Case Report

Stent Implantation May Fail Sometimes in Coronary Complications: Extension of an Iatrogenic Left Main Coronary Artery Hematoma

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Abstract

Coronary artery perforations and dissections, associated with cardiac tamponade or acute vessel closure, are life-threatening complications of percutaneous coronary intervention. In some cases, subepicardial hematomas could occur and compress the vessel. A 59-year-old woman was admitted to our hospital with chest pain and was diagnosed with non–ST-elevation myocardial infarction. Coronary angiography showed the total occlusion of the diagonal artery. During the intervention, left main coronary artery dissection and intramural hematoma occurred as coronary complications. The left main coronary artery was stented; however, the extension of the hematoma through the ostium of the left anterior descending artery caused further complications. The patient underwent an urgent coronary artery bypass graft surgery and was discharged on the seventh postoperative day.

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Introduction

Coronary dissections and intramural hematomas could be the iatrogenic complications of percutaneous coronary intervention (PCI). The incidence of intramural hematomas, according to intravascular ultrasonography (IVUS), is up to 6.7%.[1,2] Such complications can be treated with either interventional stenting or surgery or could be followed up conservatively. This report presents a rare case of coronary dissection and intramural hematoma undergoing coronary artery bypass grafting due to the propagation of the hematoma toward the left anterior descending artery (LAD).

Case Report

A 59-year-old woman who had a history of hypertension and smoking was admitted to our hospital with chest pain. The patient was diagnosed with non–ST-elevation myocardial infarction due to elevated troponin levels and ongoing chest pain. She had a regular pulse rate (120

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bpm) and a blood pressure of 155/107 mmHg. A 12-lead electrocardiogram showed sinus rhythm without an ST elevation, and coronary angiography (CA) revealed total occlusion in the diagonal artery (Figure 1A).

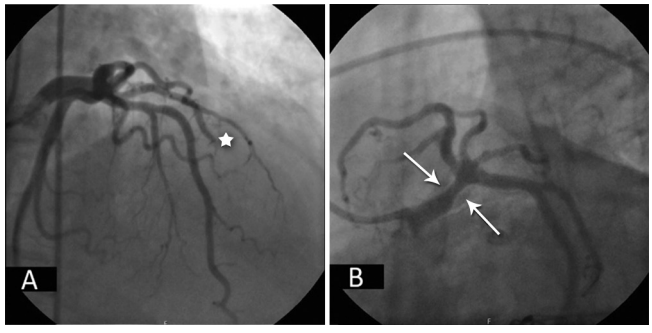

Figure 1. A) The right anterior oblique view with cranial angulation in the coronary angiography shows total occlusion in the diagonal artery (star). B) The left anterior oblique view with caudal angulation in the coronary angiography shows dissection and intramural hematoma in the left main coronary artery (arrows).

Percutaneous transluminal coronary angioplasty on the diagonal artery was planned because of the ongoing chest pain as a sign of ischemia. First, the left main coronary artery (LMCA) was cannulated with an EBU (6F EBU 3.5, Medtronic, USA) guiding catheter. Nonetheless, the support proved insufficient to wire the LAD, and it was replaced with a Judkins guiding catheter. Although it provided good guiding support, it failed to advance into the LAD due to an angulated take-off. After 2 attempts at the wiring of the LAD with a 0.014-inch coronary wire (BMW, Abbott, USA), the patient complained of increased chest pain. The contrast medium was contained in the LMCA wall (Figure 1B). Dissection and intramural hematoma were among the first diagnoses considered as a complication, and the decision was taken to wire the circumflex artery and stent the LMCA promptly without any protrusion to the circumflex artery. A 4.5×12 mm stent was successfully implanted in the complicated segment (Figure 2A & Figure 2B). Because the stent appeared relatively under-expanded, post-dilatation was performed with a 5.0×9 mm noncompliant balloon at 16 atm (Figure 2C). During the inflation of the noncompliant balloon, the contrast material on the LMCA wall shifted toward the LAD. A subsequent CA showed the extension of the hematoma toward the LAD and its subtotal occlusion (Figure 2D).

Multiple attempts at rewiring the lumen of the LAD were unsuccessful. It was decided to proceed with emergency coronary artery bypass grafting. The patient underwent successful surgery and was discharged from the hospital without further complications on the seventh postoperative day.

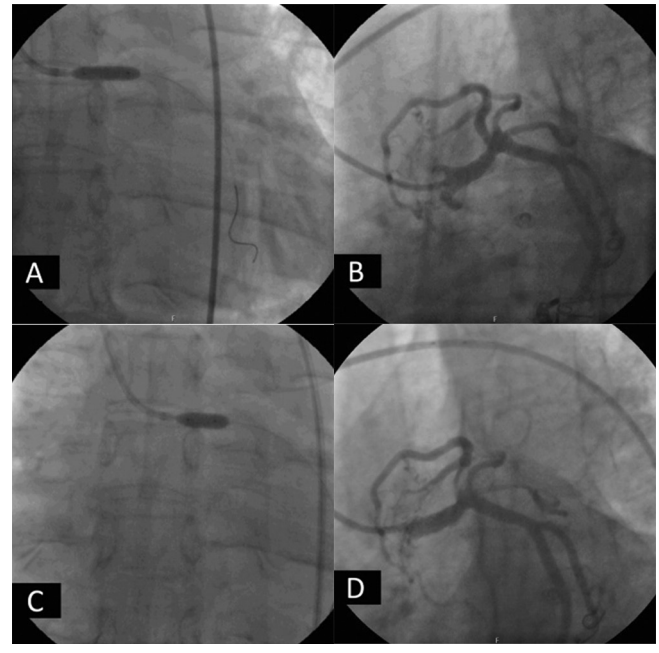

Figure 2. A) The right anterior oblique view with caudal angulation in the coronary angiography shows stent implantation to the LMCA through to the circumflex artery. B) The left anterior oblique view with caudal angulation in the coronary angiography shows good flow after LMCA stenting and a diminished contrast around the LMCA. C) The right anterior oblique view with caudal angulation in the coronary angiography shows the post-dilatation state of the stent with a noncompliant balloon. D) The left anterior oblique view with caudal angulation in the coronary angiography shows the suitable expansion of the stent; however, the ostial section of the left anterior descending artery is occluded.
LMCA, Left main coronary artery

Discussion

In the case presented herein, we interpreted the presence of the contrast medium in the LMCA only as dissection. Nevertheless, while inflating a noncompliant balloon, we saw the migration of an intramural hematoma. Considering the mechanism of the complication and the compression on the LAD ostium, we established a diagnosis of intramural hematoma. What should be considered in the development of this complication is that the lumen could have been torn with the blade effect due to the prolapse of the wire during our attempts to enter the LAD (Figure 3A). Damage to the LMCA was the starting point of the hematoma. After post-dilatation, the intramural hematoma extended to the LAD ostium, rendering further advancement to the LAD unfeasible (Figure 3B).

Coronary dissections and intramural hematomas could occur iatrogenically as a complication of percutaneous PCI.[1] The incidence of intramural hematomas diagnosed with IVUS reaches 6.7% following PCI.[2,3] Mural hematomas start with dissection, triggered by trauma, and propagate along

the medial layer of the artery.[4] The mechanism considered in this case is the prolapse movement in the guidewire during attempts at wiring the LAD. First, the guidewire caused a dissection; then, an intramural hematoma occurred. IVUS was not available in our clinic; however, the extension of the contrast medium toward the LAD during post-dilatation made us think that it was an intramural hematoma.

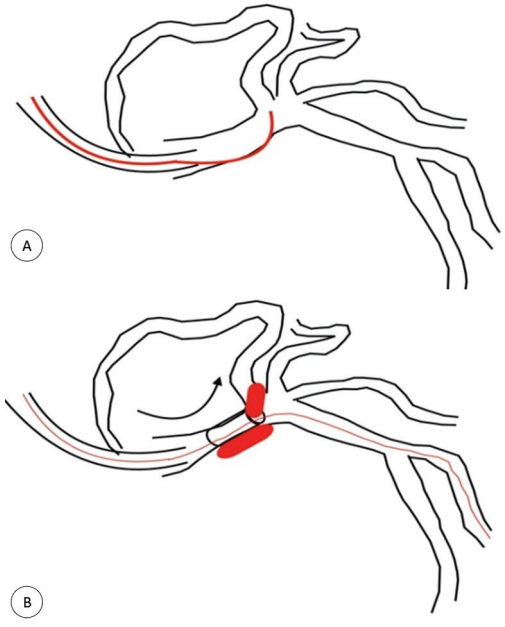

Figure 3. A) The schematic illustration of the left anterior oblique view with caudal angulation shows the possible mechanism of the complication due to the prolapse of the guidewire against the LMCA wall. B) The intramural hematoma (red shape for the hematoma) extends toward the ostium of the left anterior descending artery (arrow) during post-dilatation and compresses it. LMCA, Left main coronary artery

Iatrogenic hematomas of the LMCA are, albeit rare, potentially life-threatening complications of PCI, mostly requiring urgent revascularization.[5] IVUS is a significant diagnostic tool since it can provide essential information regarding the length of the dissection, vessel size, and the extension of the intramural hematoma. Additionally, it guides PCI and minimizes further complications. Intramural hematomas are a challenging complication, with their management strategies ranging from conservative medical treatment to percutaneous or surgical interventions. Stent implantation to cover the entire length of the hematoma and cutting balloon dilatation are some of the options.[6,7] Conservative management was not selected in this case because of the signs of ongoing ischemia. Had a longer stent to cover the LAD been chosen, the hematoma might not have extended to the LAD. The availability of IVUS in the catheterization laboratory can prove lifesaving in this type of complication. Moreover, IVUS can confirm the correct guidewire location and the adequate compression of the hematoma with PCI.[3]

The reported cases of iatrogenic intramural hematomas have been treated predominantly with percutaneous PCI. Maehara et al3 studied intramural hematomas during PCI in their retrospective analysis and showed that short-term complications (within 1 month) had occurred primarily in the non-stented group, whereas the late complications (1 month to 1 year) had happened chiefly in the stented group. Given the limited literature, the optimal treatment of iatrogenic intramural hematomas (revascularization vs conservative treatment) is still unclear; nonetheless, rapid recognition of coronary complications is vital to successful management, especially vis-à-vis ongoing ischemia and hemodynamic deterioration.

References

1. Antonsen L, Thayssen P, Jensen LO. Large coronary intramural hematomas: a case series and focused literature review. Cardiovasc Revasc Med 2015;16:116-123.
2. 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.
3. Maehara A, Mintz GS, Bui AB, Castagna MT, Walter OR, Pappas C, Pinnow EE, Pichard AD, Satler LF, Waksman R, Suddath WO, Laird JR, Jr, Kent KM, Weissman NJ. Incidence, morphology, angiographic findings, and outcomes of intramural hematomas after percutaneous coronary interventions: an intravascular ultrasound study. Circulation 2002;105:2037-242.
4. Liu X, Tsujita K, Maehara A, Mintz GS, Weisz G, Dangas GD, Lansky AJ, Kreps EM, Rabbani LE, Collins M, Stone GW, Moses JW, Mehran R, Leon MB. Intravascular ultrasound assessment of the incidence and predictors of edge dissections after drug-eluting stent implantation. JACC Cardiovasc Interv 2009;2:997-1004.
5. Djenić N, Dzudović B, Romanović R, Ratković N, Jović Z, Djukić B, Spasić M, Stojković S, Obradović S. Iatrogenic dissection of the left main coronary artery during elective diagnostic procedures--A report on three cases. Vojnosanit Pregl 2016;73:284-287.
6. Yamamoto K, Sakakura K, Momomura SI, Fujita H. Conservative management of severe coronary artery hematoma and dissection following stent implantation. Cardiovasc Revasc Med 2019;20:347-350.
7. Tarbiat M, Safarpoor G. Emergency Coronary Artery Bypass Graft Surgery for Iatrogenic Left Main Coronary Artery Dissection. J Tehran Heart Cent 2015;10:215-218.