Cover to Make a Covered Stent: An Unusual Method of treating a Coronary Perforation

Sadaf Shabbir Kiani, Azhar Ali Chaudhry, Faheem Ul Hassan

Department of Adult Cardiology, Armed Forces Institute of Cardiology/National Institute of Heart Diseases/
National University of Medical Sciences (NUMS) Rawalpindi, Pakistan

ABSTRACT

Coronary artery perforation is an infrequent yet serious complication of Percutaneous Coronary Intervention (PCI). Management includes conservative methods like prolonged balloon tamponade, emergency pericardiocentesis, in addition to implantation of covered stents, coil embolization of small vessels, as well as, Coronary Artery Bypass Graft (CABG) Surgery. Here we describe a unique case of coronary perforation management by using a man-made covered stent and an un-inflated semi-compliant balloon over a standard Drug Eluting Stent (DES).

Keywords: Coronary perforation, Chronic Total Occlusion (CTO), Man-made stent.

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INTRODUCTION

Coronary artery intervention is a routine procedure in Cardiac Catheterization laboratories and is generally associated with a low risk of complications. However, its occurrence is linked with significant increase in mortality.[1]

CASE PRESENTATION

A 73-years old hypertensive male patient, presented with complaints of effort angina and worsening dyspnea on exertion. Clinical examination of patient was unremarkable and his workup showed a normal echo with LVEF of 65% and a normal chest x-ray. His Coronary Angiogram Revealed a 100% Occluded Left Anterior Descending artery (LAD) and sub-totally occluded major Obtuse Marginal (OM). He was offered Percutaneous Coronary Intervention after he failed to respond to medical treatment.

During PCI of OM branch, the pilot 50 guide wire exited a small branch. Contrast injection showed an Ellis type-II coronary perforation (Figure-1). Initially, prolonged balloon tamponade was done, but the contrast extravasation persisted. Echo showed minimal pericardial effusion. The distal vessel was of 2.25-2.5 mm caliber, angiographically and Intravascular Ultrasound (IVUS) was not available to determine the actual vessel size. Appropriate sized covered stent was also not available. So, a novel technique was used to make a man-made covered stent using a 2.5 x 20mm, semi-compliant balloon and 2.25 x 20 mm stent. The uninflated balloon was cut between markers and room for stent was made using back end of the angioplasty guide wire, it was mounted over the stent (painted with some contrast) such that the cut edges of the balloon stayed short of the stent edges. After testing in a guide catheter in-vitro, the hand-made stent was taken over the guide wire to distal OM and installed at nominal pressure (Figure-2). After post-dilatation of the stent, the perforation was 100 % sealed. The final result showed TIMI III flow in the artery with no contrast extravasation (Figure-3). Post-procedural Echo showed pericardial effusion of 0.5mm with no tamponade effect. The patient was shifted to CCU for observation and discharged after 3 days, uneventfully.

Figure-1: Persistent Staining After Contrast Injection, Indicating Coronary Perforation (red arrow)

DISCUSSION

Coronary artery perforation is associated with a 5-fold increase in in-hospital mortality.[1] The incidence of coronary artery perforation is 0.29-0.71%.[2] However, the risk increases with complex procedures like Chronic Total Occlusion (CTO) interventions and rotational atherectomy.[3]

Correspondence: Dr Sadaf Shabbir Kiani, Department of Adult Cardiology, AFIC/NIHD Rawalpindi, Pakistan

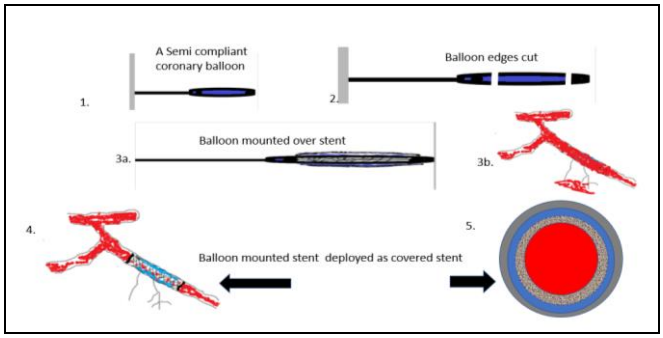

Figure-2: Hand-made covered stent preparation: (1) A 2.5x20 mm Semi-compliant balloon was taken. (2) The balloon edges were cut between markers. (3a) Mounting of the balloon over the stent. (3b) Depiction of perforation site. (4) Vessel sealed after deploying covered stent. (5) Cross-section showing sealing of the vessel wall and different layers : gray; vessel outer wall, blue; balloon layer behind stent, textured gray; stent platform, red; vessel lumen

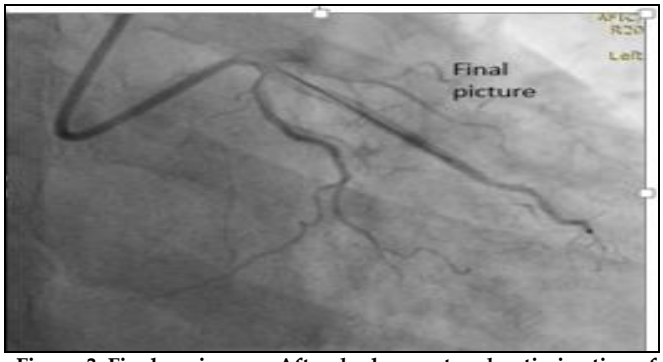

Figure-3: Final angiogram: After deployment and optimiza-tion of hand-made covered stent, no further contrast staining seen, indicating 100% sealing of the perforation

The most common cause is distal wire perforation.[4] Other varieties include proximal or distal main vessel perforation or proximal side branch perforation. The first and foremost step is proximal balloon tamponade and definitive management varies from CABG to implanting covered stents for proximal main vessel perforations including bifurcations, and use of coils, beads, microspheres, gel foam injection for distal vessel perforations.[5] Novel techniques used include the use of silk sutures,[6] and vicryl sutures and balloon fragments to use distal perforations.[7] Controlled dissection flap,[8] and handmade covered stents using polyurethane dressing (tagaderm),[9] and semi-compliant balloon have been reported occasionally, previously in the literature.[10] In Pakistan, the use of balloon-mounted covered stents to treat coronary perforation has rarely been described. Hence, our case report is unique in this regard and describes a quick and affordable way of treating coronary perforation.

LIMITATIONS OF STUDY

None.

CONCLUSION

Coronary artery perforation is one of the most unwanted complication in a PCI procedure. Early recognition and prompt management are keys to avoid life-threatening consequences. Being mindful is essential whenever doing a complex procedure. Hand-made covered stents provide a quick, easy, and affordable way to deal with coronary perforations and may be life-saving when an appropriate sized covered stent is not available and the vessel needs to be protected.

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Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript:

SSK & AAC: Study design, Case report writing, Critical Review, Approval of the final version to be published.

FUH: Data interpretation, Critical review, Study Concept, Approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated & resolved.

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