

Three-dimensional optical coherence tomography reconstruction of a long coronary artery dissection: advantages over intravascular ultrasound imaging

Gianluca Caiazzo^{a,b}, Ismail Dogu Kilic^b, Nicolas Foin^c, Enrico Fabris^b, Roberta Serdoz^b, Ciro Indolfi^a and Carlo Di Mario^b

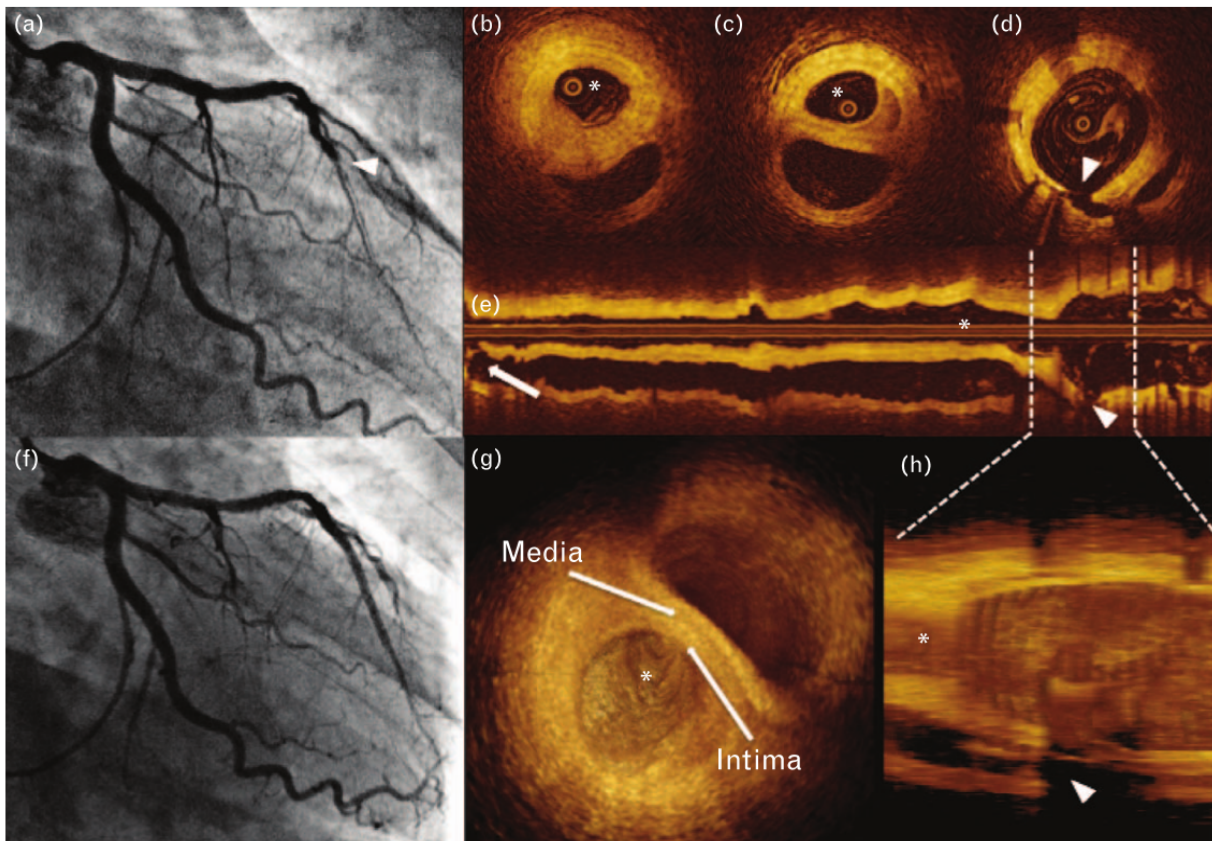
^aDivision of Cardiology, Department of Medical and Surgical Sciences, 'Magna Graecia' University, Catanzaro, Italy, ^bCardiovascular National Institute of Health Research, Biomedical Research Unit, Royal Brompton & Harefield NHS Foundation Trust, London, UK and ^cNational Heart Centre, Singapore, Singapore

Correspondence to Gianluca Caiazzo, MD, PhD, Department of Cardiology, Magna Graecia University, Viale Europa 1, Catanzaro 88100, Italy
Tel: +39 09613647067; fax: +39 09613647582;
e-mail: gianluca.caiazzo@gmail.com

A 50-year-old man presented with chest pain on exertion 1 year after implantation of two drug-eluting stents for a long critical stenosis in the left anterior descending artery (LAD). Angiography showed a very long (29 mm), double-lumen type-C dissection downstream of the stents, the longest ever shown at optical coherence tomography (OCT) (a in Fig. 1). A nonocclusive technique with the first-generation catheter-based time-domain OCT (TD-OCT) system (M3 OCT system; LightLab Imaging, Westford, Massachusetts, USA) was used and

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Fig. 1



Angiographic, OCT and 3D-OCT views of a chronic iatrogenic long coronary dissection. A) Angiographic view of the dissection in the mid-distal LAD; B and C) Distal to proximal cross-sections showing the true lumen (asterisks) and the false lumen divided by a thick flap; D) The entry tear is clearly visible (arrow heads, see also E and H) behind the stent struts. E) The longitudinal view emphasises the length of the lesion and also shows the re-entry tear in the distal segment of the vessel (short arrow); F) Final angiographic result after stent implantation; G) 3D-OCT reconstruction showing the thick flow divider involving both the intima and media (long arrows); H) Magnified view of the entry tear (arrow head) behind the stent struts.

the pullback speed was 3 mm/s during contrast injection at a rate of 3 ml/s. OCT showed the entry tear [arrow heads in the Figure (d, e, h)] behind the stent struts and a thick flap (560 μ) (b, c, e, g) generating the double-lumen towards the mid-distal LAD segment until the distal re-entry point (short arrow, e). The tridimensional reconstruction (ImageJ software, NIH) allowed a better visualization of the double-layer membrane (intima plus media) between lumens (long arrows in g and fly-through video, <http://links.lww.com/JCM/A59>). A fibrotic plaque critically narrows the true lumen (see asterisks in the Figure) that appears much smaller than the false lumen (minimal lumen areas 0.27 and 0.59 mm², respectively) (Fig. 1 b, c, e, g). A 2.25 \times 26 mm everolimus-eluting stent was deployed at the entry point with good final angiographic result (Fig. 1f). A total amount of 36 ml of iso-osmolar contrast medium was used to acquire the OCT pullback. The patient was discharged on day 3 on dual antiplatelet therapy with aspirin and ticagrelor after uneventful hospital stay.

The incidence of iatrogenic edge dissections ranges from 1.7 to 6.4% by angiography up to 34% by OCT; the latter is higher than the rate seen by intravascular ultrasound (IVUS), mainly reflecting the 10-fold higher axial resolution of the OCT.¹ Indeed, OCT allows good visualization of the surface of vessel lumen, being very effective to identify dissections as well as stent malapposition, tissue protrusion and thrombus. Accordingly, in a recent study,² IVUS showed a poor reproducibility and ability to assess qualitative measurements, including dissections, incomplete stent apposition (ISA) and protrusions when compared with OCT. Also, OCT provides more reliable identification of the entry and re-entry tears.

References

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