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Case Report
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Absence of Native Left Coronary Leaflet and Localization of Postprocedural Endocarditis Following Transcatheter Aortic Valve Replacement Utilizing Native Basilica Requiring Surgical Intervention

Junaid Khan, David Daniels, Mitul Kadakia, James Lai and Russell Stanten*

Alta Bates Summit Medical Center, USA

Abstract

Background: Structural heart valve disease is a growing and changing field with the expansion of indications of Transcatheter Aortic Valve Replacement (TAVR) allowing treatment of more patients across risk stratifications. As TAVR continues to grow and develop, it is important that unique case complications be reported and understood, so physicians can make procedural determinations based on clinical outcomes.

Case Presentation: A 79-year-old female presented to the ER approximately 7 weeks post TAVR with native Basilica procedure. The patient had an acute upper extremity limb threat that was treated by embolectomy. The source of the embolic complication was identified *via* blood cultures positive for *Staph epi* and TEE to be a result of prosthetic valve endocarditis. The patient underwent urgent surgical Aortic Valve Replacement where the 26 mm SAPIEN 3 was removed and replaced with a 23 mm INSPIRIS Valve. It was noticed that during the removal of the S3 that there was leaflet vegetation and dehiscence at the LC cusp. On the native valve, heavy calcium was present on the NC and RC cusps, while the LC leaflet was nonexistent. A fistula between NC and RC to LA was repaired. Patient was successfully weaned from CBP and transferred to ICU in critical but stable condition.

Conclusion: During the removal of the S3 TAVR due to endocarditis, the dehiscence of the S3 at the LC and nonexistence of the native LC leaflet where the original basilica was performed draw attention to potential localization of the infection to an area of thermal damage from the electrocautery of the Basilica. It is possible that the active endocarditis infection could have localized to the area of trauma from the leaflet laceration or electrocautery tissue damage resulting in necrosis from the Basilica procedure itself. Continued observation of the localization of infection and tissue necrosis post TAVR with Basilica should be documented.

Keywords: TAVR; Basilica; INSPIRIS; SAPIEN; Endocarditis; AVR; Dehiscence; Electrocautery; Necrosis; SAVR

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Correspondence:
Junaid Khan, Alta Bates Summit Medical Center, 350 Hawthorne Ave, Oakland, CA 94609, USA, Tel: +1-5104656600; Fax: +1-510-839-0806; E-mail: khan94611@gmail.com

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Introduction

Transcatheter aortic valve replacement has entered the mainstream as a treatment option for high, moderate and now, low risk aortic valve stenosis patients. As it has moved from the high to low risk populations, complications should continue to be documented as the procedure and treatment evolve. Coronary obstruction can occur when native or prosthetic valve tissue or clot occurs in the small space in the sinuses of Valsalva obstructing the coronary arteries. When this occurs, in less than 1% of patients undergoing TAVR, the mortality is greater than 50% [1]. Even when the patient with late coronary obstruction can get to the hospital and undergo a PCI, the mortality is still greater than 20% [2]. Most cases involve obstruction of the left coronary artery which could be due to the outcome of obstruction of the left coronary artery being more severe or the size of the sinus itself [3]. Though the risk of obstruction is relatively rare, the severity of this complication weighs heavily on the minds of the TAVR teams.

A Basilica procedure can be used to mitigate the risk of coronary obstruction due to leaflet tissue. BASILICA stands for Bioprosthetic or native Aortic Scallop Intentional Laceration to

prevent Iatrogenic Coronary Artery obstruction [4]. The TAVR team will use a series of measurements and criteria to determine the risk of the patient for coronary obstruction and if a Basilica is indicated for the patient [5]. If it is determined that the Basilica is necessary, the team will perform the laceration using a snare and an electrified guidewire to cut the leaflet prior to deployment of the TAVR valve [4]. There is limited data on the use and potential complications of the Basilica procedure [6]. In the porcine study models, the leaflets were examined through necropsy and showed no macroscopic collateral thermal damage, though there were complications noted where there was injury to the annulus, left atrium, septum and mitral chords from the guidewire management [4]. The potential for collateral structural damage to other cardiac structures does exist and requires attention to detail from the TAVR team. Electrosurgical incisions, in a broader application, have been noted to have more tissue necrosis and higher infection rates than traditional scalpel incisions [7,8]. More studies need to be done with larger populations to draw conclusions as to the safety and potential complications of the Basilica procedure.

Endocarditis is a potentially fatal complication of prosthetic heart valve replacement whether the patient undergoes TAVR or SAVR. The rate varies between 0.3% to 1.2% per patient year [9]. Prosthetic valve endocarditis, though rare, has a mortality rate that is devastating. The rate has improved from greater than 50% to just over 22% as the identification and treatment methods have improved [10]. Once endocarditis is determined, the method in which it is treated have a significant impact on the survival of the patients. With medical management only, the mortality hovers around 75% whereas surgically treated patients have a better outlook of 23% to 43% [11]. With such a drastic difference in the survival of endocarditis, it is understandable that many patients go with surgical removal of the device over medical treatment alone.

Case Presentation

A 79-year-old female presents with severe, symptomatic aortic stenosis and NYHA class II heart failure. Her mortality risk was calculated at 2.7% and M&M risk of 14%. Though her STS denotes a low surgical risk, her history of chronic kidney disease, PMH from chronic atrial fibrillation, DM2, HTN, anemia, hypothyroidism and frailty criteria make her at intermediate risk for open heart surgery and she was deemed at a good TAVR candidate. During the preoperative work up, it was revealed that she had very effaced coronary sinuses and a large left coronary valve leaflet. It was determined that intentional laceration of the left coronary leaflet was necessary to prevent coronary obstruction post TAVR. Her AVA was 0.6 cm^2 with MG/PG 35.8 mmHg/65.6 mmHg.

The TAVR was performed by the multidisciplinary TAVR team. The initial procedure went as planned inclusive of the basilica procedure to the left coronary cusp and deployment of a 26 mm SAPIEN 3 valve in the aortic position. The valve was evaluated post deployment *via* transthoracic echo in which it was noted to be in excellent anatomic position and good function. There was a trace paravalvular insufficiency noted and an additional inflation with 2 ml added to the balloon was performed. The valve was then evaluated where even less paravalvular insufficiency was noted with a mean gradient of 8 mm. The procedure was completed and felt to be a success with trace AR and without PVL.

The patient presented to the ER approximately 7 weeks post TAVR with native Basilica procedure. The patient had an acute upper extremity limb threat that was treated by embolectomy. The source of the embolic complication was identified *via* blood cultures positive for *Staph epi* and TEE to be a result of prosthetic valve endocarditis. Her admission was complicated by tachy-brady arrhythmias and refractory A-fib requiring an urgent temporary transvenous pacemaker to be placed. Sterilization of the prosthetic valve was determined to be unlikely and potential complications life threatening, therefore the patient would benefit from a redo surgical Aortic valve replacement with a bioprosthetic valve.

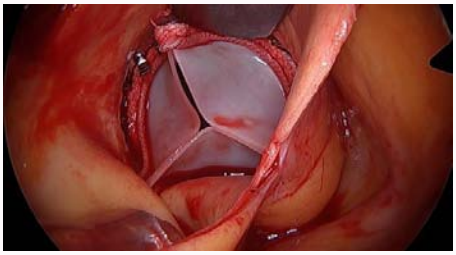

Figure 1: Post repair of annulus and implant of new surgical bioprosthetic valve.

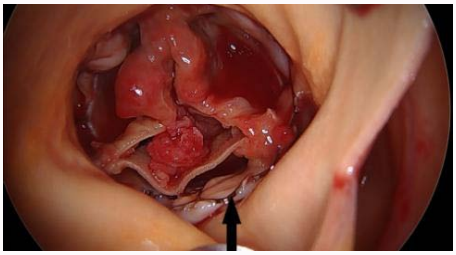

Figure 2: Infected Sapien 3 valve, noted dehiscence of the left coronary oriented cusp of the prosthetic TAVR valve.

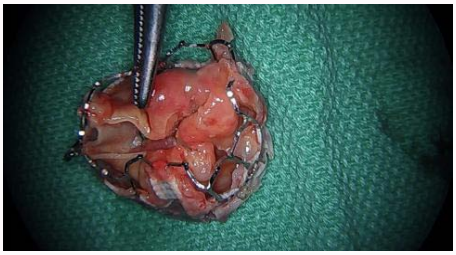

Figure 3: Removal of infected Sapien 3.

The patient underwent urgent surgical Aortic valve replacement where the 26 mm SAPIEN 3 was removed and replaced with a 23 mm INSPIRIS Valve (Figure 1). The patient was noted to have pulmonary hypertension resulting in PA pressures 2/3 of systemic pressures. It was noticed that during the removal of the S3 that there was leaflet vegetation and dehiscence at the LC cusp (Figures 2 and 3). On the native valve, heavy calcium was present on the NC and RC cusps, while the LC leaflet was nonexistent (Figure 4). The SAPIEN was excised as well as the native RC and NC cusps. A fistula between NC and RC to LA was repaired using a pericardial patch (Figure 5). Patient was successfully weaned from CBP. Hemodynamics, wall motion and valve function were noted to be excellent. Post procedure she was transferred to ICU in critical but stable condition. A permanent pacemaker was placed 4 days post procedure. Patient was discharged to Acute Rehab in satisfactory condition.

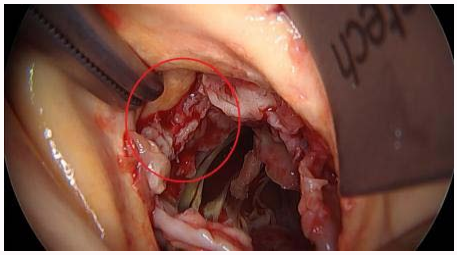

Figure 4: Native valve post infected Sapien 3 removal with right angle in the left coronary, absence of left coronary leaflet tissue noted.

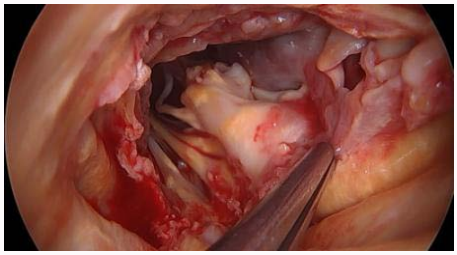

Figure 5: Fistula between Right and Non-coronary to Left Atrium.

Discussion and Conclusion

As TAVR becomes the standard of care for Aortic valve replacement, new procedures are developed to ensure success of the TAVR procedure. These procedures need to be documented and case reports shared with the medical community to determine if any potential complications put the patient at increased risk. In this case report, the disappearance of the native left coronary leaflet from the native valve and the localization of the endocarditis on the prosthetic S3 to the left coronary cusp area, draw attention to the initial BASILICA procedure. It raises potential questions about enhanced thermal trauma resulting in potential necrosis of the native leaflet. Understanding that the Basilica of the native valve leaflet at the left coronary cusp occurred during what seemed to be an uncomplicated TAVR procedure, calls to question if the endocarditis could have localized to the area of trauma from the laceration of the leaflet resulting in tissue necrosis or creating a site for infection. Electrosurgery has been documented to have complications inclusive of vaporization, coagulation, necrosis and higher rates of infection than traditional scalpel incisions [7,8]. However, in one of the larger Basilica studies to date looking at 30 patients at 30 days, showed no increased risk of death or endocarditis at the end of the study period [6]. This seems to support that there is no increased risk to the patient in the periprocedural timeframe. Yet, this patient's complications were reported beyond 30 days. In a study into the rates of endocarditis from the TAVR registry, rates of endocarditis were higher in patients with DBM and occurred on average 5 months post implant [12]. This patient had DBM possibly increasing her risk of infection and the infection was found greater than 30 days post procedure seeming similar to the study. Another possible factor could have been caused by the wires passed through the groin to facilitate the Basilica procedure. Exchange length wires, 260 cm, are used for this an it adds to the amount of hardware passed through the sheath across the patient's valve potentially introducing trauma or infective organisms. In this patient, it is hard to determine if the localization of the endocarditis infection was potentially driven or enhanced by the intentional laceration of the native valve leaflet upon the initial TAVR procedure. Continued documentation and reporting of unique patient cases are needed to continue to assess risk to patients in the changing AVR treatment landscape.

Declaration

Alta Bates Summit Medical Center was a study participant in the Partner 1, 2, and 3 TAVR trials. All authors participated in these studies.

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