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# A RESCUE TRANSCATHETER SOLUTION FOR EARLY SUTURELESS BASAL RING INFOLDING

## **Running Head:** RESCUE TAVI IN SUTURELESS VALVE

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## **ABSTRACT**

We report the case of an 83-year-old woman treated with a “rescue” valve-in-valve transcatheter aortic valve implantation because of an early basal ring partial collapse of a sutureless valve, probably due to septal hypertrophy.

**Keywords:** sutureless valve; TAVI

## **INTRODUCTION**

In elderly patients with severe aortic stenosis (AS), transcatheter aortic valve implantation (TAVI) could not be the treatment of choice in presence of marked left ventricular outflow tract (LVOT) calcification or interventricular septum basal hypertrophy [1-2]. Early prosthesis deterioration due to hemodynamic turbulences, residual LVOT obstruction or LVOT-right atrium fistula have been described as potential complications [2-3]. Therefore, in these patients, surgical aortic valve replacement (AVR) should be preferred because it allows to perform a concomitant septal myectomy [1]. AVR with sutureless prostheses has quickly become a very viable option in older patients, especially in those ones with small aortic annulus, because it merges the usefulness of a biological prosthesis with the chance of reducing the cross-clamp and surgical times as well as the rate of postoperative complications compared to the standard AVR [4]. The presence of an anchorage subvalvular stent, however, requires a careful evaluation of the LVOT anatomy in order to avoid postoperative complications or prosthesis dysfunction. Concomitant septal myectomy, indeed, should be considered in presence of LVOT hypertrophy. However, a cut-off value for the interventricular septum dimensions indicating when that procedure is required during surgical AVR is still missing. For these reasons, we report the case of an 83-year-old woman who had to undergo to a “rescue” valve-in-valve (V-in-V) TAVI because she experienced an early basal ring partial collapse of the sutureless valve after minimally invasive AVR probably related to the untreated septal hypertrophy.

## **CASE PRESENTATION**

An 83-year-old woman with a severe symptomatic AS was admitted to our hospital for surgical AVR as the HeartTeam considered TAVI at high risk due to basal septum hypertrophy (Interventricular septum of 16 mm; Left ventricle end-diastole and end-systole diameters: 38 mm and 22 mm, respectively). Her medical history highlighted very high cardiovascular risk: arterial hypertension, dyslipidemia, 1<sup>st</sup> grade obesity, peripheral artery disease, hyperthyroidism, and chronic atrial fibrillation. Due to the patient's age and comorbidities, a minimally invasive surgical AVR (upper J mini sternotomy) with sutureless prosthesis was planned. Cardiopulmonary bypass was established through standard Aortic-Right atrium cannulation and Custodiol® Solution was antegrade administered to achieve the cardioplegic arrest. A Perceval S, size M (Sorin®, Salluggia, Italy) sutureless valve was implanted according to the manufactures' indications after an

accurate decalcification of the aortic annulus. In order to prevent atrio-ventricular (AV) conduction system damage and considering the absence of significant narrowing of the LVOT, the septal myectomy was not performed. No complications occurred during the valve deployment and the implanted prosthesis appeared well-functioning at the intraoperative transesophageal echocardiography. Cardiopulmonary bypass weaning as well as the surgery course were uneventful.

Postoperative course was unremarkable until the 3<sup>rd</sup> day after the surgery when she presented type III AV block and progressive worsening of hemodynamics and respiratory function. The echocardiogram (Figure 1A) revealed the presence of moderate aortic regurgitation and high pressures gradients through the implanted valve (max/mean gradients: 52/31 mmHg; Prosthetic Valve Area: 1,15 cm<sup>2</sup>) that appeared to be “heart shaped” as a result of a partial collapse of the basal ring at the level of the right coronary sinus; this structural distortion jailed the right coronary cusp and caused moderate to severe aortic regurgitation.

Urgent transcatheter balloon valvuloplasty was successfully performed to reshape the valve and to stabilize the hemodynamics but the patients developed the same imaging and clinical pattern nine days after. The Angio-CT scan (Figure 1 B-C) confirmed the partial infolding of the valve basal ring, therefore, after a careful evaluation by the HeartTeam, it was decided to perform a “rescue” transfemoral V-in-V TAVI (Figure 1 D) with a Sapien 23 mm valve (Edwards Lifesciences LLC, Irvine, CA, USA).

The procedure was successfully performed, and the patient was discharged in good clinical conditions on 16<sup>th</sup> postoperative day. The transcatheter aortic prosthesis remained still competent during the follow-up and no signs of structural distortion or dysfunction are present at 4<sup>th</sup> year of follow-up.

## **DISCUSSION**

Basal stent infolding is a very rare complication after sutureless valves implantation and it's mainly associated with a wrong sizing or prosthesis deployment [5,6]. No cases of basal ring infolding relapse associated with a mild left ventricle septal hypertrophy have been reported. Such complication was not observed even in the premarket approval trials among over than 700 patients with a freedom from valve reoperation of 97.83% at 1 year [7].

Structural malfunctioning is usually detected during intraoperative echocardiographic check or at the time of implantation during balloon inflating [5-8] therefore it can be easily fixed before leaving the operative room.

On the contrary, spontaneous distortion in the early postoperative period is an extremely rare event and could even require an emergency re-intervention.

In our case, the reason of so much delayed and spontaneous stent recoil remains unclear. We suppose that the preoperative septal hypertrophy, increased by myocardial postoperative edema and by the abnormal motion of the interventricular septum related to the cardiopulmonary bypass and to the cardioplegic solution, might have played a significant role. This condition probably modified the symmetry of the aortic annulus in a such extreme way that even the postoperative balloon valvuloplasty didn't solve the problem and the additional radial force of the transcatheter Sapien valve was necessary to stabilize the surgical prosthesis. When the underlying anatomy is suitable, balloon valvuloplasty, indeed, is almost always effective [6-8].

Left ventricle hypertrophy, therefore, can represent a mined field that can hamper even a theoretically "lower-risk" procedure. The anatomy of LVOT, indeed, have to be carefully considered not only when TAVI with prosthesis including subvalvular stents is planned but also in surgical procedures with sutureless valves. Surgical AVR, indeed, requires the extracorporeal circulation and cardioplegic arrest of the heart: these two conditions can deeply modify the anatomy of the heart in the early postoperative hours and can make wrong all those decisions taken during the preoperative planning. For this reason, during sutureless valve implantation, partial septal myectomy should be considered even in case of borderline septal hypertrophy in order to avoid structural valve malfunctioning.

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## **FIGURE LEGEND**

**FIGURE 1.** (A) Postoperative echocardiogram that shows the basal ring deformation at the level of hypertrophic septum (on the left) and the presence of moderate aortic regurgitation and high pressures gradients (on the right) through the implanted valve. (B) Postoperative Angio-CT scan showing the basal ring relapse of the sutureless valve that appeared to be “heart shaped”. (C) 3D Volume rendering of the structural distortion of the aortic prosthesis. (D) Angiogram snapshot showing the right positioning of the Sapien TAVI inside the surgically implanted sutureless valve.