

IVUS Tip Detection Facilitates PCI for Left Circumflex Artery Occlusion After Mitral Valve Repair: Mechanistic Insights From IVUS

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A 60-year-old man with symptomatic paroxysmal atrial fibrillation was referred to our hospital. Comprehensive evaluation revealed severe mitral regurgitation, and mitral valve repair was performed. Both echocardiographic and intraoperative findings were consistent with Barlow disease.

On postoperative day 7, the patient developed exertional dyspnea during cardiac rehabilitation. Electrocardiographic changes and elevated cardiac biomarkers led to the diagnosis of non-ST-segment elevation myocardial infarction. Emergency coronary angiography demonstrated complete occlusion of the left circumflex artery (LCX). Following discussion with the cardiac surgical team, percutaneous coronary intervention (PCI) was selected as the revascularization strategy.

During the initial PCI, a drug-eluting stent was successfully implanted. Intravascular ultrasound (IVUS) demonstrated a highly echogenic linear structure within the lesion. An ex vivo experiment using the same surgical suture material confirmed that this structure represented a surgical suture, indicating that LCX occlusion had been caused by suture entrapment following mitral valve repair.

The patient subsequently developed in-stent restenosis approximately every six months and underwent three PCI procedures. During the third PCI, a large side branch jailed by the previously implanted stent became occluded. Despite multiple conventional rewiring techniques, guidewire passage into the side branch was unsuccessful. Finally, IVUS-guided tip detection enabled precise guidewire manipulation into the side branch, resulting in successful recanalization.

The patient has remained free from recurrent LCX restenosis, with recovery of left ventricular function and an uneventful clinical course during follow-up.

This case demonstrates two important findings. First, IVUS successfully identified the surgical suture responsible for LCX occlusion, providing direct mechanistic insight into this rare complication after mitral valve repair. Second, IVUS-guided tip detection proved highly effective for complex side-branch rewiring after repeated PCI, highlighting its value as a bailout technique in challenging coronary interventions.