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## Commentary: Leaflet perforation after transcatheter aortic valve implantation in calcified roots: When perfect can be the enemy of good?

Aleksander Dokollari, MD,<sup>a</sup> and Gianluigi Bisleri, MD<sup>b</sup>

The presence of advanced atherosclerotic disease in the ascending aorta has represented one of the main indications for transcatheter aortic valve replacement (TAVR) as an alternative to conventional surgical aortic valve replacement in high-risk patients. In the present issue of the *Journal*, Liesman and Fukuhara<sup>1</sup> present 2 cases of leaflet perforation and perivalvular leaks following the implantation of a self-expandable transcatheter bioprosthesis in calcified roots; based on such findings, the authors raise a concern whether leaflet perforation after TAVR in patients with severely calcified aortic root could represent an under-recognized complication. In particular, both patients in this series had previously undergone chest radiation therapy.

Radiation therapy to the mediastinum can be associated with significant valvular abnormalities, manifesting as progressive valve thickening and calcification, resulting in valve restriction and dysfunction that presents as stenosis and/or regurgitation. Such degenerative changes have been shown to extend also to the aorto-mitral curtain and to be independently associated with mortality in patients

From <sup>a</sup>Division of Cardiac Surgery, St Michael's Hospital, Toronto; and <sup>b</sup>Division of Cardiac Surgery, Queen's University, Kingston, Ontario, Canada.

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Address for reprints: Gianluigi Bisleri, MD, Victory 3–Kingston Health Sciences Center, 76 Stuart St, Kingston, Ontario, Canada K7L2V7 (E-mail: [gianluigi.bisleri@queensu.ca](mailto:gianluigi.bisleri@queensu.ca)).

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Gianluigi Bisleri, MD, and Aleksander Dokollari, MD

### CENTRAL MESSAGE

Transcatheter approach is often preferred for aortic valve replacement in presence of a calcified aortic root; the extent of such calcifications may affect the durability of transcatheter prosthesis.

undergoing cardiac surgery.<sup>2,3</sup> While most reports focus on surgical treatment of native valve disease after radiation, there are no reports regarding the use of TAVR post-radiotherapy.

The underlying mechanism of postimplant leaflet damage in both self-expandable and balloon-expandable prosthesis is multifactorial. Potential causes include leaflet damage during crimping or implantation, manufacturing defects, and inadequate closing pressure due to abnormal flow hemodynamics.<sup>4-6</sup> Furthermore, the expanding possibility of crimping TAVR devices into lower-profile delivery catheters could potentially lead to a greater chance of collagen fibers in the tissue leaflets being exposed to fragmentation.<sup>7,8</sup>

Furthermore, it is now widely accepted that an asymmetric dilatation of the transcatheter valve can lead to increase stress and accelerated prosthetic degeneration, either in balloon-expandable or self-expandable valves<sup>9</sup>: the presence of extensive calcifications at the level of the aortic valve and the root can represent a controversial element in terms of ideal suitability for a TAVR procedure, since either the lack of the excess of calcium can significantly impact procedural success and therefore also durability.<sup>10</sup> Clearly, it could be argued that the presence of a previous history of radiation to the mediastinum can increase the likelihood of more severe changes in the native valve but could also potentially affect the implanted

transcatheter prosthesis, unlike the surgical setting, which allows for routine valve and annular debridement.

In conclusion, the chronic changes following chest radiation could potentially lead to a hostile environment, more so for a transcatheter approach than a surgical one, as in the current experience by the Liesman and Fukuhara,<sup>1</sup> and eventually leading to a surgical procedure anyhow. This is another elegant example about how carefully TAVR use should be expanded in a fast-expanding pool of patients.

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