

IMAGES IN INTERVENTION

# Intracoronary Bubbles

## Iatrogenic Air Embolism Assessed With Optical Coherence Tomography

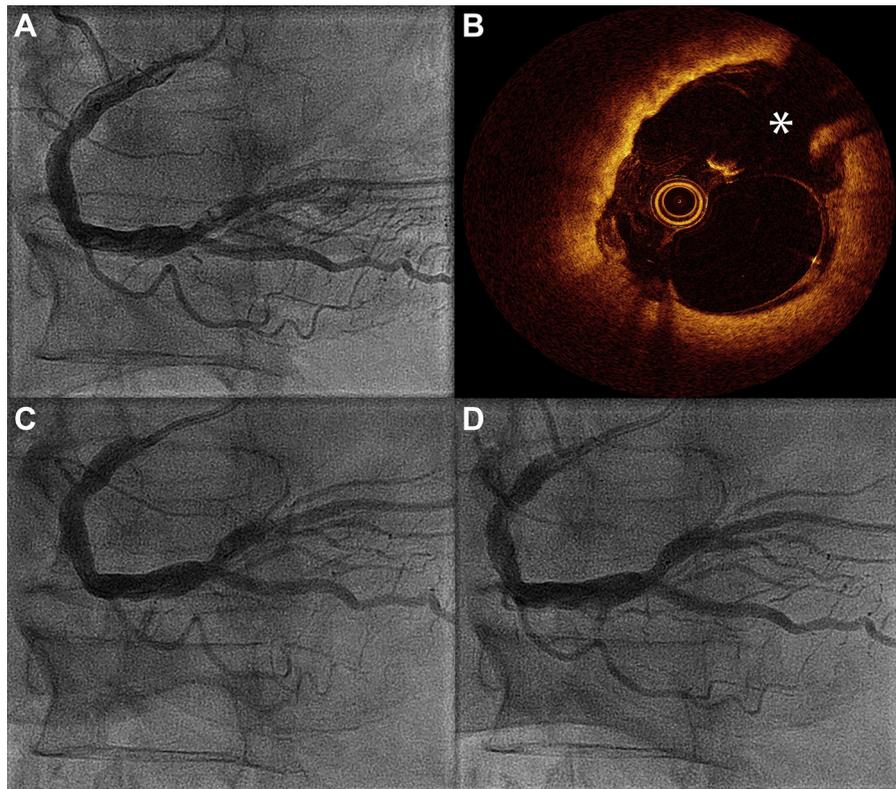


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An 82-year-old man with hypertension, diabetes mellitus type 2, and chronic renal failure under hemodialysis was admitted with rest angina. Coronary angiography showed 2-vessel coronary artery disease, with significant stenosis in the first and second diagonal branches that were small vessels, and a severe heavily calcified focal stenosis in the proximal segment of the posterolateral branch. This lesion was treated with percutaneous coronary intervention (PCI) using sequential high-pressure balloon dilations (diameters 1.5, 2.0, and 3.0 mm) followed by the implantation of a 3-mm × 12-mm drug-eluting stent. Immediate angiography after stent deployment showed good result of the stent, but also revealed a localized slow-flow phenomenon subsequently accompanied by chest pain and inferior ST-segment elevation. A filling defect in the ectatic proximal segment of the posterolateral branch was also recognized (Figure 1A, Online Video 1). The differential diagnosis of the repletion contrast defect included thrombus and air embolism, and therefore, optical coherence tomography (OCT) was indicated. No image of thrombus was detected by OCT. Instead, 2 circumferential, low-refrindex lines (without brightness inside) occupied the entire vessel lumen, confirming the suspicion diagnosis of air embolism (Figure 1B). The air leakage was probably produced during the balloon dilation secondary to a pinhole balloon rupture because a mild pressure drop was observed during the inflation of the device.

Air aspiration was performed using a 6-F Export aspiration catheter (Medtronic Inc., Minneapolis, Minnesota) with several passages. After this maneuver, the angiographic repletion defect eventually disappeared (Figures 1C and 1D, Online Video 2), and coronary flow and ST-segment changes normalized. Hospitalization was uneventful.

Coronary air embolism is a rare complication during PCI that may be asymptomatic or cause chest pain, ST-segment elevation, or systemic hypotension (1,2). Massive air embolism may cause hemodynamic derangement, severe life-threatening arrhythmias, and even death (1,2). The diagnosis of air embolism is readily suspected in cases with the typical “moving round bubbles” that are easily detected on angiography, often associated with slow coronary flow. However, sometimes, in particular during complex PCI procedures in ectatic vessels, the bubbles may remain still, and therefore, the haziness or repletion defect may be difficult to differentiate from intracoronary thrombus formation. To the best of our knowledge, this is the first report in the literature describing the value of OCT to help in the differential diagnosis of coronary air embolism. Our findings suggest that OCT readily allows the differentiation of this condition from intracoronary thrombus and therefore may be of help in selected cases to guide subsequent management. Air embolism treatment options include 100% oxygen administration as well as atropine and epinephrine injections (1). Air

**FIGURE 1** Imaging of Diagnosis, Treatment, and Resolution of Air Embolism

(A) Coronary angiography showing a filling defect in the proximal segment of the posterolateral branch ([Online Video 1](#)). (B) Optical coherence tomography depicting 2 circumferential, low-refrindex lines without any brightness inside the vessel lumen. The asterisk indicates the guidewire artifact. (C) Repletion defect decrease on coronary angiography during aspiration with 6-F Export catheter (Medtronic Inc., Minneapolis, Minnesota) ([Online Video 2](#)). (D) After full air aspiration, coronary angiography shows no residual repletion defects. Normal coronary flow and a good result of percutaneous coronary intervention were eventually achieved.

aspiration has been previously described as an alternative treatment (3). This case nicely illustrates that bubble aspiration using an Export catheter is very useful in removing the air from the coronary artery, avoiding the potential damage of distal microvasculature due to distal air embolization.

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**KEY WORDS** air embolism, bubbles, optical coherence tomography

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