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Authors: Sylwia Iwańczyk, Włodzimierz Skorupski, Marek Grygier, Tomasz Sikora, Aleksander Araszkiewicz, Maciej Lesiak

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Myocardial infarction with non-obstructive coronary arteries (MINOCA) in young women: the key role of optical coherence tomography

The role of OCT in MINOCA.

Iwańczyk Sylwia¹, Skorupski Włodzimierz¹, Grygier Marek³, Sikora Tomasz³, Araszkiewicz Aleksander¹, Lesiak Maciej¹

¹Department of Cardiology, Poznan University of Medical Sciences, Poland

Corresponding author: Sylwia Iwańczyk, MD, 1st Department of Cardiology, University of Medical Sciences, ul. Długa 1/2, 61–848 Poznań, Poland, tel: +48 61 854 92 93, fax: +48 61 854 90 94, e-mail: syl.iwanczyk@gmail.com
Optical coherence tomography (OCT) is an intracoronary imaging technique providing detailed morphological information on coronary lesions, improving an accurate diagnosis and the selection of an appropriate treatment strategy.

A 26-year-old smoking female with no previous medical history and no risk factors for coronary heart disease was admitted to a local non-university hospital with an anterior ST-segment elevation myocardial infarction (STEMI). On arrival, she has reported the chest pain lasting for several hours, and the ECG presented ST-segment elevation in all precordial leads. An echocardiogram showed regional motion abnormalities in the anterior wall of the left ventricle with significantly impaired ejection fraction (~35%). The patient immediately received a loading dose of aspirin and ticagrelor and was transferred to the catheterization laboratory for coronary angiography and primary percutaneous coronary intervention (PPCI).

Coronary angiography revealed a thrombus in the middle segment of the left anterior descending (LAD) artery, narrowing the lumen in about 50% (Fig. 1A). No stenotic changes were observed in other segments of the coronary arteries. The operator chose conservative treatment administrating antithrombotic (abciximab) and antiplatelet drugs (ticagrelor, aspirin). During the next hours, the patient had reported the resolution of symptoms. Additionally, a marked reduction of anterior ST-segment elevation on ECG occurred. After six days, control coronary angiography revealed an almost complete thrombus resolution (Fig. 1B). Next day, the patient was discharged from the hospital with the suggestion to perform control coronary angiography and OCT examination in a reference center.

After six months, the woman was hospitalized in our center for clinical and angiographic reevaluation. She presented symptoms of heart failure in functional class II, according to New York Heart Association (NYHA). On echocardiography dyskinesis of the apex and
akinesis in the apical segments of the LV with EF about 35% was recognized. Coronary angiography did not show stenotic or thrombotic changes in any coronary arteries (fig 1 C). However, OCT revealed fibroatheroma and fibrous plaques in mid and proximal LAD. In the area of the previous thrombus, a healing ruptured atherosclerotic plaque was visualized (Fig. 1 D-F). Due to the absence of anginal symptoms and no significant narrowing of the coronary artery, we decided to continue conservative treatment.

MINOCA is defined as myocardial infarction with no obstructive coronary atherosclerosis [1]. A frequent mechanism of MINOCA in women is plaque rupture and ulceration [5]. Nonetheless, coronary angiography has known limitations in the assessment of lesion severity.

Optical coherence tomography provides a superior resolution (10 μm) of plaque morphology and can be a tool for better understanding the origin of MI with nonobstructive coronary arteries. OCT can identify unstable features of the atherosclerotic plaque, as well as culprit (infarct-related) lesion [4]. Moreover, there is very high sensitivity, specificity, positive and negative predictive value for OCT to detect histologically defined healed plaques. The presence of features of vascular vulnerability and local and systemic inflammation of healed plaque may predispose the patients to develop ACS in the future. Therefore, this group of patients may benefit from more aggressive secondary prevention aiming at the suppression of inflammation and platelet activity [3].
References


Figure 1. Coronary angiography (A-C) and OCT findings (D-G). A, Coronary angiography revealed a thrombus (white arrows) in the middle segment of LAD. B, Control angiography (after five days) revealed thrombus resolution (white arrow) C, Control angiography (after six months) revealed normal coronary arteries. D, OCT demonstrated atherosclerotic plaque (white arrow). E-F, OCT with plaque rupture (white arrow).