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CASE REPORT

Left Main Coronary Artery Perforation Treated with Conventional Stent (A Real Management Dilemma)

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Abstract

Background: Left main coronary artery (LMCA) perforation is a very rare complication of percutaneous coronary intervention (PCI); there is a scarcity of data for its treatment and almost a lack of literature for the use of regular coronary stent for its management.

Case Presentation: We report a case of 90 years old male who presented with anterior wall myocardial infarction (AWMI) and developed Ellis Type 3 coronary artery perforation in calcified LMCA. Post dilatation of ostial Left anterior descending artery (LAD) stent was successfully managed with the deployment of regular drug-eluting stent (DES), preceded by immediate balloon tamponade.

Management & Results: The patient remained hemodynamically stable, and his echocardiogram did not show pericardial effusion or tamponade and was discharged home eventually in a stable condition.

Conclusion: In conclusion, LMCA perforation may occur during high-pressure post dilatation of calcified artery as evident from earlier studies but can be managed successfully with conventional coronary artery stent placement, provided there will be no hemodynamic compromise or tamponade. This case report has introduced a new concept of managing coronary artery perforation, which may reduce the risk of in-stent restenosis significantly associated with using a covered stent.

Keywords

Left Main, Anterior Wall Myocardial Infarction, Percutaneous Coronary Intervention, Drug-Eluting Stent, In-Stent Restenosis, Covered Stent, A Case Report.

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Introduction

Coronary artery perforation is luckily a rare but dreadful complication of PCI and may cause high mortality if not treated promptly and adequately[1]. It occurs in 0.2-0.6% of procedures, but in chronic total occlusion (CTO) procedures reported incidence is about 4.8%[2,3]. It is associated with 13-fold increase in major adverse cardiovascular events (MACE) and five fold increase in 30-day mortality[4]. Furthermore, this may result in cardiac tamponade, myocardial infarction, and death[5]. Management would vary from close observation, balloon tamponade, placement of coronary-specific stent-graft, or need of emergency surgery if other strategies failed[6,7]. This case report describes the management of left main coronary artery (LMCA) perforation with conventional coronary artery stent placement

Case Presentation

A 90-year-old male presented with complaints of chest pain for 2 hours, and his EKG revealed ST-segment elevation in precordial leads V2-V6 (Fig. 1). Examination revealed blood pressure of 107/44 mm of Hg, heart rate of 90 beats/min, respiratory rate of 16 breaths/min, and was afebrile. The patient was in Killip class I. Aspirin 300 mg, Clopidogrel 600 mg were administered along with unfractionated heparin, 5000 IU. Subsequently, he was shifted to the cardiac catheterization laboratory for primary PCI after taking written and informed consent.

Management and Treatment

For the primary procedure, the right radial artery was accessed. Initial coronary angiography revealed a plaque rupture in most-proximal LAD (Fig. 2A & B). Therefore, a stent (DES II 4.0 × 18) at 12 atm was deployed in ostio-proximal LAD following pre-dilatation with a semi-compliant balloon (2.0 × 10 at 10 atm). The choice floppy coronary wire was used to cross the lesion, ostial LAD was pre-dilated with a semi-compliant balloon 2.0 × 10 at 10 atm, and a DES II 4.0 × 18 coronary stents were deployed at 12 atm (Fig. 2 C & D). Finally, a non-compliant balloon (4.0 ×12mm) was used for post dilatation up to 14-20 atm. Post dilatation at 20 atm resulted in a grade III Ellis perforation in LAD and at the proximal stent edge in distal LMCA (Fig2E & 3A).

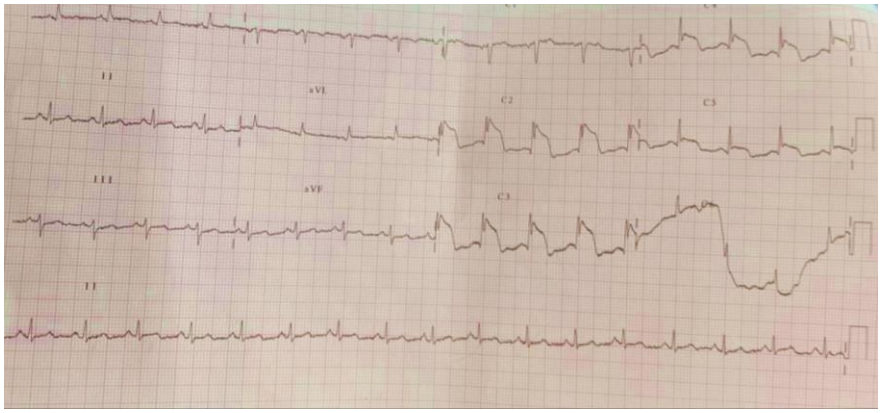

Figure 1: 12-lead electrocardiogram (ECG) at presentation

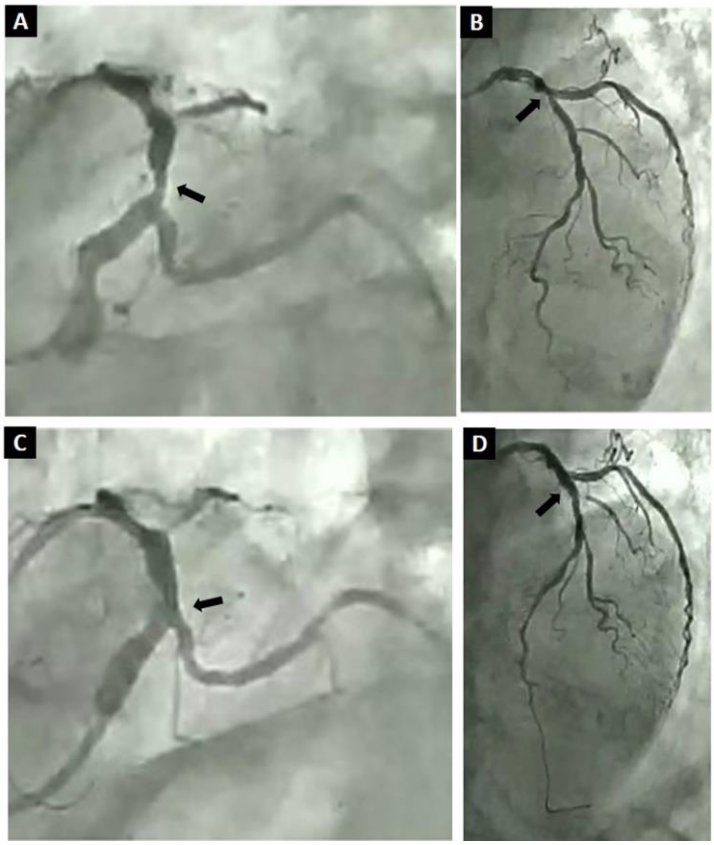

Figure 2: Baseline angiography showing significant ostial LAD disease (A, B) and post stenting image of ostial LAD (C, D)

Balloon tamponade at the site of perforation with the NC balloon at low pressure up to 4 -8 atm was performed for almost 5 minutes with intermittent deflation to allow perfusion. Despite this maneuver, the perforation in LAD was sealed, but perforation in the distal left main coronary artery was not sealed. Hence, prolonged intermittent balloon dilatation was considered without successfully healing the artery (Fig. 3B). Therefore, a DES II 4.0 × 12mm coronary stent was placed in LMCA at 12 atm to cover the perforation overlapping with the previous stent, and post dilatation was performed with a 4.0 × 12 non-compliant balloon at 12-14 atm.

Transthoracic echo revealed no pericardial effusion, and the patient was hemodynamically stable throughout the procedure with mild chest discomfort (Fig. 3D). After stenting, coronary angiography showed only mild extravasation of contrast (Fig. 3C). No anticoagulation reversal was considered as the patient maintained normal hemodynamics, and echocardiography did not reveal pericardial effusion. The patient was then shifted to the coronary care unit (CCU) for close observation.

Results

In CCU, the patient remained hemodynamically stable. Serial transthoracic echocardiography showed no pericardial effusion. After 24 hours, coronary angiography was repeated, which did not show any extravasation of contrast in LMCA (Fig. 3E & F). The patient kept on guideline-directed ACS medications and was ultimately discharged home on the sixth day of post-procedure.

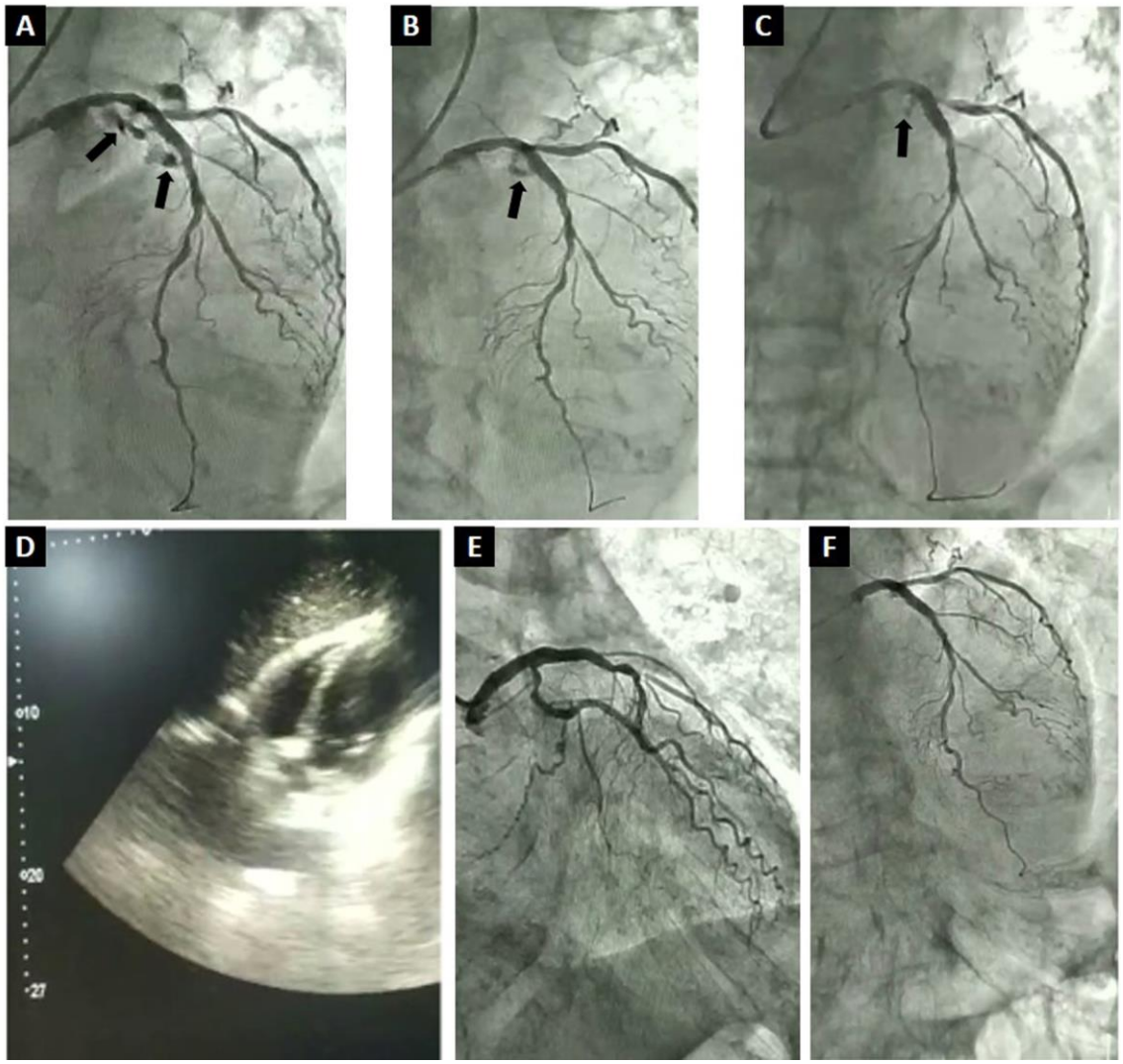

Figure 3: Ellis type III perforation in LAD and LM (A) after post dilatation, LAD perforation sealed after balloon tamponade with persistence of LM perforation (B), slight trickling after regular DES deployment in LMCA (C), post perforation echocardiography (D), recheck angiography after 24 hours did not reveal any extravasation (E, F)

Discussion

LMCA perforation is the rarest type of all perforation and, in a study conducted by Lee et al. constitutes 4.2% (2 out 48) of all coronary perforation. Stents, pre and post-dilatation, and calcification are among the commonest causes of perforation, along with old age and the presence of comorbid8. Shimony et al. found balloon inflation as the cause of perforation in 26% of cases[7,9], and wire perforation was caused in 53%. In our case, the potential cause of perforation was high-pressure post dilatation on the background of a calcified vessel. Among different available management strategies, balloon tamponade and the use of Polytetrafluoroethylene-covered stent have widely changed the spectrum of this deadly life-threatening complication and minimized the need for urgent surgical intervention[10]. The presence of cardiac tamponade is the major reason for hemodynamic compromise and increases the risk of death by threefold[11], which was luckily did not develop in this likely due to immediate sealing of LAD perforation. However, perforation at the left main site persisted and could be communicating or

contained, sparing the development of tamponade.

After a robust search of the literature, we could not find any data where regular stents have been used to seal perforation through anecdotal cases. In our case, there were two main reasons for using regular drug-eluting (DES) for Left main perforation. First, the patient was hemodynamically stable as there were no clinical and echocardiographic features of tamponade. Secondly, the use of a covered stent would straightly lead to another myocardial infarction (MI) resulting from occlusion of the left circumflex artery amid already extensive anterior MI. So we finally decided to put a regular stent. Amazingly, it resulted in a significant reduction of extravasation immediately, which finally completely stopped in the check angiogram performed the next day.

Conclusion

In conclusion, LMCA perforation may occur during high-pressure post dilatation of calcified artery as evident from earlier studies but can be managed successfully with conventional coronary artery stent placement, provided there will be no hemodynamic compromise or tamponade. This case report has introduced a new concept of managing coronary artery perforation, which may reduce the risk of in-stent restenosis significantly associated with using a covered stent.

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