

MINI-FOCUS ISSUE: INTERVENTIONS

INTERMEDIATE

IMAGING VIGNETTE: CLINICAL VIGNETTE

Ultra-Low Contrast Percutaneous Coronary Intervention Guided by Optical Coherence Tomography Complicated by Coronary Perforation



Scott A. Harding, MB, ChB, Thalib Mowjood, MB, ChB, Sarah Fairley, MBBChBAO, PhD

ABSTRACT

Percutaneous coronary intervention (PCI) in patients with chronic kidney disease is associated with a high-risk of contrast-induced nephropathy. We describe a case of ultra-low contrast PCI guided using optical coherence tomography using normal saline for clearance complicated by distal wire perforation treated with embolization. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2020;2:2429-31) © 2020 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

A 56-year-old woman with stage 4 chronic kidney disease (estimated glomerular filtration rate 29 ml/min/1.73 m²), type 2 diabetes mellitus, previous percutaneous coronary intervention (PCI) to the right coronary artery, and peripheral vascular disease presented with an anterior non-ST-segment elevation myocardial infarction to a regional hospital. Coronary angiography demonstrated diffuse 3-vessel coronary disease and was complicated by the development of contrast-induced nephropathy, with the estimated glomerular filtration rate decreasing to 16 ml/min/1.73 m². The patient was discharged on medical therapy but was readmitted with a further anterior non-ST-segment elevation myocardial infarction 2 weeks later. The patient was referred to our center and reviewed by the Heart-Team. PCI to the left anterior descending artery (LAD) was recommended because the patient was considered unsuitable for bypass grafting.

Zero contrast PCI was planned. Roadmaps were made from the previous angiogram (Figure 1A) and a wire tree was created. Optical coherence tomography (OCT) examination of the LAD was performed using normal saline (25 ml at 5 ml/s) for clearance (Figure 1B, Video 1). This allowed accurate assessment of the lesion and vessel size. (Figures 1C to 1E). A severe lesion with a large amount of thrombus was demonstrated. Lesion location was confirmed by coregistering the OCT location with the cine angiogram. The lesion was predilated and a 2.75 × 23 mm drug-eluting stent deployed using the wire tree as landmarks. Following post-dilation, OCT with normal saline clearance (25 ml at 5 ml/s) confirmed optimal stent deployment (Figure 1F, Video 2).

The patient remained asymptomatic and hemodynamically stable throughout the procedure. During stent placement, the LAD guidewire was noted to have advanced around the apex. Therefore, an angiogram (Figure 1G) using 5 ml of contrast was performed to exclude a distal wire perforation. An Ellis grade 2 perforation in the apical LAD was visible in the runoff phase (Supplemental Figures 1A and 1B, Video 3).

From the Wellington Hospital, Wellington, New Zealand.

The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

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**ABBREVIATIONS
AND ACRONYMS**

LAD = left anterior descending artery

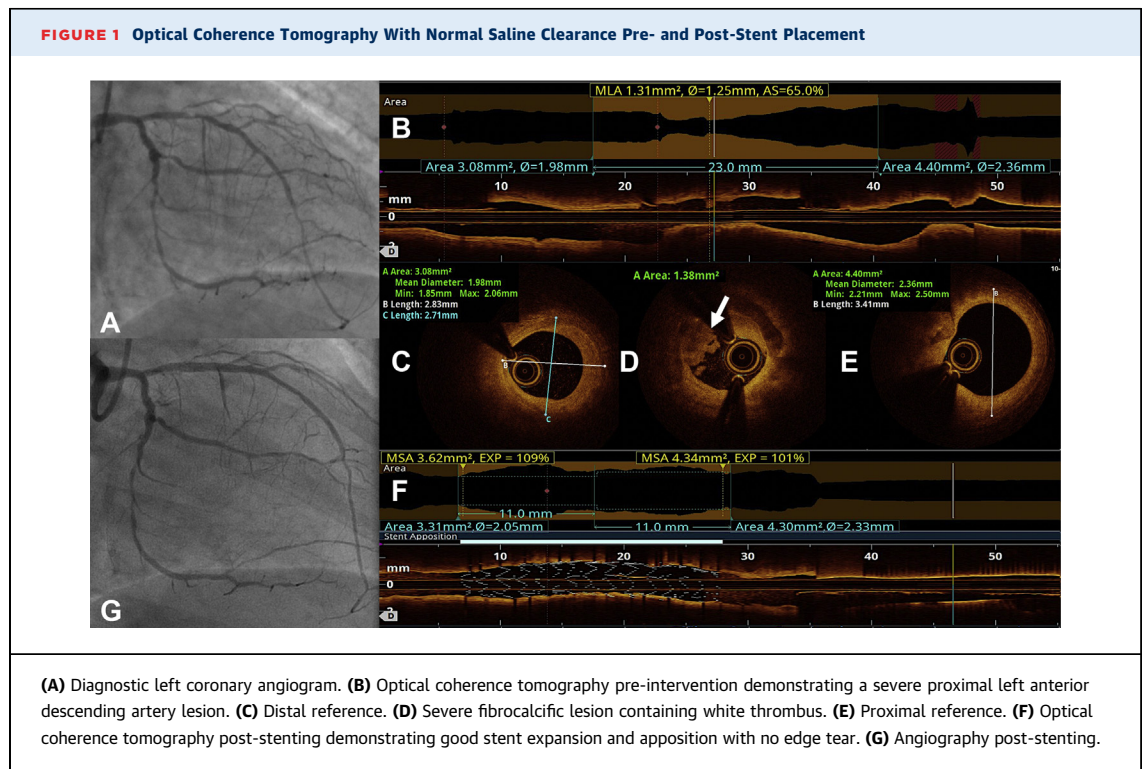
OCT = optical coherence tomography

PCI = percutaneous coronary intervention

A microcatheter was advanced over the guidewire as close to the perforation in the apical LAD as possible. A tip injection was performed to confirm the microcatheter position (Supplemental Figure 1C, Video 4) and 900- μ m EmboGold microspheres (Merit Medical, South Jordan, Utah) were injected. A further contrast injection through the microcatheter confirmed occlusion of the perforation (Supplemental Figure 1D, Video 5). A total of 7 ml of contrast was used during the procedure. A post-procedure echocardiogram demonstrated no pericardial effusion and the patient made an uneventful recovery with no deterioration in renal function.

To our knowledge this is the first report of ultra-low or zero contrast PCI guided by OCT using normal saline. There previously have been a limited number of reports of zero contrast PCI guided by OCT using low molecular weight dextran-40 (1,2). Normal saline has a number of advantages over low molecular weight dextran-40. It is readily available, cheap, does not elicit anaphylactoid reactions, and is not nephrotoxic.

Distal wire perforation cannot be excluded by intravascular imaging and a final angiogram should be considered after complex cases or if distal wire migration is noted. If distal wire perforation occurs, this can be rapidly and effectively dealt with by embolization using minimal contrast.



AUTHOR DISCLOSURES

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ADDRESS FOR CORRESPONDENCE: Dr. Scott A. Harding, Department of Cardiology, Wellington Hospital, Private Bag 7902, Wellington South, New Zealand. E-mail: scott.harding@ccdhb.org.nz.


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coherence tomography, percutaneous coronary intervention, perforation

KEY WORDS chronic kidney disease, contrast-induced nephropathy, optical

 **APPENDIX** For supplemental videos, please see the online version of this paper.