Effective use of the cutting balloon technique for treatment of intramural hematoma complicating a complex percutaneous intervention in a patient with multivessel disease and severely decreased left ventricular ejection fraction

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An 80-year-old man with multivessel coronary artery disease was admitted to our department of cardiology for an elective multivessel high-risk percutaneous coronary intervention (PCI) with left ventricular assist device support — Impella CP (ABIOMED Inc., Danvers, MA, US). The patient had a prior history of myocardial infarction and atherosclerotic risk factors which included hypertension, type 2 diabetes mellitus, and dyslipidemia. Transthoracic echocardiogram (TTE) showed left ventricular ejection fraction (LVEF) of 20%. The procedure was preceded by Heart Team qualification.

The Impella CP was placed in the left ventricle (LV) via right femoral arterial access. In the first part of the procedure, the right coronary artery (RCA) was treated, rotational atherectomy was used, and 3 drug-eluting stents (DES) were implanted (XienceProS, Abbott Vascular, Chicago, IL, US). The second part of the procedure covered PCI of the left main coronary artery (LMCA) and left anterior descending artery (LAD). After initial predilatation, the intravascular lithotripsy (IVL) technique was used with a shockwave balloon (Shockwave Medical, Inc, Santa Clara, CA, US). Subsequently, a DES (XienceProS 3.5 × 38 mm) was implanted in the LMCA and proximal-mid LAD at a 16 atm pressure. The post-stenting angiogram showed distal stent edge stenosis (Figure 1A). Intravascular ultrasound (IVUS) demonstrated an intramural hematoma (IMH) compressing the vessel lumen (Figure 1B). Hence, it was decided to fenestrate the IMH with a cutting balloon — dimensions: 2.5 × 10 mm (Flextome, Boston Scientific, MA, US) which was inflated to 8 atm (Figure 1C). Afterward, the fenestrated area was stented (XiencePro 3.0 × 38 mm, 12 atm). Angiography showed that the IMH distally shifted to the second stent (Figure 1D). Further inflation of the cutting balloon to 6 atm was performed with the expected effect. IVUS control showed an optimal outcome (Figure 1E). The final angiogram demonstrated patency of the LAD — TIMI (Thrombolysis in Myocardial Infarction) flow grade 3 (Figure 1F). During the hospital stay, the patient was rehabilitated and mobilized without any signs or symptoms of cardiac ischemia and was finally discharged after 3 days. Phone call follow-up confirmed satisfactory post-PCI rehabilitation.

In the available literature on the subject, there are case reports on using the cutting balloon (CB) method in the treatment of spontaneous and post-stenting IMHs [1–3]. Coronary artery IMH after stenting is an uncommon complication of PCI, but its occurrence can lead to significant ischemia, thrombosis, and final occlusion of the culprit artery [4]. IVUS is a useful tool for detecting IMH, and it offers complete vessel visualization in terms of both circumferential and longitudinal hematoma extent. Furthermore, the use of IVUS can guide PCI and minimize the incidence of PCI-related

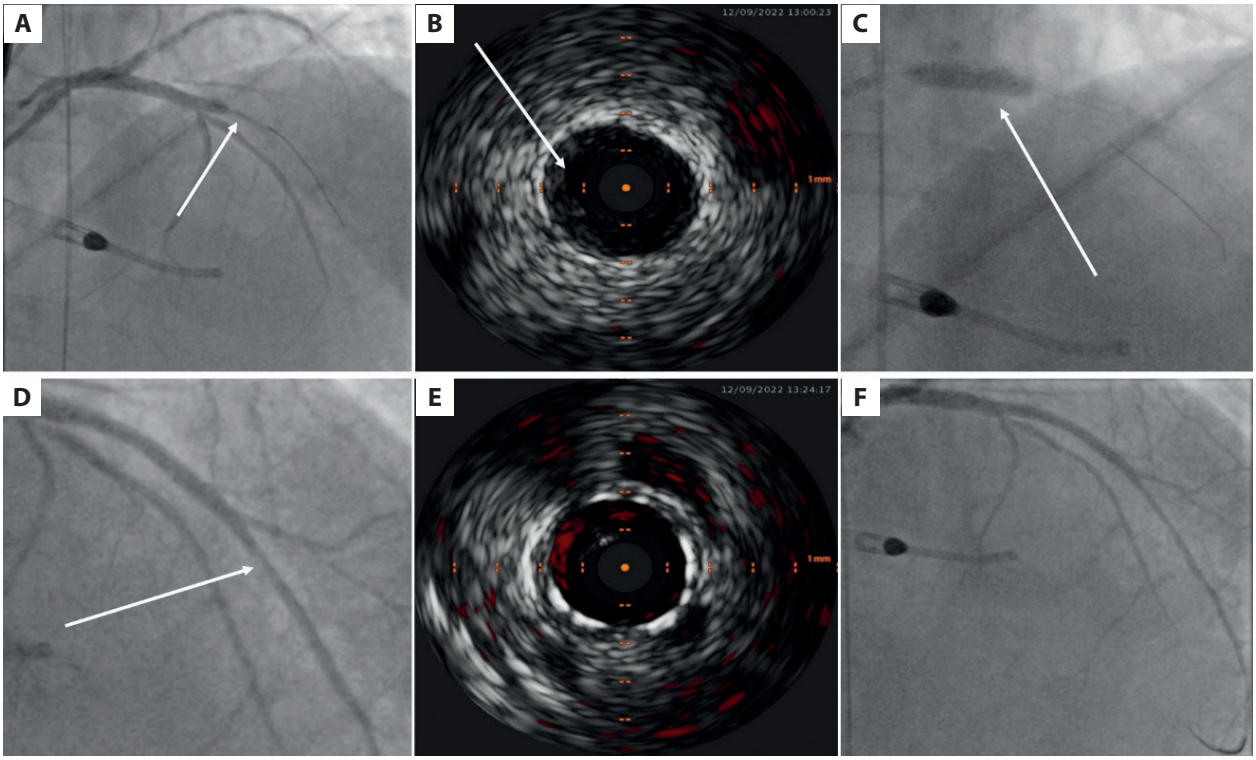

Figure 1. A. Left coronary artery angiography showing distal stent edge stenosis (white arrow). **B.** Intravascular ultrasound demonstrating intramural hematoma compressing vessel lumen (white arrow). **C.** Angiogram showing cutting balloon inflation (2.5 × 10 mm, Flextome, Boston Scientific, MA, US; white arrow). **D.** Angiography exhibiting propagation of compressive intramural hematoma (white arrow). **E.** Intravascular ultrasound control showing optimal procedure outcome. **F.** Final angiography of the left coronary artery

complications [1, 5]. There are currently no guidelines on the treatment of IMHs; therefore, treatment should be individualized on the basis of patient characteristics and clinical scenarios. In the presented case, we have demonstrated that cutting balloons can be an effective management strategy for post-stenting IMHs.

Article information

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REFERENCES

1. Antonsen L, Thayssen P, Jensen LO. Large coronary intramural hematomas: a case series and focused literature review. Cardiovasc Revasc Med. 2015; 16(2): 116–123, doi: 10.1016/j.carrev.2014.10.009, indexed in Pubmed: 25497372.
2. McGrath BM, Vo MN. Novel use of cutting balloon to manage compressive subintimal hematoma during left main stenting in a patient with spontaneous coronary artery dissection. Clin Case Rep. 2018; 6(7): 1291–1295, doi: 10.1002/ccr3.1531, indexed in Pubmed: 29988628.
3. Servoz C, Monségu J, Abdellaoui M, et al. Cutting balloon to treat post-stenting intramural hematoma during ST elevation myocardial infarction. Postepy Kardiol Interwencyjnej. 2021; 17(1): 114–115, doi: 10.5114/aic.2021.104779, indexed in Pubmed: 33868428.
4. Maehara A, Mintz GS, Bui AB, et al. Incidence, morphology, angiographic findings, and outcomes of intramural hematomas after percutaneous coronary interventions: an intravascular ultrasound study. Circulation. 2002; 105(17): 2037–2042, doi: 10.1161/01.cir.0000015503.04751.bd, indexed in Pubmed: 11980682.
5. El-Mawardy M, Abdel-Wahab M, Richardt G. Extension of a coronary intramural hematoma as a complication of early percutaneous coronary intervention after thrombolytic therapy. Case Rep Med. 2013; 2013: 218389, doi: 10.1155/2013/218389, indexed in Pubmed: 23840217.