

Images in Cardiology

Optical Coherence Tomography Evaluation of Extraluminal Left Circumflex Artery Compression Following Mitral Valve Replacement

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The left circumflex artery (LCx) follows the atrioventricular groove, which causes it to curve around the posterior annulus of the mitral valve (MV), making it susceptible to injury during MV surgery. LCx injury following MV surgery is rare, with a reported incidence of approximately 0.5%.¹ The multiple mechanisms of injury include direct injury from a suture, air embolism, and extra luminal compression.


We report a case of a 34-year-old male patient with known rheumatic heart disease. He had previously undergone MV commissurotomy and tricuspid valve repair at the age of 25 years and presented to the hospital with congestive heart failure. An echocardiogram demonstrated severe tricuspid regurgitation with a severely dilated right ventricle, moderate aortic insufficiency, and moderate-severe mitral stenosis with a mitral valve area of 1.2 cm². Following review at heart team rounds, the decision was made to offer this patient complex valve surgery. A preoperative angiogram demonstrated normal epicardial coronary arteries with a left-dominant system (Fig. 1).

The patient subsequently underwent aortic valve replacement with a 21-mm On-X mechanical valve (On-X Life Technologies Inc, Austin, TX), mitral valve replacement with a size 27/29 On-X mechanical valve, and a tricuspid valve replacement with a 31-mm Edwards Mitris bioprosthetic valve (Edwards Lifesciences, Irvine, CA). While attempting to wean off pump use, the patient had significant hypotension and a transesophageal echocardiogram demonstrated a new wall motion abnormality. Therefore, the patient was brought to the cardiac catheterization lab for further assessment.

Coronary angiography demonstrated a haziness in the LCx (Supplemental Fig. S1), which was new compared to his preoperative angiogram. To evaluate this finding further,

Novel Teaching Point

- Optical coherence tomography can be used to evaluate the mechanism of coronary injury following cardiac surgery, and guide management.

optical coherence tomography was performed, which demonstrated normal 3-layer vessel architecture with extraluminal compression (Video 1 , view video online; Fig. 2). The minimal lumen area within the compressed area was measured to be 2.35 mm², with a reference area, measured for comparison, of 7.35 mm².

Based on the optical coherence tomography findings, the patient was taken back to the operating room for emergent bypass of the obtuse marginal. Unfortunately, the patient's postoperative course was complicated by sepsis resulting in multi-organ failure, and the patient died on postoperative day 12.

The LCx injury is a rare occurrence during MV surgery. Optical coherence tomography can be used to evaluate the mechanism of injury and guide further management.

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Disclosures

The authors have no conflicts of interest to disclose.

References

1. Husain A, Alsanei A, Tahir M, et al. Left circumflex artery injury post mitral valve surgery, single center experience. *J Saudi Heart Assoc* 2019;31:94-9.

Supplementary Material

To access the supplementary material accompanying this article, visit *CJC Open* at <https://www.cjcopen.ca/> and at <https://doi.org/10.1016/j.cjco.2022.05.002>.

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See page 735 for disclosure information.

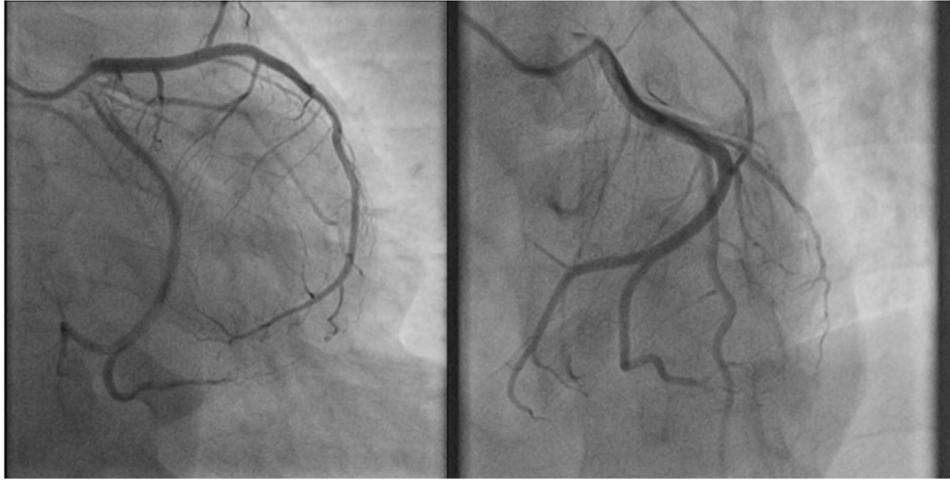


Figure 1. Preoperative coronary angiogram (multiple views) demonstrating a left-dominant system with normal epicardial coronary arteries.

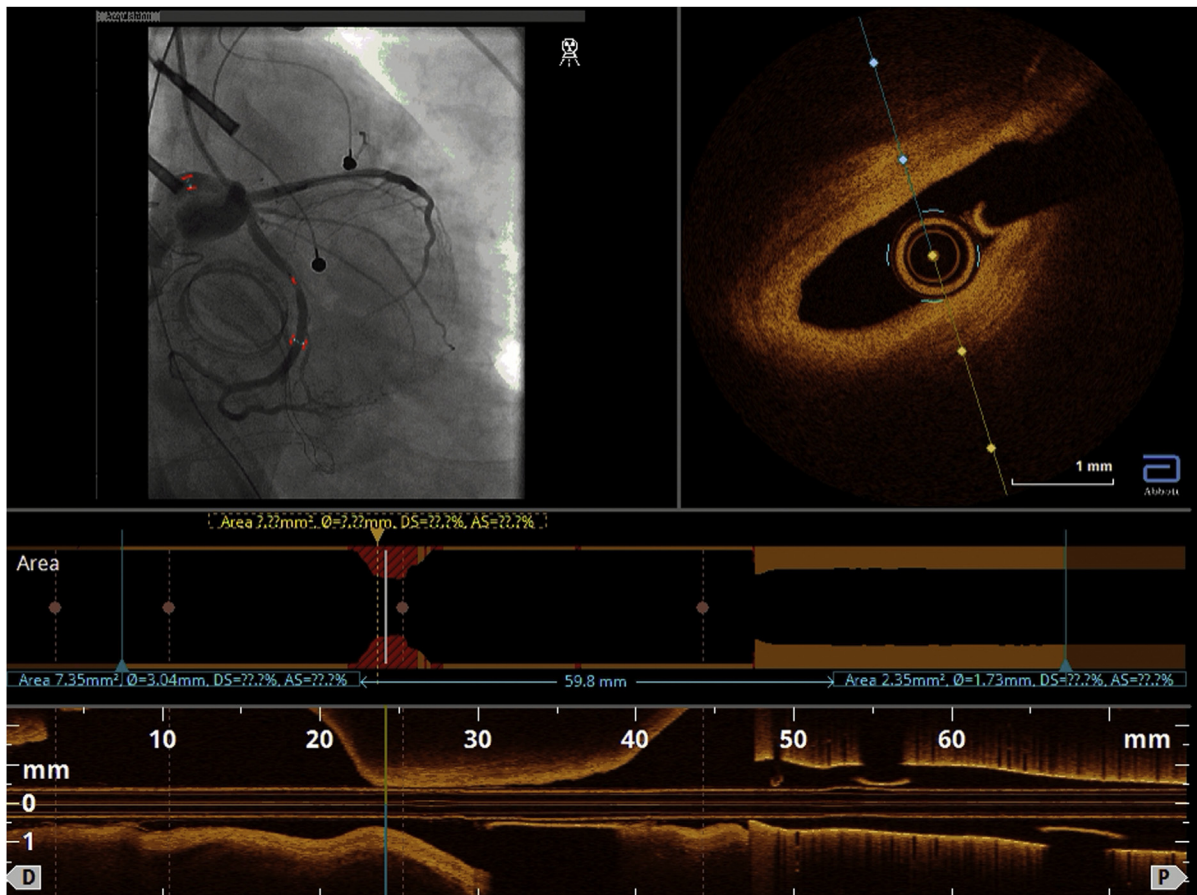


Figure 2. Optical coherence tomography images with co-registration show no disruption of the intima or media within the area of extraluminal compression.