheter VIV procedures for failing surgical bioprosthetic tissue valves offer an alternative to preoperative surgical valve replacement. In this report, we documented the feasibility of an aortic VIV intervention using a self-expandable Portico valve in a leaking deformed sutureless Perceval® S valve.

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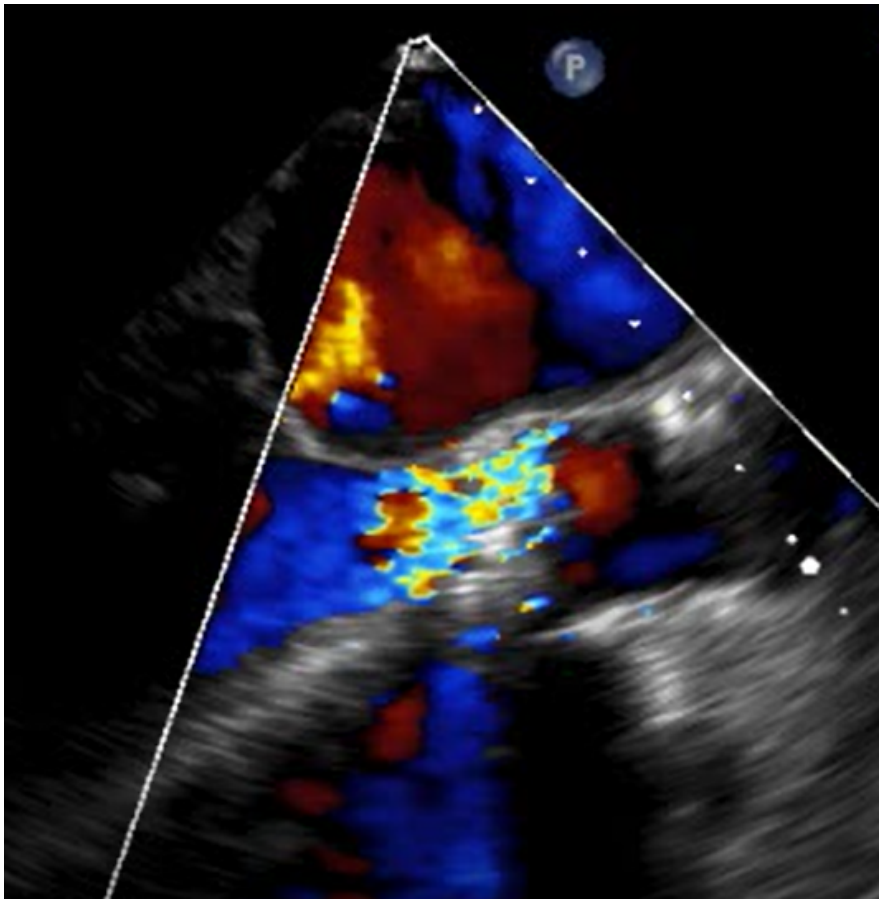
Legends

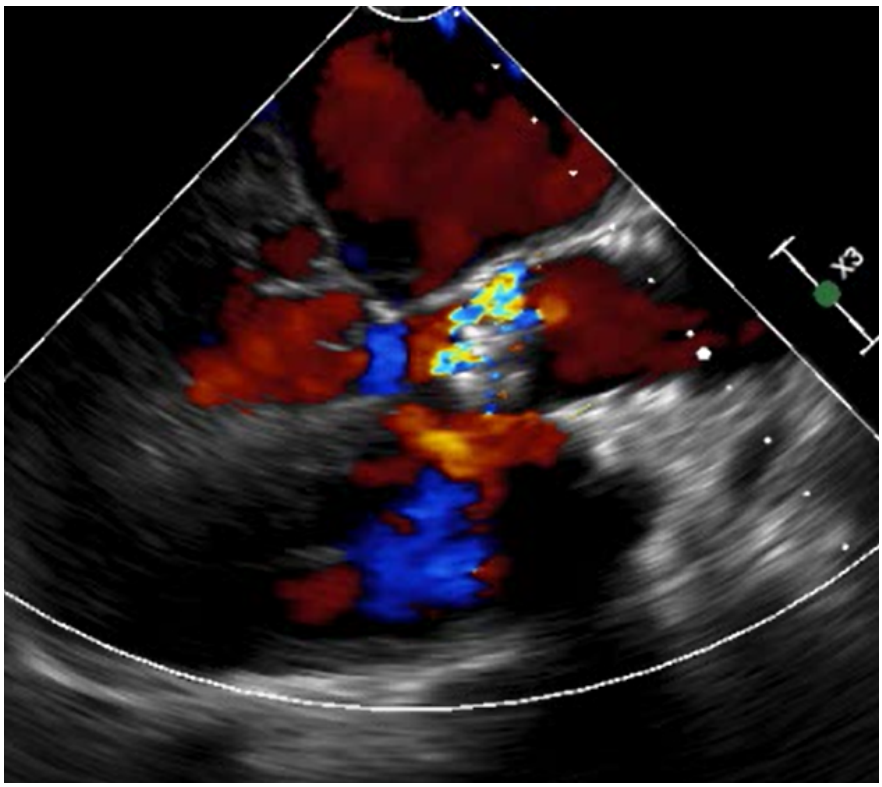
Figure 1: Paravalvular and central components of moderate to severe aortic regurgitation and stenosis.

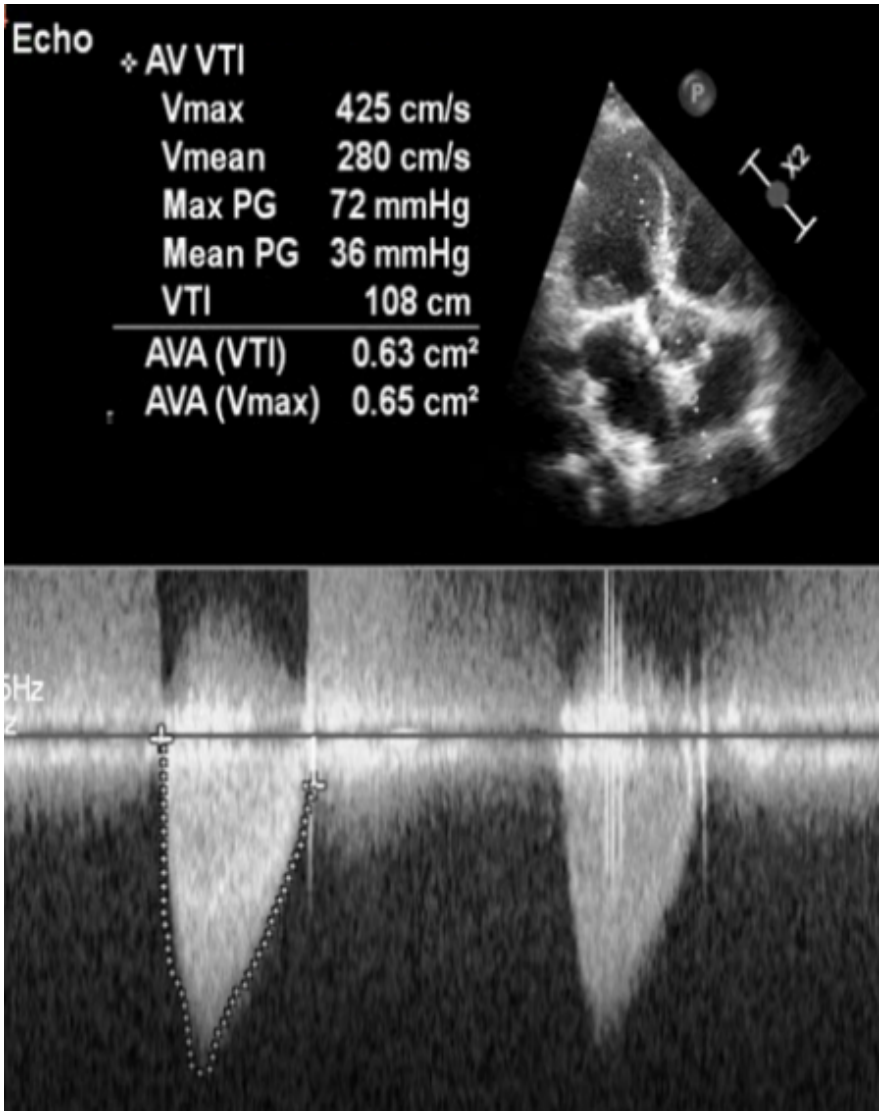
Figure 2: Cardiac computed tomography and fluoroscopic images demonstrated that some part of the Perceval® S valve collapsed and protruding into LV outflow.

Figure 3: Transcatheter Portico valve was implanted adequately at the lowest visible margin of the Perceval® S valve stent

Figure 4: Balloon dilatation with a larger balloon (22 mm) and mild to moderate aortic regurgitation with no significant aortic valve gradient







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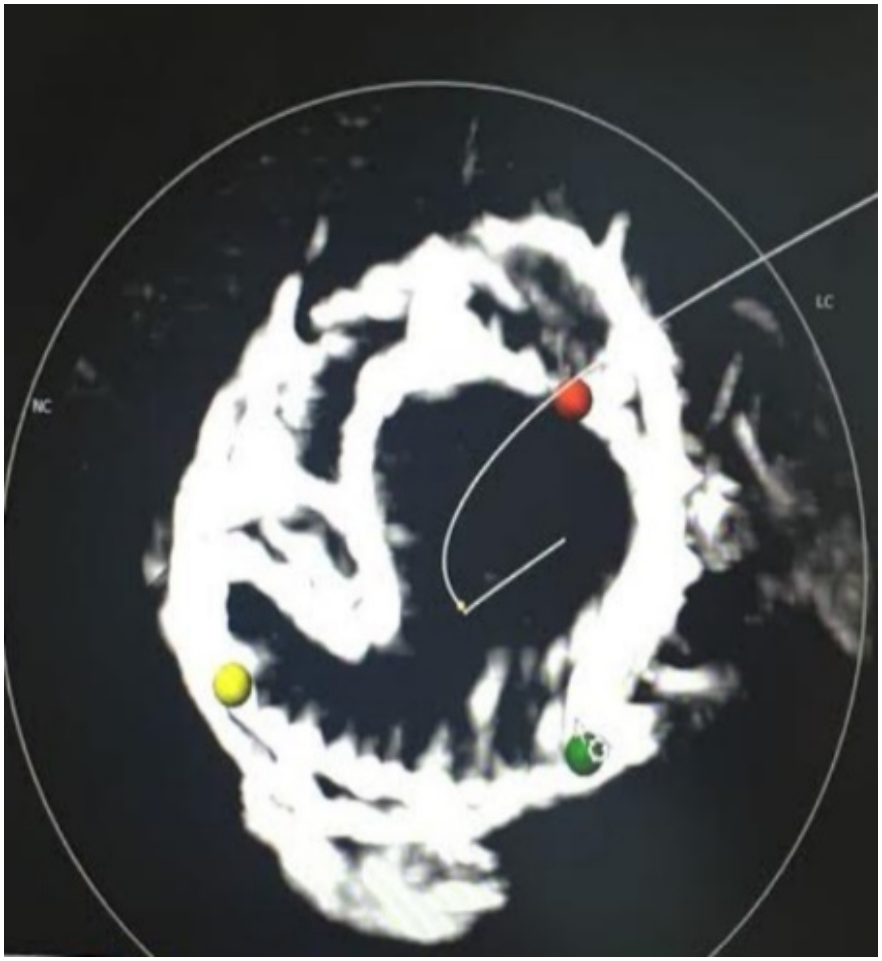

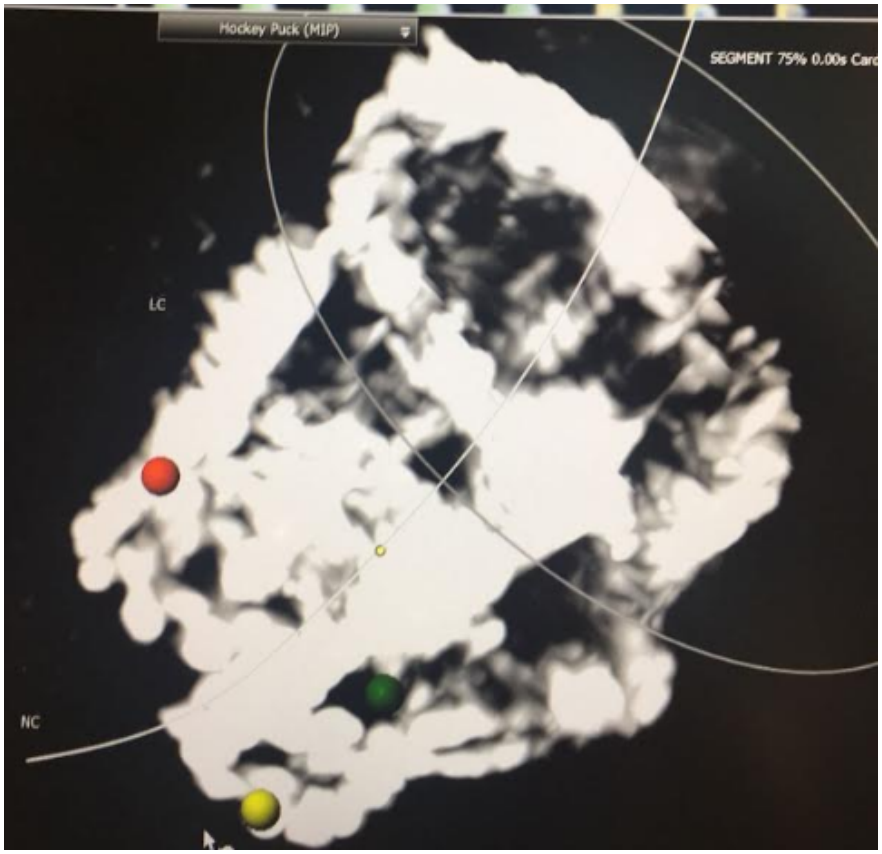

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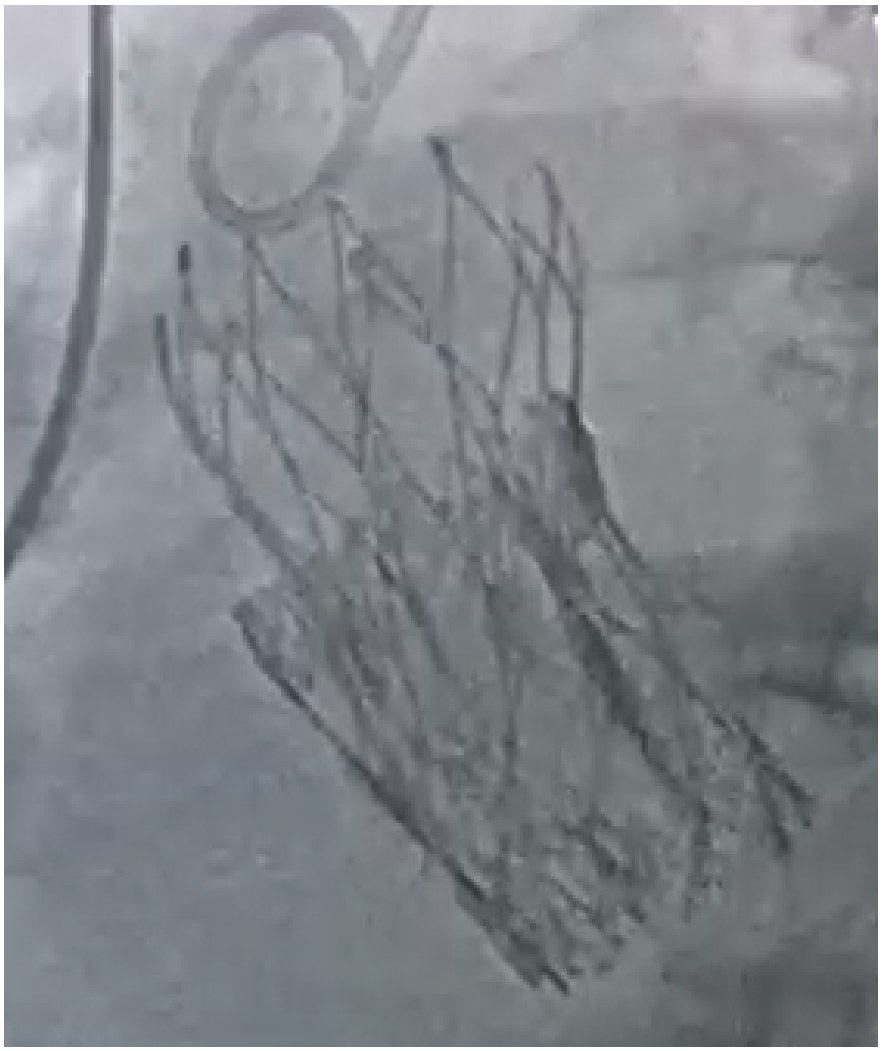
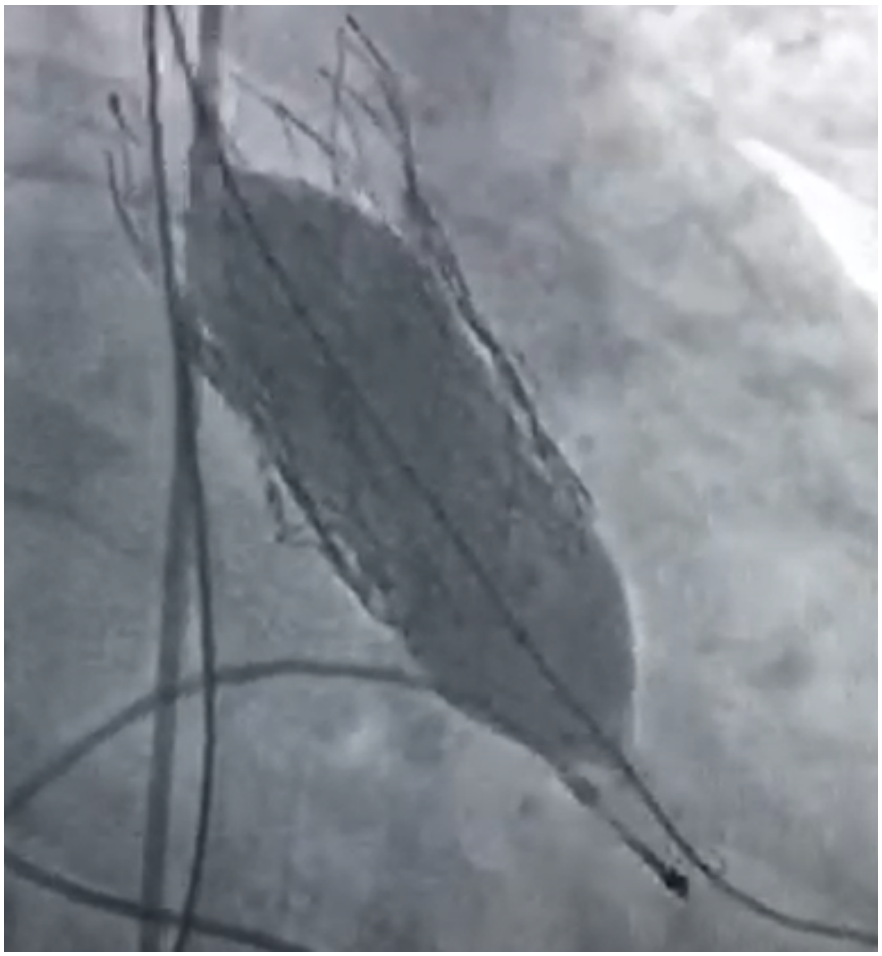
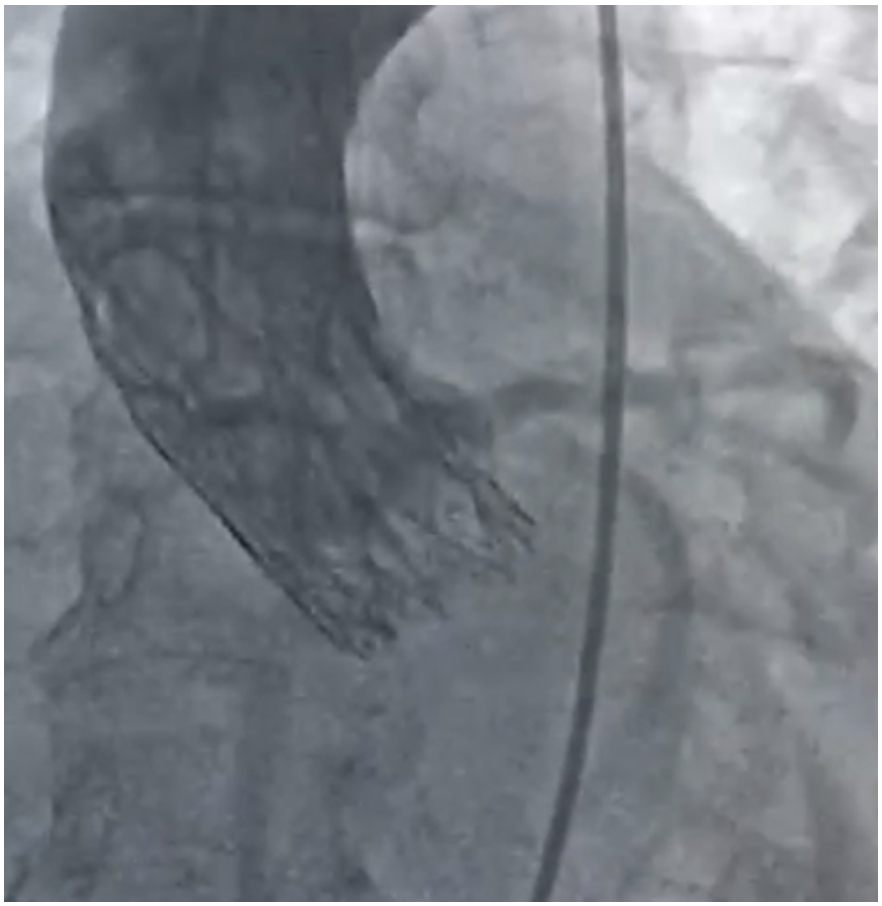
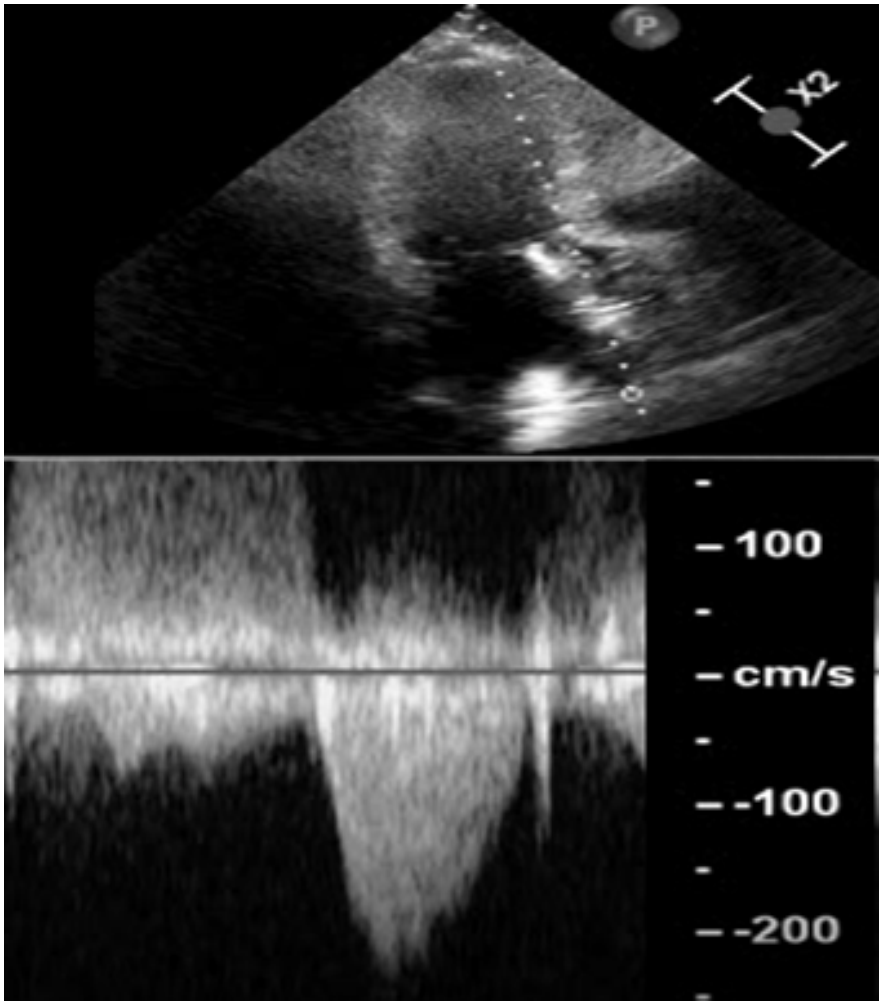
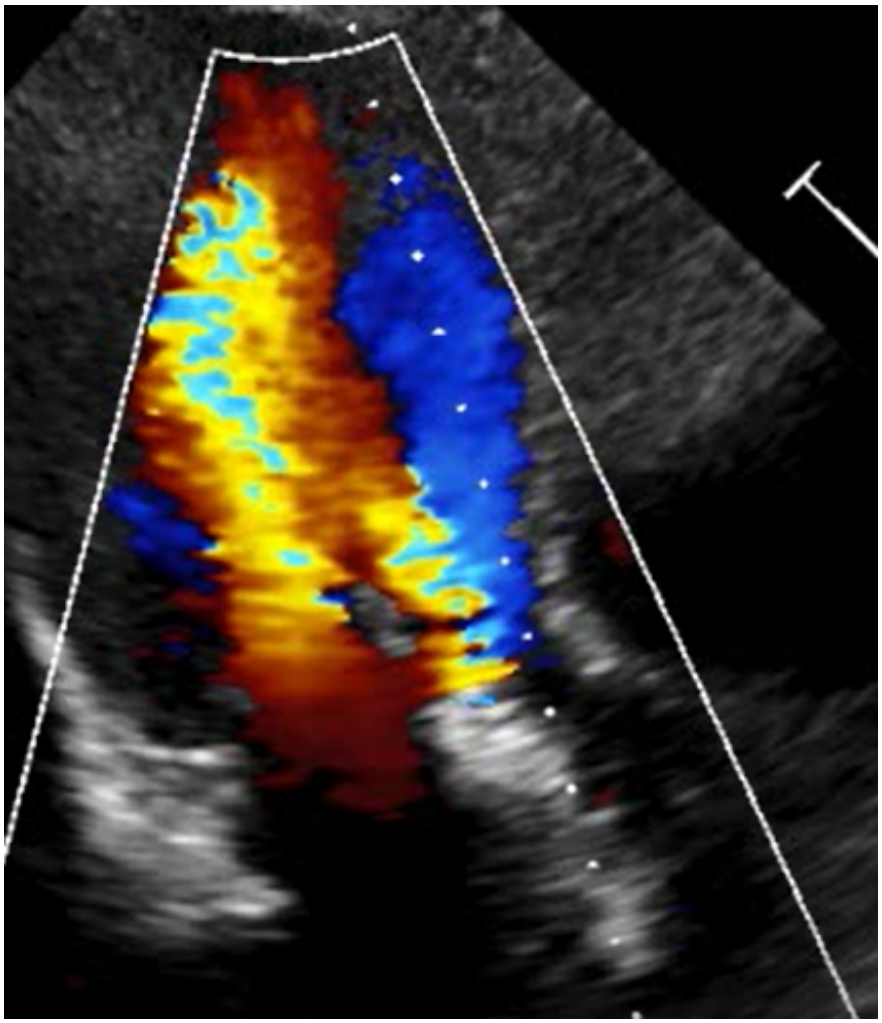


Figure 3: Transcatheter Portico valve was properly implanted at the lowest visible margin of the Perceval® S valve stent









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