

PCI in a Case of Acute MI with Cardiac Arrest

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Abstract

Burden of cardiac diseases on global scale is increasing. Hence, new interventions in minimally invasive have been introduced. Percutaneous Coronary Interventions have been seen beneficial for quality of life of patients. Patients having risk factors of hypertension, diabetes, and other comorbidities lead to consideration of High-Risk Percutaneous Coronary Interventions. It has been found that many patients undergo, cardiac arrest during the procedure or Percutaneous Coronary Interventions. Thus, it is very much important to have a panorama of knowledge of cardiac arrest during HR-PCI and patient management. In the following case presentation, panorama of the existing knowledge of cardiac arrest during HR-PCI and development of the patient-oriented concepts to explain the management of the patient on the basis of interventional and medicinal guide.

Keywords: Coronary Artery Disease; Percutaneous Coronary Intervention; Myocardial Infarction; Chronic Kidney Disease; High Risk Patient Management

Introduction

It has been seen that burden of cardiac diseases on the global scale keeps on increasing. Thus, many new interventions have been developed to maneuverer the cardiac related problems and keep the quality of life of patient very firm. Ischemic complications of hearts are resolved by minimally invasive techniques like percutaneous coronary intervention (PCI). PCI uses catheterisation technique to reduce the lesion, open up the stenosis by balloon catheter and finally placing a stent, which normalises the blood flow. Furthermore, PCI can lead to complications, although the

incidence is rare, but they are prognostically important [1]. It has been seen that, complications of PCI are strongly associated with relative adverse outcomes but rarely, it leads to fatal complications like left ventricular failure, neuronal insult, arrhythmia and cardiac arrest [2]. Many studies have also claimed that patients having chronic kidney disease (CKD), have been on the risk of coronary artery disease (CAD), which is relatively a leading cause of mortality [3]. On a slight lesion, high risk group needs to be evaluated for CAD risks and prognosis, on having a stenosis near to 50% can also be called for revascularisation to avoid further complications [4].

A study also suggested that, high risk groups often need to have revascularisation frequently on the span of a decade, or sometimes patients need to under go coronary artery bypass (CABG).

On the other hand, it has been seen that many patients often undergo cardiac arrest during the PCI procedure. Incidence often increases when it is a high risk- PCI (HR-PCI). In a study, various high risk related factors were analysed to check on the most predominant factor to cause cardiac arrest during the PCI [5]. The study showed that development of cardiogenic shock leads to cardiac arrest followed by pulse less electrical activity (PEA) [5]. In another study, it was seen that patients developing cardiac arrest during PCI, may also have been through a series of factors, like personal history, previous PCI history, hypertension, diabetes, hyperlipidaemia, CKD, ischemic event or haemorrhagic event, cardiac and cerebrovascular events [6]. On the basis of incidence, it has been seen that nearly 2% of the cases undergoes cardiac arrest during PCI [7] and 11% of patients undergoes cardiac arrest during HR-PCI [8], out of which most of the cases leads to morbidity prolonged life or mortality [9]. In the following case presentation, panorama of the existing knowledge of cardiac arrest during HR-PCI and development of the patient-oriented concepts to explain the management of the patient on the basis of interventional and medicinal guide.

Case Presentation

A 57-year-old male patient was brought to casualty department of the hospital as a referred patient from Lifecare Hospital, Nagpur, with the complaints of severe backache, heaviness in chest, episodes of vomiting and sweating since a day before of admission in Rhythm Heart and Critical Care, Nagpur. He was diagnosed to have massive anterior wall myocardial infarction (AWMI), cardiogenic shock, S/P CPR status, Pulmonary oedema, Poor LV Function – S/P IABP. Acute renal Failure. S/P PAMI to LM and LAD with DES. S/P Resuscitated Severe Cardiac Arrest. Later, in history, relatives explained of having 1 episode of cardiac arrest in ambulance itself, which was successfully resuscitated using Basic Life Supporting (BLS) method by available paramedical staff. On presentation in casualty, patient was conscious with Glasgow Coma Scale of 8, patient had cold extremities, auxiliary breathing, Pulse and Blood pressure was not recordable, and SPO2 reading of 68%. On systemic examination, chest has B/L equal airway but Wheeze was present in Left and Crepts in basal right lungs. On cardiac

evaluation, S1 and S2 were present but at irregular interval. He was immediately shifted to Catheterisation Lab for HR-PCI. Patient was put on mechanical ventilator support, along with started on high dose intravenous (IV) inotropes and sedation. Patients pulse and Blood pressure regained. Bed side Echo was done for cardiac parameters, his LVEF was 35%, and it was estimated that LVEF well reduce gradually, to avoid that intraaortic balloon pump (IABP) was introduced into aorta, which significantly improved his cardiac output. A team of phlebotomist, was called from pathology department for onsite investigations of leucocytosis and Trop I, which resulted positive. Immediately, he was taken up for Coronary Angiography (CAG), which showed Stenosis in Left Main (LM) and Left Anterior Descending (LAD) (Figure 1), and distal LAD. On Right Coronary artery, severe stenosis lesions were found. He underwent Primary Angioplasty for Myocardial Infarction (PAMI) to LM and LAD. PAMI was done from right radial artery using catheter guide of EBU 3.5 – 6F Right Radial, with the FEILDER FC J wire, and Direct stent balloon. As soon as the balloon was introduced to LM. Patient underwent another episode of cardiac arrest. Patient was given stat doses of Injection adrenaline and atropine along with short cardiopulmonary resuscitation (CPR). Patient was given a dose of heparin 5000 IU to thrombolysed the thrombus present. Now, thrombus could move a little, hence thrombosuction technique was use to suction out the thrombus. With the Xiece prime DES 3.5 / 18 mm deployed @16 atm in distal LM was delivered first. Later, to cover up the LAD, TERIFEX DES 2.75 / 40 mm was deployed @ 14 atm in ostial LAD (Figure 2). TIMI 3 flow was obtained (Figure 3). Patient tolerated the procedure well.

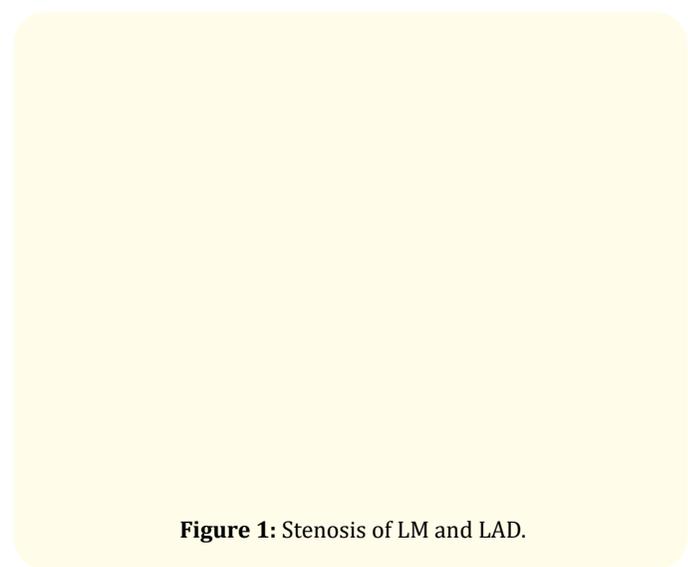


Figure 1: Stenosis of LM and LAD.

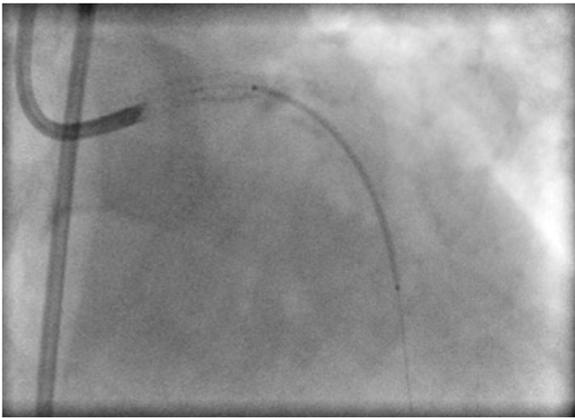


Figure 2: Stent Boost showing the placement of Stent.



Figure 3: LAD Showing Timi 3 Flow.

Patient was shifted to Intensive Coronary Care Unit (ICCU), patient had an episode of shivering for which glucocorticosteroid 100 mg IV was given. Shivering was relieved, but patient still persisted with cold extremities, for which bedside left lower limb doppler was done, which showed cold extremities and feeble pulse, suggestive of mid and distal superficial femoral artery showing triphasic waveform with mildly reduced velocities. High dose antibiotics were given, as PCT levels raised to septic level and high-grade fever spike was presented by patient.

A call was given to intensivists in regard of high PCT levels, which was suggestive of septic turn of the patient, hence antibiotics were

changed to Linezolid IV. Patient, later showed increased kidney function test (KFT) levels, for which nephrologist opinion was taken, which started patient on tablet nefrosave. Patient was put on extubation trial and he successfully cleared the extubation trail. As a result, he was extubated and put on Non-Invasive Ventilator (NIV) for improvement in breathing. Inotropes were tapered off. Patient later demonstrated hypokalaemia, for which he was given potassium correction. Patient was weaned off NIV gradually, on supporting oxygen at the rate of 2L/min, maintaining 97% SPO₂. Patient later had an episode of altered sensorium, for which neurologist opinion was sought. On the call of neurologist, LFT, ammonia, and CT Brain was done. Ammonia and LFT were in normal range. CT Brain showed no intraparenchymal infarct or bleed. After ruling out the neurological possibility, it was thought to be of ENT defect due to deglutination problem, ENT call was done, which advised of CT oral cavity and Neck, which showed normal. Blood cultures were done to check the septic persistency, which showed normal and no growth. Gradually patient comprehended to sensorium and was normal. Patients' vitals and routine investigations were normal. Patient was later weaned off from oxygen support. Patient was haemodynamically stable and no new complaints of chest pain, dyspnoea, hematoma, and maintaining SPO₂ levels of 98% on room air. Problem of deglutination was solved in the onset.

Patient was managed with Inj. Noradrenalin, Inj. Adrenalin, Inj. Dopamine, Inj. Furosemide, Inj. Heparin, Antibiotics, Antiplatelets, Antianginal, statins and other supportive treatments. He tolerated the medications and remained stable throughout the hospital stay. He was discharged with the palliative care treatment model and also with strict diet plan. He was also advised for regular follow up every 2 weeks initially.

Discussion

The presented case has a significant impact on expanding the knowledge of cardiac arrest during HR-PCI and related management. Case could successfully show that patient at high risk, even with a simple isolated lesion can lead to serious complications, that must always be considered for management. Though there is integration of several factors, that contribute to the cardiac arrest during PCI. The management of cardiac arrest during PCI showcases challenge and needs effective cardiopulmonary resuscitation using chest compressions to provide enough circulatory support

and airway support through the high-pressure oxygen mask or intubation putting patient on mechanical ventilator support. Thus, management of HR-PCI, calls for well experience and well management of Advanced Cardiovascular Life Support (ACLS). In some studies, it has been found that continuous compressions of chest can be used as a bridge to perform an efficient PCI and will lead to a successful resuscitation [10-12]. In medical management, use of intracoronary thrombolytics can be useful to prevent potential complications of ischemia [13]. This may only be effective when there is a medium sized thrombus in the artery, if massive sized thrombus is present, it is assisted with thrombosuction [14]. Although all the methods have been shown to be based on personal choice of practitioner, as the methods have not been reflected on corresponding guidelines, case studies. The case presented demonstrates the first in the kind to show the effectiveness of these methods in critical situations.

Towards an optimal management antiplatelet therapy plays a very crucial role in treating patient for ischemic events. CKD is known to inadequately inhibit platelet along with clopidogrel [15]. In the case presented, it is believed that mechanical hindrance might have led to serious complication, but another major factor of high platelet activity might lead to ischemic complications just in PCI or after PCI procedure [16]. In comparison to clopidogrel, prasugrel and ticagrelor has been seen as efficient and more effective as it is known to inhibit P2Y12 platelet inhibitor, which shows faster and greater platelet inhibition.

Conclusion

To conclude, in a case of HR-PCI, there might be a chance of cardiac arrest. On finding the relevant risk factors proper management is required. Thus, experience in handling such patients matters a lot. Practitioners can either go for thrombosuction or intraarterial thrombolytics, based on experience and personal choice. Majorly in CKD patient, it is very important to have a balance between platelet response and look for potential bleeding complications. As a result, patient was advised for ticagrelor. Ticagrelor, when compared to prasugrel, shows reduced major adverse on ischaemic events without having another episode of major bleed [16]. Providentially, patient was rescued, and saved from the complications, patient tolerated the PCI procedure and is alive and neurologically stable.

Bibliography

1. Lo MY, et al. "A rare complication of cerebral venous thrombosis during simple percutaneous coronary intervention: A case report". *Medicine (Baltimore)* 100.4 (2021): e24008.
2. Al-Hijji MA, et al. "Safety and Risk of Major Complications With Diagnostic Cardiac Catheterization". *Circulation: Cardiovascular Interventions* 12.7 (2019): e007791.
3. Subbiah AK, et al. "Cardiovascular disease in patients with chronic kidney disease: a neglected subgroup". *Heart Asia* 8.2 (2016): 56-61.
4. Dash D. "Stenting of left main coronary artery stenosis: A to Z". *Heart Asia* 5.1 (2013): 18-27.
5. Samuelsen PJ, et al. "Incidence and risk factors for major bleeding among patients undergoing percutaneous coronary intervention: Findings from the Norwegian Coronary Stent Trial (NORSTENT)". *PLoS One* 16.3 (2021): e0247358.
6. Xu JJ, et al. "Does Prior Stroke Predict Long-Term Recurrent Stroke After Percutaneous Coronary Intervention? Five-Year Results From a Large Cohort Study". *Frontiers in Neurology* 12 (2021): 740136.
7. Mohammad MA, et al. "Incidence and outcome of myocardial infarction treated with percutaneous coronary intervention during COVID-19 pandemic". *Heart* 106.23 (2020): 1812-1818.
8. Kumar A, et al. "Prognostic implications and outcomes of cardiac arrest among contemporary patients with STEMI treated with PCI". *Resuscitation Plus* 7 (2021): 100149.
9. Sanchis-Gomar F, et al. "Epidemiology of coronary heart disease and acute coronary syndrome". *Annals of Translational Medicine* 4.13 (2016): 256.
10. Udassi JP, et al. "Effect of alternative chest compression techniques in infant and child on rescuer performance". *Pediatric Critical Care Medicine* 10.3 (2009): 328-333.
11. Betz AE, et al. "Work of CPR during two different compression to ventilation ratios with real-time feedback". *Resuscitation* 79.2 (2008): 278-282.
12. Jo CH, et al. "Rescuer-limited cardiopulmonary resuscitation as an alternative to 2-min switched CPR in the setting of in hospital cardiac arrest: a randomised cross-over study". *Emergency Medicine Journal* 32.7 (2015): 539-543.

13. Al-Lawati H, *et al.* "Use of Intracoronary Thrombolysis for Huge Thrombus Burden in an Ectatic Right Coronary Artery". *Sultan Qaboos University Medical Journal* 20.4 (2020): e390-e393.
14. Bhoopalan K, *et al.* "Successful extraction of refractory thrombus from an ectatic coronary artery using stent retriever during primary angioplasty for acute myocardial infarction: a case report". *European Heart Journal Case Report* 3.1 (2019): e0161.
15. Alhazzani A, *et al.* "Biomarkers for Antiplatelet Therapies in Acute Ischemic Stroke: A Clinical Review". *Frontiers in Neurology* 12 (2021): 667234.
16. Stiermaier T, *et al.* "Reperfusion strategies in ST-segment elevation myocardial infarction". *Minerva Medica* 104.4 (2013): 391-411.