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► **To cite this version:**

Flavien Vincent, Bertrand Ledermann, Jean-Etienne Ricci, Guillaume Cayla, Benoit Lattuca. Recanalized Coronary Thrombus Role of OCT in Identifying a Slow-Evolving and Underestimated Coronary Lesion. *JACC: Case Reports*, 2020, 2, pp.2411 - 2413. 10.1016/j.jaccas.2020.09.054 . hal-03493151

HAL Id: hal-03493151

<https://hal.science/hal-03493151>

Submitted on 2 Jan 2023

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Recanalized coronary thrombus: role of OCT in identifying a slow-evolving and underestimated coronary lesion

Brief Title: A very slow-maturing coronary "swiss cheese"

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Disclosures: F. Vincent has received research grants from the Federation Française de Cardiologie and Lille University Hospital. B. Lattuca has received research grants from Biotronik, Boston Scientific, Daiichi-Sankyo, Fédération Française de Cardiologie, and Institute of CardioMetabolism and Nutrition; consultant fees from Daiichi-Sankyo and Eli Lilly; and lecture fees from AstraZeneca, Medtronic, and Novartis. The other authors have no conflicts to report.

Funding: No funding necessary

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Key words: Optical coherence tomography; coronary artery disease; recanalized thrombus; percutaneous coronary intervention; angiographic haziness; stress echocardiography; endocoronary imaging; lotus root; swiss cheese

Acknowledgments: We thank the nursing staff of the catheterization laboratory at Nîmes University Hospital, France.

Abbreviations:

OCT: Optical Coherence Tomography

PCI: Percutaneous Coronary Intervention

RCA: Right Coronary Angiogram

Abstract

Pathological studies have revealed spontaneous recanalized coronary thrombi as a frequent evolution of coronary occlusions. However, they are poorly recognized on coronary angiography, and the optimal therapeutic strategy for clinical evolution is unknown. We report the role of optical coherence tomography in identifying a recanalized coronary thrombus causing myocardial ischemia after 11 years of follow-up.

For 11 years, a 48-year-old man who smoked and had diabetes with a history of anterior myocardial infarction stented on the left anterior descending artery had an unremarkable clinical follow-up including repeated negative stress tests. New onset of angina occurred; therefore, stress echocardiography was performed, which revealed severe inferior wall motion abnormalities (Video 1). On angiography, the right coronary artery (RCA) angiogram was similar to that during the initial examination (Figure 1A, Video 2) with multiple irregular intraluminal contrast-filling defects involving the entire RCA that had been interpreted as a coronary dissection (Figure 1B, Video 3).

To clarify this ambiguous angiogram, optical coherence tomography (OCT) was performed, which showed a diffuse heterogeneous plaque burden with fibrotic areas (diffuse high-reflectivity intimal thickening with low attenuation, Figure 1CDE–D, red star), a central lumen divided by thin septa into multiple channels (Figure 1CDEFG–F) with a smooth inner border (Figure 1F, white arrowhead) that were communicating with each other (Figure 1CD, Video 4)(1).

This “swiss cheese,” “lotus root,” or “honeycomb” appearance is typical of a long recanalized coronary thrombus(2). OCT revealed the heterogeneous histological composition of this lesion with a strong signal in the septa near the central lumen (Figure 1F, white arrow) and darker signal in the deeper portion (Figure 1F, white asterisks). OCT also revealed organized thrombi with high-intensity signals (Figure 1D, blue arrow), suggesting that this long lesion might have impeded the coronary flow and triggered a thrombogenic process. Based on these findings and the large area of ischemia documented on a stress imaging test, percutaneous coronary intervention (PCI) was performed with balloon angioplasty and implantation of three drug-eluting stents, after securing the positioning of the guidewire in the central lumen at the proximal and distal intended landing zones (Figure 1G, yellow arrow). Post-PCI angiography (Figure 1H, Video 5) and OCT showed enlargement of the

central lumen by squeezing of the small surrounding channels (white stars, Figure 1I, Video 6). The patient was discharged with dual antiplatelet therapy. Three months later, the patient was asymptomatic, and stress echocardiography did not induce myocardial ischemia (Video 7).

Pathological studies have revealed spontaneous recanalized coronary thrombi as a frequent natural evolution of coronary occlusions(3). However, the optimal therapeutic strategy is unknown because of the scarcity of data regarding the long-term evolution of this coronary lesion subset. This report describes a case of very slow evolution causing myocardial ischemia after an 11-year follow-up favoring conservative medical management in the absence of ischemia but is also supportive of a careful follow-up as thrombogenic process can still occur after several years. OCT is pivotal to overcoming the limitations of angiography and excluding coronary dissection. As invasive hemodynamic assessment of this lesion has not been validated due to the presence of multiple channels, noninvasive testing seems mandatory in the decision-making process before implementing any intervention. Overall, a large registry is needed with long-term follow-up to improve our knowledge of the natural evolution of this underestimated coronary lesion and to tailor the optimal therapeutic strategy for patients.

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FIGURE TITLE/LEGEND

Figure 1:

A: Initial Angiogram (11 years ago) with filling defects and pseudo-dissection aspect involving the entire RCA.

B: Angiogram (11 years later) with persistent filling defects and pseudo-dissection aspect involving the entire RCA.

C, D, E, F, G, H: OCT images of the RCA performed using the FD-OCT C7XR system (Lightlab Imaging Incorporated, Westford, MA) and a 6F guide catheter-compatible Dragonfly Duo catheter (Abbott Vascular).

C, D, E: Diffuse heterogeneous plaque burden with fibrotic areas (diffuse high-reflectivity intimal thickening with low attenuation, red star).

F: Central lumen divided by thin signal-rich septa (white arrow) into multiple channels with a smooth inner border (white arrowhead). Dark signal of the deeper portion of the septa (white asterisks).

G: Guidewire within the central lumen (yellow arrow). Dark signal of the deeper portion of the septa (white asterisks).

H: RCA angiogram after PCI.

I: Post-PCI OCT showing optimal strut positions (white stars).

RCA, right coronary artery; OCT, optical coherence tomography; PCI, percutaneous coronary intervention

VIDEO TITLE/LEGEND

Video 1: Dobutamine stress echocardiogram showing inferior wall motion abnormalities (3-cavities view)

Video 2: Initial right coronary artery angiogram 11 years ago showing pseudo-dissection aspect of the RCA.

Video 3: Persistent pseudo-dissection aspect on the right coronary angiogram

Video 4: OCT run of the RCA showing swiss-cheese pattern

Video 5: Coronary angiogram after percutaneous coronary intervention and stenting of the right coronary artery

Video 6: OCT run after percutaneous coronary intervention with stenting of the right coronary artery

Video 7: Dobutamine stress echocardiogram showing resolution of inferior wall motion abnormalities after right coronary artery percutaneous coronary intervention

