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REFERENCES

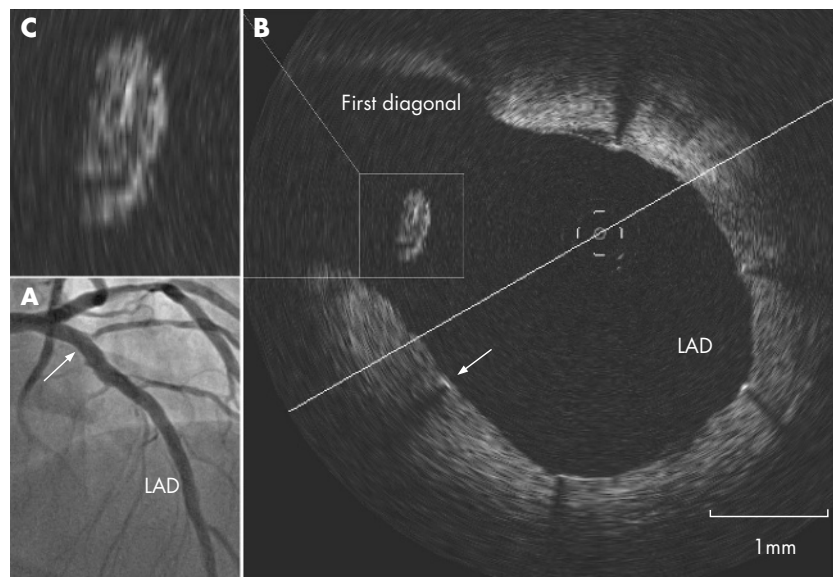
- 1 **Piepoli MF**, Ponikowski PP, Volterrani M, *et al*. Aetiology and pathophysiological implications of oscillatory ventilation at rest and during exercise in chronic heart failure. Do Cheyne and Stokes have an important message for modern-day patients with heart failure? *Eur Heart J* 1999;**20**:946–53.
- 2 **Vangesselen S**, Weymans M, Mertens L, *et al*. A Java software for calculating mean breath-by-breath variability in gas exchange parameters: application in young cardiac patients with exercise-related periodic breathing. *Comput Methods Programs Biomed* 2005;**80**:89–92.
- 3 **Yajima T**, Koike A, Sugimoto K, *et al*. Mechanism of periodic breathing in patients with cardiovascular disease. *Chest* 1994;**106**:142–6.
- 4 **Francis DP**, Davies LC, Wilson, *et al*. Impact of periodic breathing on measurement of oxygen uptake and respiratory gas exchange ratio during cardiopulmonary exercise testing. *Clin Sc* 2002;**103**:543–52.
- 5 **Corra U**, Giordano A, Bosimini E, *et al*. Oscillatory ventilation during exercise in patients with chronic heart failure. Clinical correlates and prognostic implications. *Chest* 2002;**121**:1572–80.

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Do unapposed stent struts endothelialise? In vivo demonstration with optical coherence tomography

Although drug-eluting stents have dramatically reduced restenosis rates after percutaneous coronary intervention, concerns remain with regard to the potential risk of stent thrombosis. For bifurcation lesions, a stent thrombosis rate up to 3.6% has been reported, and incomplete stent apposition has been proposed as a possible mechanism. We report the case of a 52-year-old man with diabetes and three-vessel disease. Initially, three overlapping sirolimus-eluting stents (Cypher, Cordis) were deployed to the left anterior descending artery. No further kissing post-dilatation was performed because of TIMI-3 flow in the diagonal branches. Angiography at 4 months of follow-up showed widely patent stents with TIMI-3 flow to both diagonals (panel A). Optical coherence tomography (LightLab Imaging Inc, Westford, Massachusetts, USA) at the bifurcation of the left anterior descending artery to the first diagonal (arrow) showed good stent apposition, with minimal (<0.07 mm) intimal layer (panel B, arrow) on almost all struts. One strut was protruding into the lumen at the origin of the diagonal branch circumferentially covered by a thick tissue layer (0.25 mm, panel C) extending to its connection with the vessel wall proximally and distally. On the basis of tissue density and uniform growth on the free strut with minimal growth on other apposed struts, the case strongly suggests that this tissue consists of thrombus, likely fully organised and endothelialised. These findings lead to two thoughts on stent thrombosis in the presence



of malapposed drug-eluting stents. Firstly, unapposed struts can nestle thrombus triggering stent occlusion and secondly, the process can be self-limiting, eventually allowing growth of tissue on the stent strut and possibly promoting its complete endothelialisation.

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