

CLINICAL VIGNETTE

Accordion phenomenon by optical coherence tomography

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Myocardial infarction (MI) with non-obstructive coronary arteries (MINOCA) is characterised by the evidence of MI with normal or near-normal coronaries. We present an MINOCA patient in whom an accordion phenomenon was visualised during optical coherence tomography (OCT) acquisition. A 43-year-old woman with hypertension and hyperlipidaemia was admitted to our hospital due to chest pain and breathlessness. Electrocardiogram revealed T-wave inversion and borderline ST-segment depression on aVF, III, and precordial leads. Troponin T level was elevated up to 1002 ng/mL (upper normal limit, 14). Urgent coronary angiography revealed discrete irregularities and a 50% eccentric narrowing of the intermediate artery (Suppl. Fig. 1 — see journal website). Echocardiography showed preserved left ventricular (LV) ejection fraction and LV myocardial wall hypertrophy with interventricular septum (IVS) thickness up to 15 mm. Cardiac magnetic resonance revealed late gadolinium enhancement in the midst of anterolateral and inferolateral wall segments as well as in the anteroapical segment, indicating ischaemic aetiology and irregular IVS hypertrophy (14 mm). Thus, for exclusion of any impairment of the coronary intimal integrity, visualisation of the left anterior descending coronary artery (LAD) and the left circumflex coronary artery by OCT (Optis™, Abbott, Lake Bluff, IL, USA) was performed. It showed mild narrowing at the LAD ostium (Fig. 1D) with preserved intimal layer integrity and two sites of coronary invagination (Fig. 1A, B). The intraluminal LAD areas were as follows: ostium, 5.7 mm²; reference at proximal LAD, 14 mm²; proximal invagination, 5.9 mm²; distal invagination, 3.7 mm²; and reference below distal invagination, 7.5 mm². No chest discomfort or ST-segment changes were observed during OCT acquisition. After removal of the wire, the coronary invaginations disappeared. Haemoglobin level on admission was 12.7 g/dL; however, due to abnormal uterine bleeding it dropped to 7.1 g/dL (lower normal limit, 12). Thus, antiplatelet pharmacotherapy was discontinued. The accordion (or concertina) phenomenon results from mechanical alterations of the geometry/curvature of a tortuous coronary artery by an intracoronary wire. From a mechanical point of view it could also be called the “bellows phenomenon.” In most cases, it was visualised by angiography and attributed to stiff coronary wires. Intravascular visualisation of this phenomenon was reported very rarely. The largest intravascular ultrasound (IVUS)-based study included 10 patients [1]. Single IVUS [2] and OCT [3, 4] reports have described also the stent accordion phenomenon. The accordion phenomenon is thought to be benign; however, cases of transient transmural myocardial ischaemia with ST-segment changes on electrocardiogram have been reported. If unrecognised, it may lead to an unnecessary intervention, especially in MI patients and borderline coronary lesions; thus, proper interpretation of the diagnostic imaging is critical. In the largest contemporary, single-centre study assessing OCT safety, the rate of OCT-related events was 0.6%, in line with previous studies. The most frequent and self-limiting complications were transient ST-segment elevation and bradycardia. No differences in safety were observed between OCT and IVUS [5]. Similarly to the musical instrument, which is played by compressing and expanding the bellows, the accordion phenomenon is an interplay of tortuous coronaries and intracoronary wires.

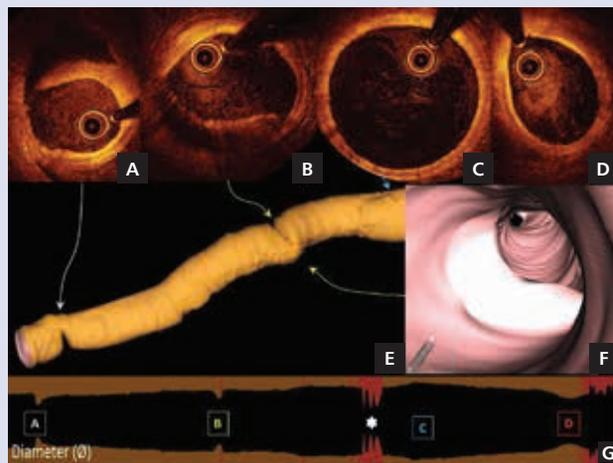


Figure 1. Optical coherence tomography images from the left anterior descending coronary artery; **A.** Cross-section of the distal coronary invagination; **B.** Cross-section of the proximal invagination; **C.** Cross-section of the proximal reference; **D.** Cross-section of the ostium; **E.** Lumen in three-dimensional (3D) reconstruction — arrows indicate corresponding cross-sections; **F.** Intraluminal 3D reconstruction; **G.** Longitudinal reconstruction of the lumen cross-section areas. Letters in coloured boxes indicate corresponding cross-sections from panels A–D; asterisk indicates artefacts

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