Cardiac Imaging

Coronary Artery Aneurysm Can Occur in Drug Eluting Stents: Is Plaque Composition Important?

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A 53-year-old woman with new on-set angina and 2-vessel coronary artery disease underwent intravascular ultrasound (IVUS) guided percutaneous coronary intervention with a sirolimus-eluting stent, Cypher (Cordis, Johnson and Johnson Corp., Miami FL, USA) 3 mm × 23 mm, in the left circumflex artery (LCX) and two different types of stent in the right coronary artery (RCA): a Xience everolimus-eluting stent in the distal lesion (Abbott Laboratories, Abbot Park IL, USA) 2.75 mm × 28 mm, and a Cypher 3 mm × 23 mm in the proximal lesion, with a minimal gap between them involving a healthy segment. The final angiogram revealed excellent results (Figure 1A, Figure 2A).

Virtual histology (VH) analysis,[1,2] prior to stent implantation, revealed a fibrotic lesion in the LCX (Figure 3A). In addition, VH analysis of the distal (Figure 4A) and proximal (Figure 5A) lesions of the RCA showed plaques with a prominent necrotic core close to the luminal border. All the lesions analyzed with VH were in close proximity to the segment of significant angiographic stenosis and were covered after stent implantation. Post stent-implantation grayscale IVUS examination confirmed good stent apposition in both vessels (Figures 3B, 4B, 5B).

Five months later the patient complained of chest pain. The coronary angiogram and IVUS examination revealed coronary artery aneurysms (CAAs) within both stented segments of the RCA (less prominent inside the Xience stent, Figures 2B and 4C; more prominent inside the Cypher stent, Figures 2C and 5C), but no aneurysm formation in the LCX (Figure 1B). The patient's clinical history did not suggest predisposition to aneurysm formation, while systemic arteritis was excluded.

Although there are no guidelines on how to treat such lesions, since the patient presented with a clinical syndrome of angina, we decided to optimize stent apposition as far as possible using IVUS-guided[3] balloon angioplasty; lifelong dual antiplatelet therapy was recommended.

In our patient, simultaneous CAAs of different severity were formed within two different types of drug eluting stent (Xience and Cypher) implanted in the same coronary artery (RCA). However, CAA did not occur in the stented segment of the LCX. Our findings suggest that plaque composition may play a role in the creation of CAAs in addition to stent type. It is possible that the presence of inflammation in the necrotic core area would interfere with the normal healing process after stent implantation. Another possibility is that the use of two different drug-eluting stents could have contributed to the development of the aneurysms. We believe that this is a novel observation, which needs further validation.
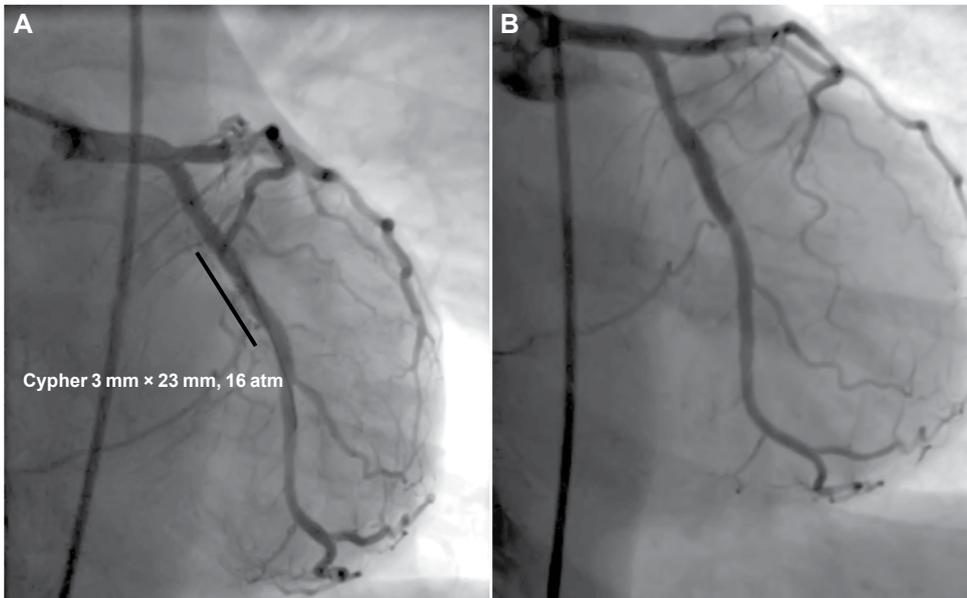
Figure 1. Angiogram of the left circumflex artery. A. Immediately post stent implantation. B. 5 months post stent implantation.
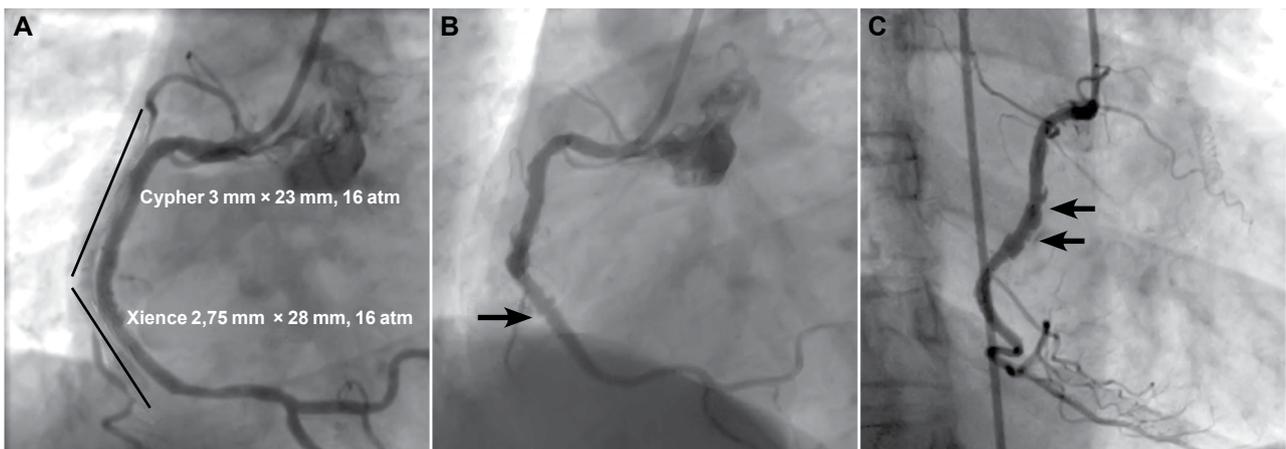

Figure 2. Angiogram of the right coronary artery. A. Immediately post stent implantation. B, C. 5 months post-stent implantation, showing coronary artery aneurysms (black arrows).
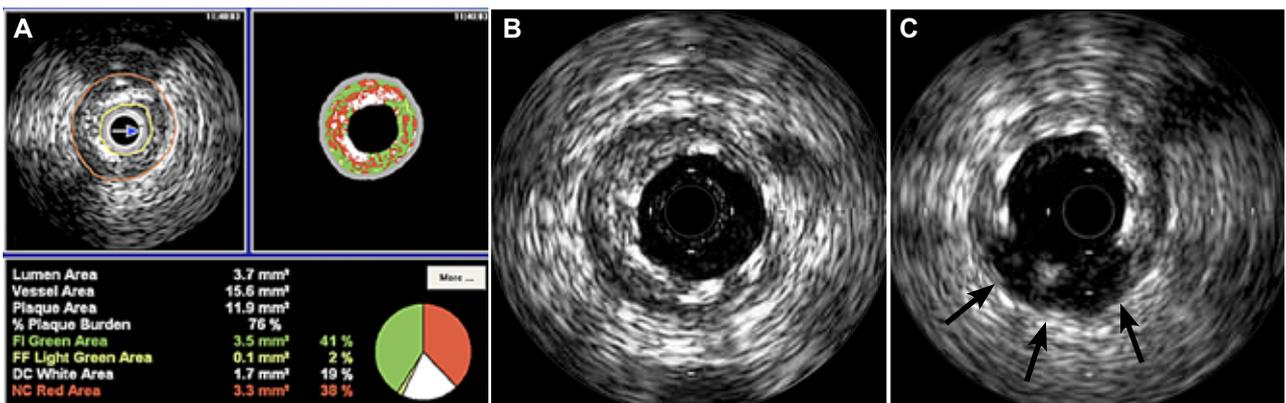

Figure 3. Left circumflex artery lesion. A. Virtual histology analysis prior to stent implantation. B. Grayscale intravascular ultrasound immediately post stent implantation.
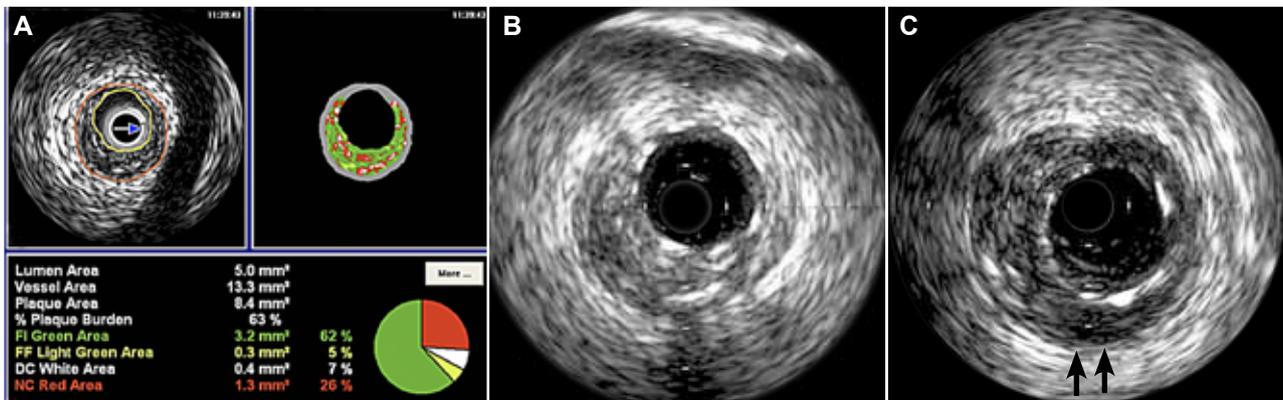
Figure 4. Distal lesion in the right coronary artery. A. Virtual histology analysis prior to stent implantation. B. Grayscale intravascular ultrasound immediately after stent implantation. C. 5-months post stent implantation, showing coronary artery aneurysms (black arrows).
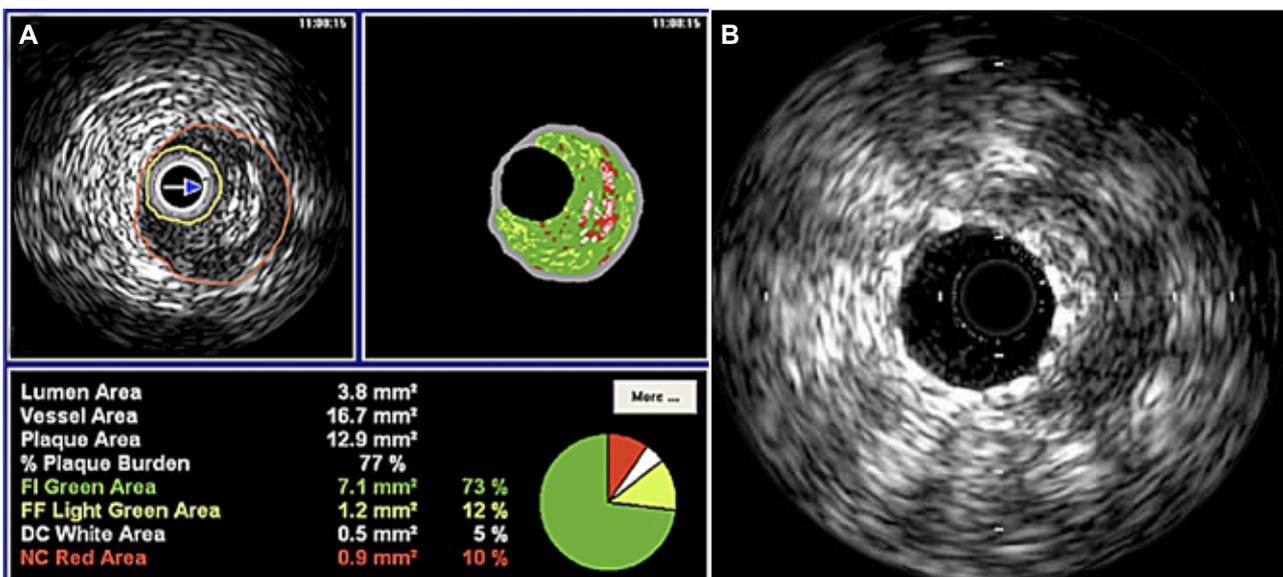

Figure 5. Proximal lesion in the right coronary artery. A. Virtual histology analysis prior to stent implantation. B. Grayscale intravascular ultrasound immediately after stent implantation. C. Five months post stent implantation, showing coronary artery aneurysms (black arrows).

References

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3. Van Velzen JE, Schuijf JD, De Graaf FR, et al. Imaging of atherosclerosis: invasive and noninvasive techniques. Hellenic J Cardiol. 2009; 50: 245-263.