



Dangerous Complication of Percutaneous Coronary Intervention (PCI) of Coronary Complete Total Occlusion (CTO) Managed by Complete Total Occlusion (CTO)

Swapan Saha¹, Tony Ete¹, Rinchin Dorjee¹, Gaurav Kavi¹, Pravin Kumar Jha¹, Pranjal Phukan², Animesh Mishra¹

¹Department of Cardiology, North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences, Shillong, India

²Department of Radiology, North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences, Shillong, India

Email: dranimeshmshillong@gmail.com

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Abstract

Patients having chronic total occlusion (CTO) of coronary artery who have inadequate collaterals to provide sufficient blood flow to the myocardial bed may present with anginal symptoms. Revascularisation of myocardium can be considered in those patients who remain symptomatic despite optimal medical therapy. Angioplasty in CTO may lead to complication like coronary perforation which if not managed on time can be catastrophic. However with proper back up, team work and skill such dreaded complication can be taken care of with good outcome.

Subject Areas

Cardiology

Keywords

Coronary Artery Disease, Coronary Perforation, Cardiac Tamponade

1. Introduction

Although rare, coronary artery perforation and thereby cardiac tamponade comprise a significant risk of chronic total occlusion PCI. It is, therefore, important to be ready for managing such complications. We report on a patient who had perforation of left anterior descending coronary artery during CTO angioplasty with subsequent cardiac tamponade requiring injection of one ml of 50% n-BCA in the vessel lumen for resolving pericardial bleeding.

2. Case

A 56 years old man, known case of systemic hypertension and type 2 diabetes mellitus, presented with history of angina (CCS class III) and dyspnoea (NYHA class II) of six month duration. Electrocardiogram was within normal limit. Transthoracic echocardiography showed hypokinetic anterior and inferior left ventricular wall with ejection fraction of 35%. Coronary angiography showed total occlusion of mid left anterior descending (LAD) artery filling retrogradely through right coronary artery with significant stenosis of distal left circumflex (LCX) and mid right coronary artery (RCA) (**Figure 1(a)** & **Figure 1(b)**). After doing angioplasty to LCX and RCA, patient was discharged. In follow-up, after three months, he continued to have anginal symptoms on exertion. In view of persistent symptoms, he was taken for angioplasty of LAD. After proper preparation, 0.014" (36 mm) Shinobi plus guide wire was crossed though the lesion in LAD artery (**Figure 1(c)**). Check coronary angiography, however, showed the wire (**Figure 1(d)**) to be in false LAD lumen with extravasation of contrast material in mid LAD (**Figure 1(e)**).

Soon thereafter, patient developed sudden hypotension and transthoracic echocardiography confirmed massive pericardial effusion with signs of cardiac tamponade. Immediate pericardiocentesis was done and drainage showed frank blood which was auto-transfused. Injection protamine was administered to revert the action of heparin. As the wire was in the false lumen, mechanical hemostasis with balloon inflation could not be tried. Despite of conservative management for few hours, extravasation of contrast material to the pericardium persisted and there was no clinical improvement of the patient. Finally, 0.014 Headway microcatheter was inserted through the guide catheter and the tip was kept at the site of perforation. One ml of 50% n-Butyl cyanoacrylate (n-BCA) was injected under fluoroscopic guidance. Check coronary showed no extravasation of contrast (**Figure 1(f)**) and patient had significant hemodynamic improvement. The next morning, echocardiography showed no pericardial effusion and drainage was removed. The patient was discharged after 72 hours in stable condition. In the subsequent follow-up, he was clinically stable and repeat echocardiography did not show any pericardial effusion.

3. Discussion

Patients with CTO who have inadequate collaterals to provide sufficient blood flow to the myocardial bed presents with anginal symptoms. Revascularisation can be considered for those who remain symptomatic despite optimal medical therapy. Patients undergoing successful PCI have significant reduction in symptoms, improvement in left ventricular (LV) function and survival [1]. Our patient also was taken for CTO angioplasty of LAD as he was symptomatic despite of stenting in LCX and RCA along with optimal medical therapy.

Although development of new techniques has increased the success rates of CTO PCI in recent years, it is still far below the expected success rate for PCI in non-CTO lesions [2].

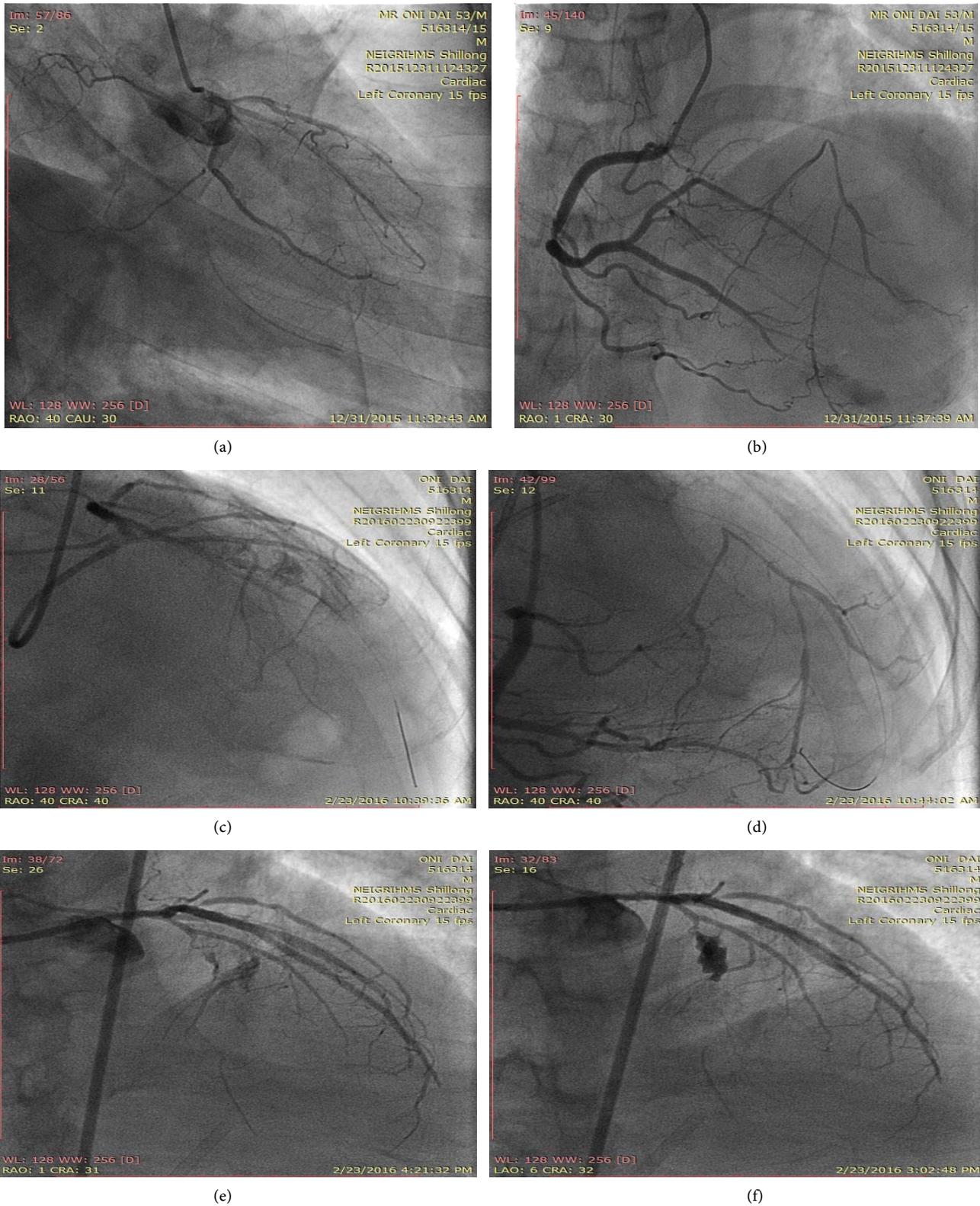


Figure 1. Angiographic views: (a) Total occlusion of mid LAD and significant stenosis of distal LCX (b) Significant stenosis of mid RCA with LAD filling retrogradely from RCA (c); 014 Shinobi plus guidewire was crossed through the lesion in LAD artery; (d) Guide wire in false LAD lumen; (e) Extravasation of contrast material in mid LAD; (f) No extravasation of contrast after n-BCA injection.

CTO PCI may also result in contrast nephropathy [3] due to administration of large amount of contrast. It is, therefore, important to practice prophylactic measures, like hydration, to minimize this risk. In addition, CTO PCI carries increased risk of bleeding due to use of large caliber sheaths [4]. Long fluoroscopy and cine-angiography exposure may also cause radiation skin injury.

Moreover, percutaneous coronary intervention for CTO is associated with in-hospital complications like 0.5% for death, 3% for myocardial infarction and 0.2% for emergency bypass surgery. Coronary perforation was reported in 2.9% with cardiac tamponade in 0.6% of cases [5]. Unfortunately, our case also resulted in unsuccessful PCI with dreaded complication of coronary perforation and cardiac tamponade.

Ellis *et al.*, [6] classified coronary perforation into four types namely Type I: extraluminal crater without extravasation, Type II: pericardial or myocardial blushing without contrast streaming, Type III: extravasation through perforation > 1 mm with contrast streaming and Type CS: cavity spilling when the extravasation streams toward an anatomical cavity.

There is increased risk of coronary perforation in CTO PCI because of routine use of stiff and polymer-jacketed guide wires and uncertainty about the vessel course. In our case also guide wire was in false lumen. However, in most cases, it does not result in tamponade, unlike our case, and can be managed conservatively [7]. In patients where extravasation is located in the wall of epicardial artery, stent-graft can be used effectively to cover the perforation [8]. Additionally, lifesaving measures intended at occlusion of the distal vessel by coils, gelfoam, precoagulated autologous blood and intracoronary thrombin have been used [9]. In our patient, we used n-BCA injected at the site of perforation.

4. Conclusion

In summary, our lifesaving measure for sealing the coronary perforation was fast and effective for stabilization of the patient, avoiding the need for emergency surgery. It is, therefore, advisable for the PCI team to be ready with necessary equipments and manpower for managing dreaded complications, like our case, before attempting PCI in CTO lesions.

Consent

Informed consent was obtained from the patient to report this case.

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