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## Images in Cardiology

# Progression from Nodular Calcification to Calcified Nodules Leading to Acute Myocardial Infarction

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Calcified nodules (CNs) are known as an uncommon cause of acute coronary syndrome.[1,2] CNs are characterized pathologically by a lesion with an eruption of a cluster of small nodular calcifications, caused by fracture of sheet calcification and/or fragmentation of necrotic core calcification, leading to thrombus formation.[1-3] However, the precise mechanism of CN formation has not been fully clarified. We report a case of acute coronary syndrome (ACS) caused by CNs that developed from nodular calcification, with multimodality intracoronary imaging, including a series of optical coherence tomography (OCT) observations. This case report was conducted in compliance with the institutional ethics committee guidelines and received the committee's approval.

A 72-year-old man with a history of dyslipidemia, diabetes mellitus, and chronic kidney disease on maintenance hemodialysis experienced chest pain on exertion and underwent clinically driven coronary angiography. Coronary angiography showed no functionally significant stenosis, and OCT (ILUMIEN OPTIS; Abbott Vascular, Santa Clara, CA) examination revealed the presence of nodular calcification in the proximal right coronary artery (RCA) with a minimal lumen area (MLA) of 8.21mm$^2$ (Fig. 1A; Video 1, view video online). Five years later, he presented with sudden chest pain and high-sensitivity cardiac troponin elevation, and he was subsequently diagnosed with non-ST-segment elevation acute myocardial infarction. Urgent coronary angiography revealed a severe stenosis in the proximal RCA. OCT examination showed eruptive CN protruding into the lumen with mixed thrombus and an MLA of 1.35 mm$^2$ (Fig. 1B; Video 2, view video online). Coronary angioscopy (Forwardlooking, OVALIS, Osaka, Japan) revealed mixed thrombus attached to cauliflower-like shape calcification (Fig. 2; Video 3, view video online). Thrombus vaporization and debulking with excimer laser coronary angioplasty at the lesion segment of proximal RCA was performed. OCT examination after this angioplasty demonstrated MLA expansion to 2.62 mm$^2$ (Fig. 1C). A 3.5- × 15-mm third-generation drug-eluting stent was implanted, followed by postdilatation with a noncompliance balloon of 4.0 × 10 mm. Final OCT examination showed a minimal stent area of 8.92 mm$^2$ (Fig. 1D). He had no cardiac events for 2 months after the percutaneous coronary intervention.

### Novel Teaching Points

- Our case report demonstrates an ACS case that progressed to CNs from nodular calcification, which is known to be relatively benign, with a series of OCT images and acute phase coronary angioscopy images.
- In patients with CNs, thrombus vaporization and debulking with excimer laser coronary angioplasty may be therapeutic options.

Our case report demonstrates an ACS event caused by CNs, with historic imaging confirming previous nodular calcification. We also demonstrate the use of multimodality imaging, including OCT and angioscopy, and the use of laser angioplasty to treat CNs. Our case report is the first to demonstrate an ACS case that progressed to CNs from nodular calcification, which is known to be relatively benign, with a series of OCT images, therapeutic options, and acute phase coronary angioscopy images.

### Ethics Statement

This case report was conducted in compliance with the institutional ethics committee guidelines and received the committee's approval.

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### Disclosures

The authors have no conflicts of interest to disclose.

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See page 490 for disclosure information.

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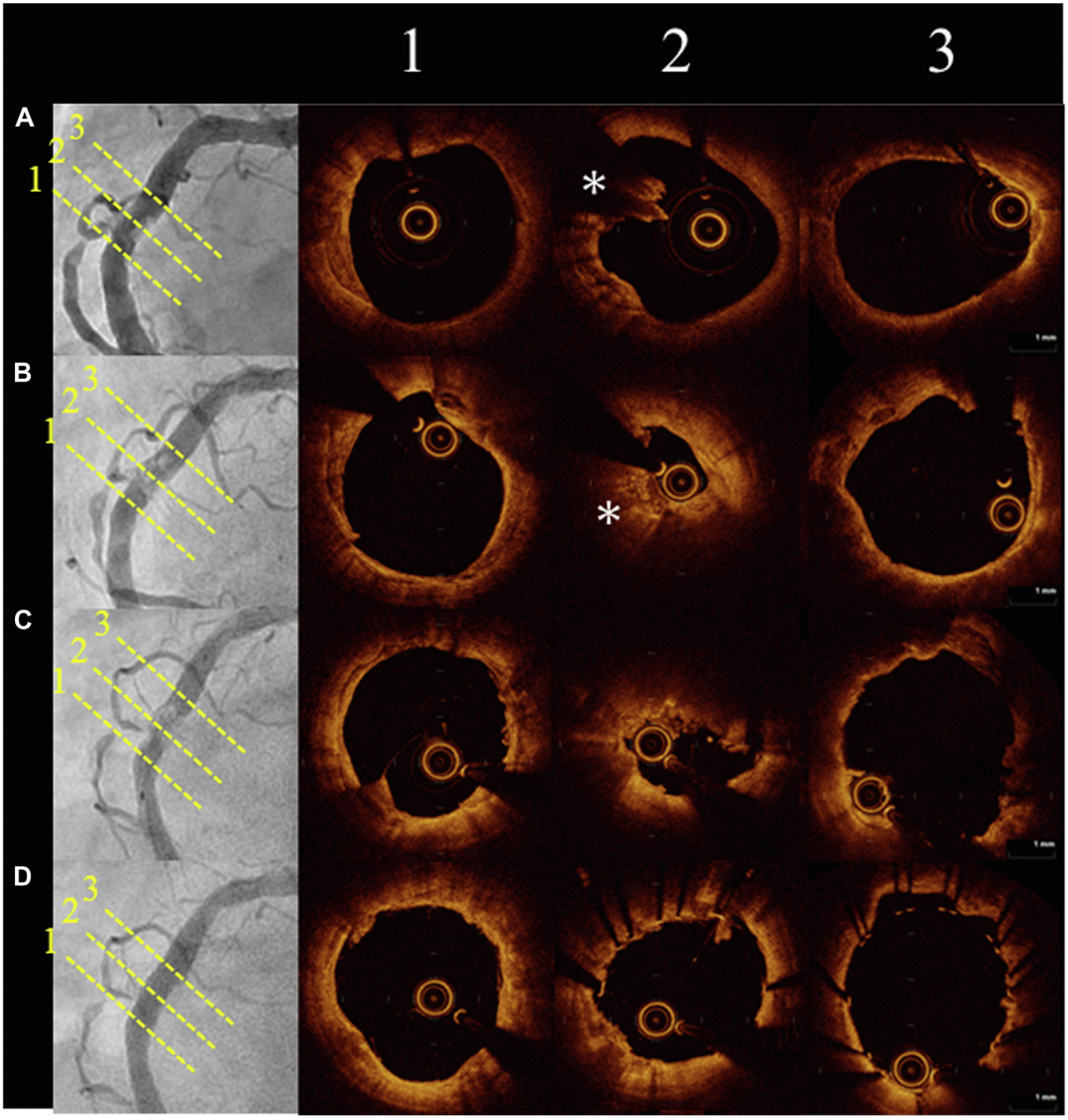


**Figure 1.** A series of coronary angiograms and optical coherence tomography images. (**A**) Five years prior to the occurrence of acute myocardial infarction. Nodular calcification without thrombus formation (**asterisk**) was observed. (**B**) Preintervention. Nodular calcification progressed to eruptive calcified nodules (**asterisk**). Mixed thrombus was observed. (**C**) Post-excimer laser coronary angioplasty. (**D**) Postintervention.

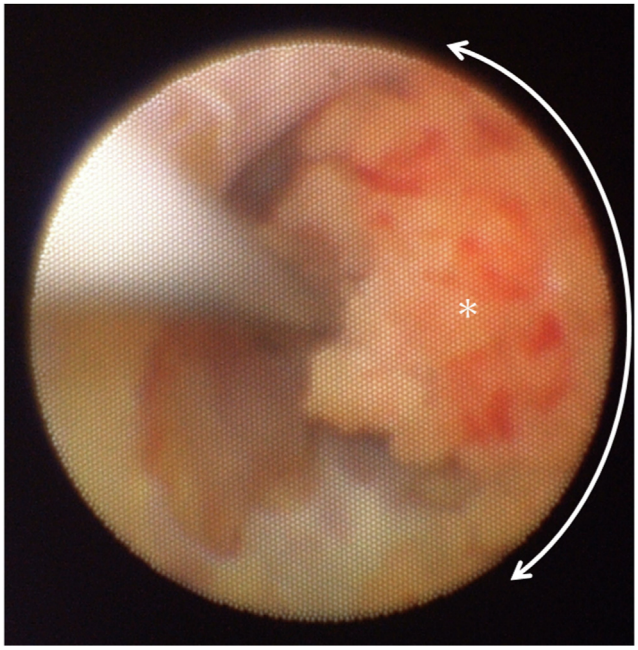

**Figure 2.** Preintervention coronary angioscopy images. Mixed thrombus (**asterisk**) attached to cauliflower-like shape calcification (delineated by **arrow**: "1 to 5 o'clock") was observed.

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## Supplementary Material

To access the supplementary material accompanying this article, visit *CJC Open* at https://www.cjcopen.ca/ and at https://doi.org/10.1016/j.cjco.2023.04.006.