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A 44 years-old male patient surviving total occlusion of the left main coronary artery (STEMI) accompanied with cardiogenic shock

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A B S T R A C T

Introduction: Thrombus occlusion of the left main coronary artery (LMCA) is a poorly prognostic condition that is commonly associated with mortality especially when complicated with cardiogenic shock.

Presentation of case: In this report, we presented a case for 44 years-old male patient who is not known to have ischemic heart disease. He was transferred from a peripheral hospital for emergency percutaneous coronary intervention (PCI) after presenting with anterior ST-elevation myocardial infarction (STEMI) complicated with cardiogenic shock.

Discussion: The PCI revealed complete occlusion of the LMCA with a thrombus which was stented and the patient regain his cardiovascular stability. The patient survived this complete occlusion that was complicated with cardiogenic shock giving the quick intervention with the PCI and the use of the circulatory support devices.

Conclusion: The PCI procedure with the intra-aortic balloon pump should be available and offered early for patients with STEMI complicated with cardiogenic shock. This could be very critical in increasing the survival rates for those patients.

1. Introduction

Left main coronary artery (LMCA) thrombus occlusion causing acute coronary syndrome is an uncommon event and usually associated with severe life-threatening presentations including arrhythmias, cardiogenic shock, and sudden death. [1]. Atherosclerotic plaque rupture and thrombus formation with coagulation cascade activation and platelet aggregation is the main mechanism for ST-segment elevation myocardial infarction (STEMI) [2]. As the LMCA is responsible for the blood supply of the whole left ventricular muscle and the anterior two-thirds of the interventricular septum and the whole septum if dominant, its sudden occlusion is certainly a life-threatening condition causing malignant arrhythmias and cardiogenic shock. [1, 2]. While PCI for LMCA occlusion gained importance besides CABG in patients with stable angina undergoing elective procedures, LMCA revascularization in acute MI still a challenging procedure. [3]

In this report, we presented a case of a 44-years old male patient who is not known to have ischemic heart disease, was transferred to our tertiary hospital after being diagnosed in a peripheral hospital with a massive anterior STEMI complicated with cardiac arrest and frequent ventricular tachycardia, cardiogenic shock, and pulmonary edema. Angiographic findings showed 100% occlusion of the LMCA artery with its branches (LAD and LCX). Emergency PCI procedure was performed by a consultant of interventional cardiology and the patient was able to pass this fatal event.

2. Case report

A 44 years-old male patient, who is a heavy smoker (40 pack/Year) and has no past medical history or family history for cardiovascular diseases, presented to a peripheral hospital with a 1-h duration of chest pain. The pain was retrosternal, radiating to the neck and both shoulders, heavy in nature, associated with sweating, nausea, and shortness of breath. Initial ECG showed ST elevation in leads V2–V4, but minutes after that, he developed ventricular tachycardia with hemodynamic instability that was successfully electrically cardioverted. He received thrombolytic therapy (Metalyse IV) and was referred to our hospital for emergency PCI. Upon arrival at our hospital, he was conscious, oriented,

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and free of chest pain, but was complaining of severe SOB (NYHA IV) and hemoptysis with hypoxia failed to be corrected by 10 L/min face-mask of O_2 and eventually required Non-Invasive Positive Pressure Ventilation (NIPPV). Examination showed bilateral chest crepitation up to mid-zones, initial ECG showed ST elevation in lead I, aVL, V1–V2, and Q wave V–V3 with reciprocal changes in inferior leads (Fig. 1). His BP was 85/62 mmHg on dopamine 20mcg/kg/min and his pulse rate was 125 BPM. Echocardiogram showed severe LV impairment with LVEF of 20%, with global hypokinesia. The chest X-ray showed pulmonary edema (Fig. 2).

Laboratory results on admission are shown in (Table 1). Dual anti-platelet therapy (aspirin 100mg) and ticagrelor (loading dose 180mg then 90mg daily), anticoagulants (Heparin 5000IU), and high dose Atorvastatin (40mg) were started. The patient became severely hypoxic with respiratory distress due to pulmonary edema, therefore, he was intubated. He underwent emergency cardiac catheterization (time from door to the balloon was 65min) which showed 100% occlusion of LMCA with thrombus (Fig. 3A), the RCA was dominant (supplying the posterior descending artery PDA) and only wall irregularities were noticed. Percutaneous Transluminal Coronary Angioplasty (PTCA) and stenting to LMCA/LAD was done with normal TIMI III flow in both LAD and CX, one drug-eluting stent was inserted (Xience expedition 3.5x28 × 12 atm) (Fig. 3 B) Intra-aortic balloon pump (IABP) was also inserted in the same procedure to maintain normal blood pressure during the procedure. Tirofiban infusion (0.15mcg/kg/min) was initiated by a large thrombus burden and continued for 24 hours.

The patient's blood pressure improved immediately after the procedure, therefore, vasopressors tapered and eventually were stopped. The patient was extubated after that and his condition was stabilized. The patient was satisfied with the treatment especially with the improvement of his symptoms and he was adhering well to his medications and the management plan. Finally, this work has been reported in line with the SCARE 2018 criteria [4].

3. Discussion

The LMCA supplies most of the left ventricle and therefore its acute occlusion will lead to infarction of a large area of the myocardium. This will mostly be accompanied by subsequent complications of cardiogenic shock, arrhythmias, and eventually death. Considered the least coronary artery to be affected by atherosclerosis, the 4 mm in diameter LMCA runs from 1 to 25 mm before it bifurcates to Left Anterior Descending (LAD) and Circumflex artery (Cx) [5,6]. The main mechanism underlying LMCA total occlusion is atherosclerotic plaque rupture and thrombus formation. Other causes include catheter-induced dissection, embolus, aortic dissection, and vasospasm [1]. LMCA occlusion is considered a high-risk angiographic finding [7]. These patients more often have cardiovascular risk factors such as hypertension and three-vessel disease [5]. ST-segment elevation in aVR and/or V1 and widespread ST-segment depression usually raises the suspicion of LMCA occlusion [8]. Cardiogenic shock is the most common complication of LMCA occlusion, it may present in more than 85% of cases [9], and therefore, it also indicates LMCA occlusion. The mortality rate is high with LMCA occlusion compared to lesions in other vessels and >50% of patients require CPR at some point [9]. In agreement with that, a meta-analysis report showed that 26% of patients presented with STEMI involving the LMCA were in cardiogenic shock and those patients had significantly higher 30-day all-cause mortality compared with those presenting without shock [10]. As well, a higher rate of cardiogenic shock and mortality was also found to be associated with LMCA disease especially when concomitant with non-LMCA CAD [11].

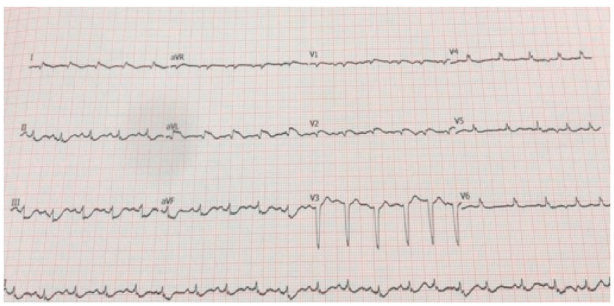

Fig. 1. 12-leads ECG shows ST elevation in lead I,aVL, V1–V2, Q wave V–V3 with reciprocal changes in inferior leads.

Fig. 2. Chest X-ray shows pulmonary edema.

Table 1
Laboratory results on the patient's admission.

Troponin (ng/mL)	6.31
Creatine Kinase (U/L)	4074
CK-MB (U/L)	694
BNP (pg/mL)	5518
WBC (10^3/mm^3)	22.6
Hb (g/dL)	18.4
PLT (10^3/mm^3)	220
HbA1c	5.2%
LDL (mmol/L)	3.86
HDL (mmol/L)	0.96
Total Cholesterol (mmol/L)	5.22
TG (mmol/L)	1.98
Sodium (mmol/L)	134
Potassium (mmol/L)	4.2
Urea (mmol/L)	9.4
Creatinine (mcmol/L)	134

Therapeutic strategies for cardiovascular disease of the LMCA have been studied in stable CAD and to a lesser extent in the case of acute coronary syndrome ACS, however, there is limited data and evidence in the setting of an acute total occlusion. Using PCI for stable LMCA disease gained recent success as a therapeutic approach or strategy. However, it is still under evaluation in the case of acute coronary syndromes [9]. Other therapeutic options for revascularization are thrombolytics, CABG, and new revascularization strategies such as intracoronary

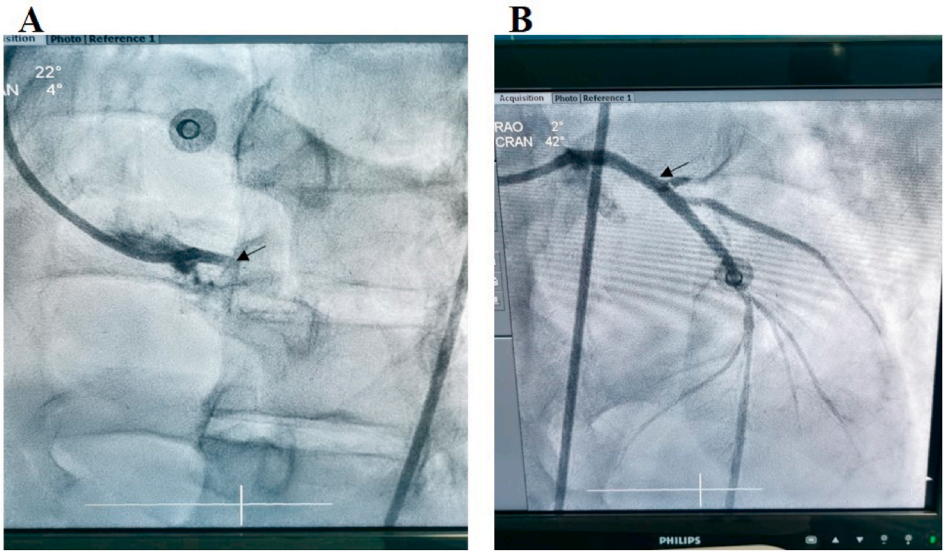

Fig. 3. **(A)** Spider view shows total LM occlusion. The black arrow shows the site of the coronary block. **(B)** TIMI flow III in LM and LAD after stenting. The black arrow shows the stent.

eptifibatide infusion [9]. Some reports may prefer percutaneous revascularization with circulatory support, mostly in the form of an intra-aortic balloon pump, with surgical options being usually difficult due to the catastrophic presentation of the patients. In a study of 23 patients, the PCI success rate was over 90%, even though in-hospital mortality was high (50%) and six-month total mortality was 65% with only one patient of the 23 reported to have stent thrombosis [2]. Another important feature of our case is that our patient was right dominant. The left coronary dominance is considered a high-risk feature for PCI with higher morbidity and mortality; in such patients, it is presumably that LMCA total occlusion will lead to imminent death [2,11]. In this report, we presented successful PCI revascularization of a complete block of the LMCA. Although the patient eventually passed away within 5 days, however, this was related to sepsis rather than directly related to his heart condition.

4. Conclusion

LMCA total occlusion in ACS is a rare but yet a high-risk angiographic feature. Despite successful recanalization with PCI, the mortality rate remains high. Recognizing the symptoms and typical ECG changes of the patients with ACS caused by LMCA occlusion and taking a quick decision on conducting the proper PCI procedure with applying early circulatory mechanical devices (intra-aortic balloon pump IABP) are critical for patients' survival.

Ethical approval

We received approval to publish this case from the IRB committee at King Abdullah University Hospital. A copy of the IRB approval is available for review by the Editor-in-Chief of this journal on request.

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Author contribution

All authors contributed significantly to preparing the manuscript. All authors presented substantial contributions and participated in the idea generation, corrections, and the final approval of the version to be submitted.

Registration of research studies

Not applicable for this type of study.

Guarantor

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Consent

Signing a written patient consent was waived by the IRB committee because sadly the patient passed away before publishing this article. A copy of the IRB approval is available for review by the Editor-in-Chief of this journal on request.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Declaration of competing interest

The authors declared no conflict of interest.

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