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Editorial

TAVI for rheumatic aortic stenosis – The next frontier?

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Transcatheter aortic valve implantation (TAVI) has revolutionized our approach to the management of patients with degenerative calcific aortic valve stenosis (AS) and is now firmly established as the treatment of choice in those at increased risk of perioperative mortality [1]. Considering that less than two decades ago, close to one third of elderly patients in need of aortic valve replacement surgery were turned down because they were considered unsuitable for open heart surgery, the success of the TAVI procedure has transformed the lives of thousands of people. However, despite its great success, it is important to keep in mind that countless numbers of patients with aortic valve disease who are too high risk for surgery are considered unsuitable for TAVI. Amongst the most important of these limitations is the narrow spectrum of morphological, anatomical and physiological abnormalities of the aortic valve which can safely accommodate current commercially available TAVI valves.

Fundamental to the technical success of the TAVI procedure is adequate calcification of the aortic valve to allow for secure positioning and anchorage of the valve. The absence of adequate calcification and the inability to adequately anchor the valve is associated with an increased risk of valve embolization, paravalvular regurgitation, annular rupture and conduction disturbances [2], and remains a major contraindication for the procedure. This is important because not all disease processes which result in aortic stenosis (and/or regurgitation) cause an adequate degree and distribution of calcification. Rheumatic aortic stenosis, the subtext for the important study published by Saji et al. in this issue of the IJC [3], is one such disease which leads to severe morphological distortion of the valve with limited calcification at the time most patients are symptomatic and in need of intervention. Whereas the immobility of the valves in degenerative AS is due to process of active calcification [4], the stenosis in rheumatic AS is caused by post inflammatory commissural fusion and fibrinous thickening of the valves without much calcification [5], explaining why most such valves are poor substrate for TAVI.

The subject of the potential role of TAVI in patients with rheumatic heart disease (RHD) is important because despite its virtual eradication in North America and Europe, the burden of RHD and by extension the prevalence of rheumatic aortic valve disease and the potential need for non-surgical treatment solutions globally remains significant. Estimates are that RHD affects between 35 and 70 million patients across the globe [5,6] and accounts for up to 1.4 million deaths per year, most of them in low- to middle-income countries [7]. Amongst those with RHD, modern registries conducted in RHD endemic areas of the world, suggest that although isolated aortic stenosis is infrequent (<3%), up to 60% of those with symptoms (including those over 70 years) have disease which involves the aortic valve, with evidence of both stenosis and regurgitation [8]. Given the successful use of TAVI in calcific aortic valve stenosis (including valves with both stenosis and regurgitation [AS/AR]) it is not surprising that various reports have emerged testing the use of TAVI for rheumatic disease despite the risk of poor procedural success and increased complications [9].

With this background in mind, the report in this issue of the IJC by Saji and colleagues raises an important question for us to consider and contemplate. Namely, in parts of the world where a proportion of the aged population of patients presenting for TAVI evaluation have evidence of rheumatic involvement of their calcified stenosed aortic valves, should these patients also be denied the procedure by virtue of their "rheumatic pathology"? The results from the small case series suggest that perhaps, with appropriate imaging by CT scan to ensure that there is an adequate amount and distribution of calcification and with careful clinical selection of suitable patients, TAVI may be safe and potentially efficacious.

The group of TAVI operators from JAPAN describe their experience of the evaluation of AS using 2D echocardiography and CT scanning and the outcomes of commercially available balloon- ($n = 8$) and self-expanding ($n = 2$) TAVI prostheses in ten elderly patients (mean age 83 ± 6 years) considered to have degenerative calcific aortic valve stenosis with echocardiographic evidence suggestive of rheumatic involvement of the valve. All patients, were at increased risk for conventional surgery (STS score $7 \pm 4\%$) [3]. Of note is that patients without any calcification of the aortic valve were excluded and that all of the patients included in this series had varying 'moderate +' degrees of calcification of the aortic valve leaflets (mean Agatston calcium score (AU) of 2062 ± 864). Successful device implantation was reported in 90% of cases with one patient (10%) having required a second TAVI to be placed

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in view of residual paravalvular AR. There were no 30-day deaths and the safety outcomes were positively met.

Should we take from this report that there is hope for the future use of TAVI in patients with RHD? Not on the basis of this cohort. To begin, it is important to emphasize again, that neither the patient population nor the valve morphology was typical of the vast majority of patients with symptomatic rheumatic heart disease globally [8]. These patients were older by several decades, and despite the echo evidence of commissural fusion, their valves were almost indistinguishable from age related degenerative calcific AS which is what in all likelihood, allowed for the technical success of the TAVI valves in this cohort. Secondly, the case series was small (10 patients) and should be interpreted understanding the inherent limitations of information derived from small cohorts. However, as a proof of concept report in this unique subset of patients it is encouraging and worthy of further exploration. Thirdly, the report suggests that the use of CT scanning, to further define the morphological abnormalities of the valve and assess the degree of calcification, in addition to the usual information derived from pre-TAVI CT, was a very important part of the successful patient selection process and predictor of procedural success.

Overall, Saji and colleagues should be congratulated for conducting their study and reporting these results which may eventually open the door to the more routine use of TAVI in patients similar to those in their cohort thereby expanding access and availability of this lifesaving technology to an even greater number of patients in need.

Conflict of interest

The authors report no relationships that could be construed as a conflict of interest.

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