

## Canadian Society of Echocardiography 2023

### Clinical Case Submission

**Title:** Radiation Valve Disease: Old Problem, New Choices

**Author Name(s):** Vicki N. Wang MD FRCPC<sup>1</sup>, Sasireka Kathirkamalingam RDCS<sup>1</sup>, and Shaheeda Ahmed MD FRCPC<sup>1</sup>

<sup>1</sup>Schulich Heart Program, Sunnybrook Health Sciences Centre

#### Clinical Presentation

A 60 year old male presented to hospital with chest tightness and palpitations. His medical history included Hodgkin's lymphoma treated with chemoradiation 32 years prior, complicated by a treated recurrence, likely bleomycin-related interstitial pulmonary fibrosis and moderate aortic stenosis on assessment two years previously. He was admitted with atrial fibrillation and an elevated troponin. He spontaneously converted to sinus rhythm. Coronary angiography showed proximal 40% lesions in the circumflex and left anterior descending arteries.

#### Imaging Findings

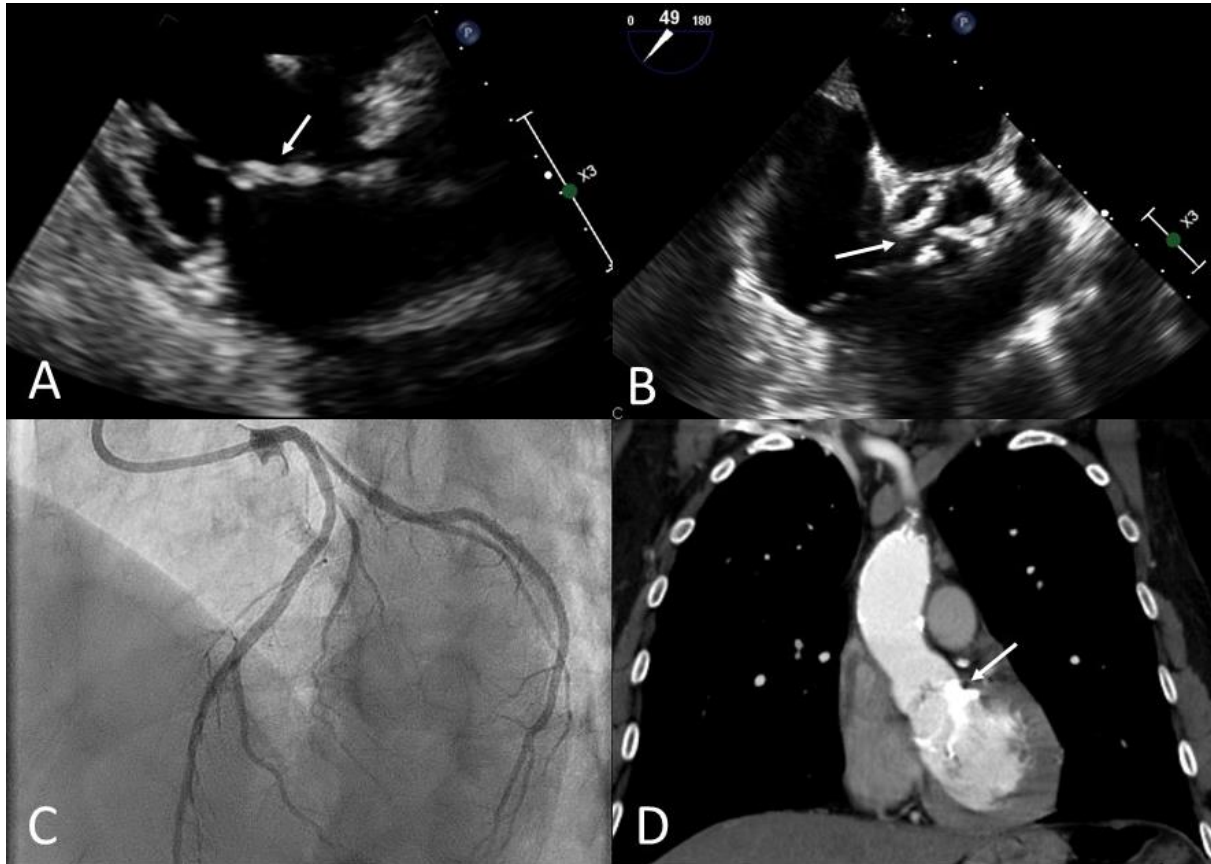
Transthoracic echo demonstrated marked calcification of the aortomitral continuity, severe thickening, calcification and restriction of the anterior mitral leaflet and aortic cusps. There was rapid progression in aortic stenosis, now severe (peak/mean 85/49mmHg) with moderate regurgitation and moderate mitral stenosis/regurgitation. Findings suggested radiation-related valvular disease.

#### Summary/Discussion Points

He was evaluated for cardiovascular surgery at Heart Team Rounds. CT chest showed severe circumferential calcification of the ascending aorta. The need for deep hypothermic circulatory arrest to replace both valves and ascending aorta increased his already high baseline surgical risk related to pulmonary fibrosis and prior chest radiation. Open surgery was deferred with close follow up and consideration of percutaneous aortic valve intervention in the future.

Radiation-related valvular heart disease occurs in 37-81% of patients receiving thoracic radiation following a long latency period of 10-20 years. Risk is dose-dependent, with those at highest risk receiving greater than 30 Grays of radiation. The aortic valve is most vulnerable given its alignment within the radiation beam. Calcification of the aortomitral continuity is typical with associated anterior mitral leaflet restriction. Radiation related aortic stenosis is the most common valvulopathy requiring intervention. Mediastinal radiation significantly increases cardiac surgical risk due to premature coronary disease, a porcelain aorta, adhesions, and pulmonary fibrosis<sup>1</sup>. Trans-catheter aortic valve replacement is an effective contemporary alternative for these patients; mitral interventions are still emerging<sup>1,2</sup>.

**Figure:** A – TTE (A3C) shows a severely calcified/restricted anterior mitral valve leaflet, B – TEE shows severely calcified/restricted aortic valve, C – Coronary angiogram shows mild proximal stenoses of the circumflex and left anterior descending arteries, D – CT chest shows a porcelain aorta with severe aortomitral continuity calcification.



## References

- (1) Belzile-Dugas E, Fremes SE, Eisenberg MJ. Radiation-Induced Aortic Stenosis: An Update on Treatment Modalities. *JACC Adv.* 2022; 100163. Article in Press.
- (2) Mitchell JD et al. Cardiovascular Manifestations from Therapeutic Radiation. *JACC: CardioOnc.* 2021; 3(3): 360-380.