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Commentary: Leaflet perforation after transcatheter aortic valve replacement: An unsuspected complication with underestimated outcomes

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The indications for transcatheter aortic valve replacement (TAVR) have recently been widened to low-surgical risk patients.¹ As surgical risk decreases, so does the average age of the patients. One major consideration remains: TAVR prosthesis durability, which has been poorly investigated thus far. Several authors have suggested that different mechanisms, all involving some extent of leaflet damage, including cusp rupture, leaflet thrombosis, and accelerated calcification, could have major consequences on valve durability and therefore on patient outcomes after TAVR.^{2,3} These lesions appear to be responsible for aortic regurgitation and the need for surgical explant.⁴ However, these lesions remain underdiagnosed.

In this issue of the *Journal*, Liesman and Fukuhara⁵ report 2 cases of leaflet perforation with a need for surgical explant. These cases share several common aspects: first, both patients had a history of chest radiation therapy with severe root calcification; second, both cases received a TAVR procedure with a self-expandable valve after a primary sternotomy; and third, surgical explant because of aortic regurgitation was required in both cases after a short

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CENTRAL MESSAGE

Leaflet perforation after transcatheter aortic valve implantation is a rare complication that may alter valve durability due to transcatheter valve leaflet vulnerability.

period following the TAVR procedure: 3 and 5.8 years. Similar macroscopic findings were also noted: neo-endothelialization of the TAVR prosthesis nitinol frame into the aortic wall, with a perforation/tear located on the right coronary cusp.

Liesman and Fukuhara⁵ unmask a major unknown of TAVR prostheses: valve durability/longevity. The 2 cases occurred in the early- to mid-term follow-up post-TAVR, which suggests that leaflet fragility could have a negative impact on valve durability. Hypothetic risk factors for leaflet perforation were additional postdeployment balloon dilatation, as well as crimping of the prosthesis, which has also been reported by others.² In addition, they suggested that valve durability could be further affected by implanting the prosthesis into an undecalcified native aortic valve and aortic root. This article is important because the authors effectively shed some light into a potential mechanical failure of TAVR due to the leaflet injury. The newer generation of TAVR bioprostheses has leaflets that are generally thinner to accommodate the smaller caliber of the delivery sheaths, which may translate into a potentially increased fragility of the leaflets. Further mechanical stress may be due to the crimping process, recapturing, and postdeployment balloon dilatation, and may render the leaflets vulnerable to perforation and subsequent thrombosis, although these theories remain hypothetical. Further studies are needed to assess these issues.

Liesmann and Fukuhara⁵ have exposed a novel but potentially underdiagnosed complication of TAVR prosthetic leaflet perforation. The durability of TAVR

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prostheses should be considered in our decisional algorithm when assessing the optimal approach to aortic stenosis, especially in younger patients.

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