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IMAGES IN CARDIOLOGY
Coronary heart disease

Optical coherence tomography in ablation-related coronary artery injury

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A 43-year-old male with recurrent atrioventricular re-entrant tachycardia refractory to adenosine, amiodarone, and intravenous flecainide underwent a right femoral access radiofrequency ablation (RFA) using four sheaths (6F, 7F, 2 × 8F). The procedure was performed using TactiCath™ D–F irrigated contact force ablation catheter and EnSite Precision™ 3D mapping system (Abbott Laboratories, Chicago, IL, USA). Earliest atrial activation was found at the middle coronary sinus (CS) electrodes. Following trans-septal puncture to access the left atrium, 30–35 W RFA was delivered at 6 o'clock over the mitral annulus. On the right, earliest atrial activity was mapped to the posteroseptal region on the tricuspid annulus. Up to 45 W RFA was delivered over the CS ostium followed by consolidating lesions, successfully terminating the arrhythmia. During a 45 min waiting period with four boluses of isoprenaline, the supraventricular tachycardia (SVT) did not recur, and sheaths were removed. On the table,

Video 1 Immediate angiographic appearance of the right coronary artery confirming acute occlusion of the posterior left ventricular branch. The likely location of the optical coherence tomography findings of *Figures 1 and 2* is highlighted by X.

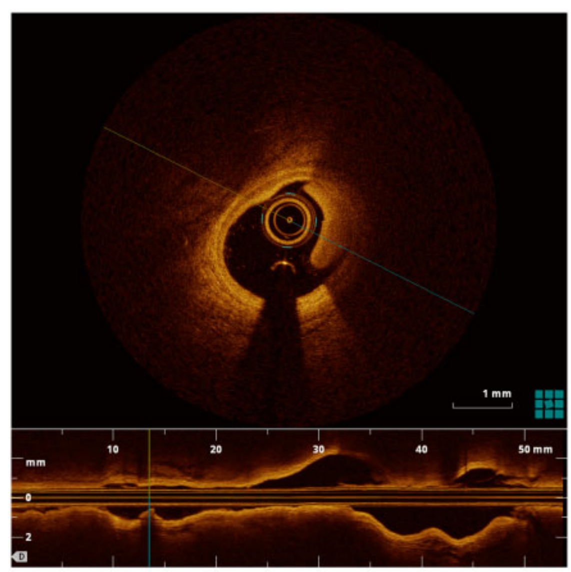

Figure 1 Optical coherence tomography image demonstrating thrombus formation at the site of focal endothelial disruption.

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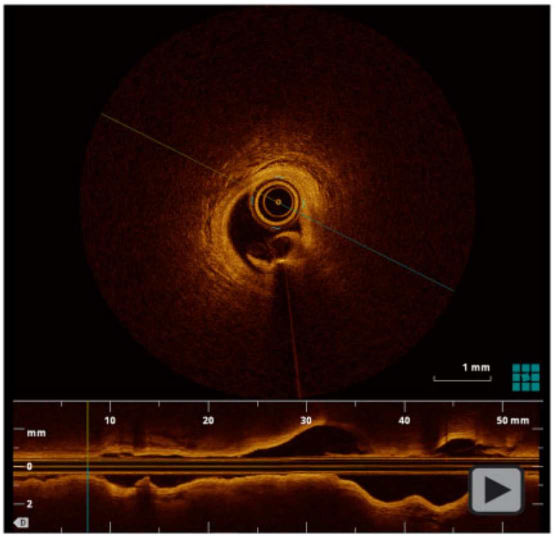
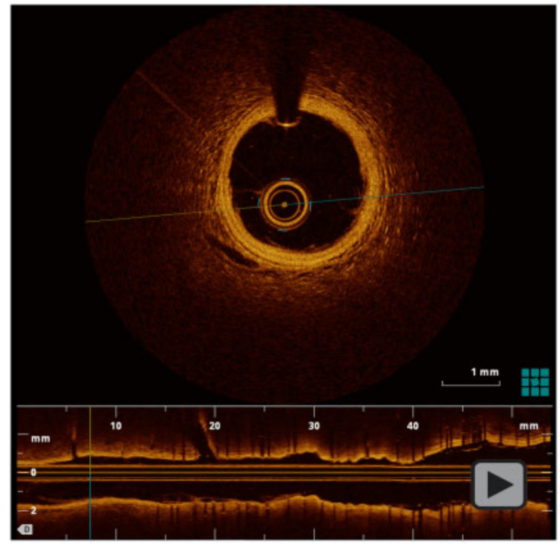


Video 2 Optical coherence tomography view of the ablation related injury to the posterior left ventricular artery.



Video 3 Cranial view right coronary artery angiogram demonstrating good patency of vessel following the deployment of two stents.

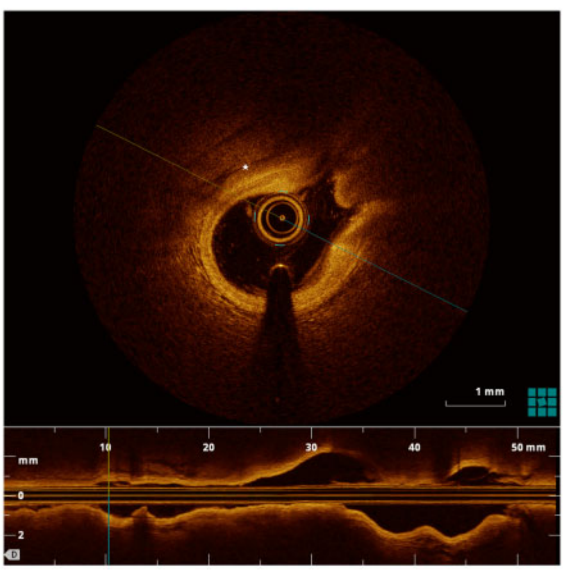


Figure 2 Optical coherence tomography image captured just distal to *Figure 1* identifying striations in the periadventitial tissue (*), which may represent oedema and disruption of the normal vessel wall architecture, and the likely cause for significant recoil post-ballooning.

the patient developed cough, pallor and diaphoresis alongside inferior lead ST-elevation on electrocardiogram. Urgent bedside echocardiogram excluded perforation and other acute complications.

An emergency radial access coronary angiogram revealed a complete occlusion of the posterior left ventricular artery (PLV) (*Video 1*). A standard balance middleweight wire was used to cross the lesion with ease, and a 2.0 mm × 12 mm compliant balloon was inflated to 4 atm. However, there was significant intractable recoil of the vessel after ballooning despite two 250 µg boluses of intracoronary glyceryl trinitrate. Optical coherence tomography (OCT) was performed to visualize and better understand the mechanism of injury, demonstrating focal endothelial disruption with overlying thrombus formation (*Figure 1* and *Video 2*). Focal striations, consistent with macroscopic tissue injury were also identified in the periadventitial space (*Figure 2*). Two overlapping drug-eluting stents (2.5 mm × 30 mm, 2.75 mm × 12 mm) were deployed and dilated using a 3.0 mm non-compliant balloon, achieving excellent angiographical result (*Video 3*). Final OCT post-stenting demonstrated excellent stent-wall apposition over the injury site and a malapposed stented segment proximally which could benefit from post-dilation (Supplementary material online, *Video S1*). No other abnormalities were identified. The patient made good clinical recovery and remained symptom-free on discharge and follow-up.

Deep-tissue thermal injury from RFA delivered close to the PLV is thought to be responsible for the tissue 'swelling' described previously[1] and the novel periadventitial striations found in this case. The optimal treatment of RFA induced coronary artery injury remains unknown. Majority (44.2%) of patients are treated with expectant medical management,[2] where coronary spasm is likely the commonest mechanism of injury, especially at the CS.[3] This case supports the use of intracoronary imaging to visualize the vessel wall, identify the underlying pathology, and guide the management of RFA induced injury on a case-by-case basis.

Supplementary material

Supplementary material is available at *European Heart Journal - Case Reports* online.

Consent: The authors confirm that written consent for submission and publication of this case report including images and associated text has been obtained from the patient in line with COPE guidance.

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