



## BASILICA – A classical name for a novel solution

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### Introduction

The development of transcatheter aortic valve implantation (TAVI) has led to a paradigm shift in our management of severe, symptomatic aortic stenosis (AS). It has provided an efficacious and safe treatment for patients deemed either inoperable, or prohibitively high risk for surgical aortic valve replacement (SAVR). As the technology improves and experience grows, global use of TAVI has increased year on year. With increasing familiarity has come a commensurate increase in the range of indications that TAVI is being used for, and it is now being utilised in lower risk patient populations, as well as within degenerate

SAVR prostheses (valve-in-valve; ViV). Nevertheless, despite the overwhelming success that has allowed TAVI to transition from burgeoning niche technique into a mainstream benchmark procedure, challenges still remain. One of the most feared complications during TAVI is the risk of coronary obstruction during valve deployment. This can occur as a result of the skirting segment of the prosthesis frame being positioned in front of the coronary ostia, but more commonly occurs due to displacement of the native aortic valve leaflets. In most cases, patients whose anatomy presents a risk for this can be predicted by pre-procedural CT imaging. In this situation, the current options are to either decline the patient for TAVI, or to pre-empt the complication by

### Take Home Messages

- Coronary obstruction during TAVI is rare but potentially fatal
- It is 3-4-fold more common in valve-in-valve TAVI - an increasingly common strategy in the setting of degenerative SAVR.
- BASILICA is a novel technique employing electrocautery to lacerate the AV leaflets ensuring they splay either side of the coronary ostia when displaced by a TAVI prosthesis.



engaging a guide catheter, wire and a stent within the at-risk coronary ostia prior to valve deployment. However, outcomes following PCI in this setting are relatively poor. A systematic review of the topic found that mechanical haemodynamic support was required in 25% of such cases, whilst significant compression of the stent was seen in 13% (1). A recently developed technique, the bioprosthetic or native aortic scallop intentional laceration to prevent coronary artery obstruction technique - abbreviated to BASILICA - shows promise in providing a potential solution to this life-threatening problem (2).

### **BASILICA – Messiah or false prophet?**

The BASILICA technique has been developed at the National, Heart, Lung, and Blood Institute (NHLBI) in the USA specifically to allow patients at risk of coronary obstruction to undergo TAVI. It involves use of electrocautery to lacerate the aortic valve leaflets, thereby ensuring that they splay either side of the coronary ostia when displaced by a TAVI prosthesis. Femoral arterial access and tandem guide catheters are used; one catheter delivers the cutting wire (a 0.014” guidewire inside a polymer jacket which can be electrified when needed) to the base of the cusp targeted for laceration, while the other delivers a snare device through the orifice of the aortic valve and into the left ventricle. The cutting wire is traversed through the valve leaflet with the assistance of bursts of radiofrequency energy. Once through the leaflet and in the left ventricle, the wire is then snare-retrieved and externalised. Laceration is achieved by then placing tension on both free ends of the guidewire, whilst simultaneously applying electrical energy (typically 70W) in short bursts until the guidewire is free.

It was initially tested in swine before being trialled in patients who were ineligible for SAVR and who were at high risk of coronary obstruction (2). This initial first-in-human study involved 7 patients, and the procedure was successfully carried out in all cases. A single leaflet was lacerated in 6 patients, whilst both left and right coronary cusps were lacerated in one case. There was no haemodynamic compromise following BASILICA, and most importantly all patients went on to have uncomplicated TAVI with 100% 30-day survival.



Clearly, the numbers involved in this study are small. However, it is worth noting that BASILICA was developed following the success of the LAMPOON (Laceration of the anterior mitral valve leaflet to prevent left ventricular outflow tract obstruction) procedure, an analogous technique used to allow trans-mitral valve implantation in patients at risk of LVOT obstruction (3). Both procedures are in their infancy and have a relative paucity of data, but show significant promise.

### **A new dawn for valve-in-valve TAVI?**

As mentioned in the introduction, TAVI is now being used to treat degenerate bioprosthetic SAVRs. A significant proportion of patients who present with symptoms secondary to a failing bioprosthetic SAVR are deemed prohibitively high risk for re-do surgery, and so ViV TAVI is an important therapeutic option. Interestingly, studies assessing the durability of bioprosthetic SAVRs have demonstrated younger age to be one of the predictive factors for structural deterioration. It is thought that, in addition to a passive degenerative process, there is also an active mechanism which triggers an inflammatory response which may be more potent in younger patients who are more immunologically active (4). As such, the requirement for ViV TAVI may progressively increase as young recipients of SAVR run into problems related to bioprosthesis failure. Coronary obstruction during ViV TAVI is 3-4-fold more common when compared to native valve TAVI. With this in mind, it is possible that BASILICA may find its primary usage in facilitating ViV TAVI. In fact, in the aforementioned first-in-human study, 6 out of the 7 patients treated with BASILICA had failed bioprosthetic valves.

### **Conclusion**

Coronary obstruction during TAVI is a rare but potentially fatal complication. Current options for mitigating the risk are inadequate and given the potential for increasing numbers of ViV TAVI in coming years, a novel solution is required. The BASILICA procedure is a promising step in the right direction but needs further validation before being taken up into routine practice. To this end, a prospective clinical trial is now underway to assess the efficacy of BASILICA in a larger cohort of patients (5). The study aims to recruit 60 patients who are planned to undergo TAVI or ViV TAVI, are deemed to be high risk for coronary obstruction, and who have been declined for SAVR.



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Given the rapid advancements occurring in the field of structural intervention, if the results of this trial substantiate the promise seen in the first-in-human trial, it may not be long until BASILICA becomes a more household name within our cath labs.



## References

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