Coronary Artery Perforation Due to High-Pressure Cutting Balloon Inflations

The coronary angiogram of a 68-year-old female with non ST-elevation myocardial infarction showed occlusion of the left anterior descending (LAD) artery just after a small-caliber first diagonal. The lesion was crossed with a standard workhorse wire (Figure 1A). After pre-dilations with semi-compliant balloons, flow restoration in the LAD revealed diffuse atherosclerotic disease in the mid-portion (Figure 1B). There was a focal calcified area where the semi-compliant balloons had a waist (Figure 1C, Video 1), and subsequent inflations with a non-compliant balloon up to 18 atm did not improve it. Cutting balloon inflations (Wolverine 3.0 x 10 mm, Boston Scientific, Galway, Ireland) up to 10 atm also failed to improve the waist. A final inflation up

Figure 1. (A) Mid- left anterior descending occlusion (red arrow); workhorse wire has crossed the lesion. (B) Diffuse atherosclerotic disease in the mid-portion of the LAD. (C) Pre-dilatation with a semi-compliant balloon showing a waist. (D) Full expansion of the cutting balloon at 14 atm. (E) Subsequent angiographic view showing an Ellis Grade III perforation (white arrow). (F) Sequential balloon inflations with the semi-compliant balloon resulted in (G) leak restriction (white arrow), (H) covered stent deployment, and (I) the final angiographic result.
to 14 atm (the cutting balloon’s rated burst pressure was 12 atm) resulted in full expansion of the cutting balloon (Figure 1D); however, the next angiographic view revealed an Ellis III coronary perforation (Figure 1E, Video 2). We promptly withdrew the cutting balloon and re-advanced the semi-compliant balloon, performing sequential long inflations (Figure 1F, Video 3). Leak restriction was achieved (Figure 1G, Video 4), and bedside echocardiography excluded pericardial effusion. A PK Papyrus (BIOTRONIK AG, Bülach, Switzerland) 2.5 x 20 mm covered stent was then implanted to seal the perforation (Figure 1H, Video 5). Two more drug-eluting stents were implanted proximally with good angiographic results and Thrombolysis in Myocardial Infarction II–III flow (Figure 1I). The patient had an uneventful recovery and was discharged four days later.

Coronary artery perforation is a serious complication of percutaneous coronary intervention that can potentially be life-threatening. Early recognition and adequate management with balloon tamponade or covered stents are very important for patient survival; however, bail-out surgical intervention may also be required.

In conclusion, our case highlights that performing high-pressure cutting balloon inflations in native calcified coronary arteries should be avoided as the risk of coronary perforation is high.

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Video 1. Semi-compliant balloon inflations revealing a waist.
Video 2. Coronary angiogram post high-pressure cutting balloon inflation demonstrating an Ellis Grade III perforation.
Video 3. Re-advancement of the semi-compliant balloon to perform sequential long inflations.
Video 4. Leak restriction demonstrated post sequential long inflations with the semi-compliant balloon.
Video 5. A covered stent was implanted and the leak was eliminated.