CASE REPORT

CARDIAC TAMPONADE: A CASE REPORT

Neelam Javed[1]

ABSTRACT

Abstract: Cardiac Tamponade is a medical or traumatic emergency that occurs when the pericardial sac fills with enough fluid to compress the heart, resulting in shock and reduced cardiac output. It is a rare, but life-threatening condition. During 13 years, 66,812 invasive cardiac procedures were documented, with 118 of those procedures involving CT complications, and the rate of iatrogenic cardiac tamponade was 0.176% of all the procedures. The incidence of pericardial effusions is thought to occur in about two cases out of every 10,000 people. Patients with HIV, end-stage renal illness, occult malignancies, tuberculosis, autoimmune diseases such as lupus, or penetrating traumatic injuries to the chest have higher prevalences. This case was about 59 years old female patient who presented in the Aga Khan University Hospital with the complaint of Iatrogenic LAD perforation after undergoing Percutaneous Coronary Intervention at a tertiary care charitable hospital. The diagnosis in the case scenario is Cardiac Tamponade.

Keywords: Cardiac Tamponade, Iatrogenic LAD perforation, Percutaneous Coronary Intervention

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[1*] Senior Lecturer, Faculty of Nursing and Midwifery, Ziauddin University, Karachi-Pakistan

INTRODUCTION

Cardiac Tamponade (CT) is a medical or traumatic emergency that occurs when the pericardial sac fills with enough fluid to compress the heart, resulting in shock and reduced cardiac output [1]. It is caused by the gradual buildup of pericardial fluid (effusion), blood, pus, or air in the pericardium that compresses the heart chambers and can result in hemodynamic compromise, circulatory shock, cardiac arrest, and death [2]. Cardiac Tamponade is a rare, but life-threatening condition. During 13 years, 66,812 invasive cardiac procedures were documented, with 118 of those procedures involving CT complications and the rate of iatrogenic cardiac tamponade was 0.176% of all the procedures. The incidence of certain invasive cardiac procedures varied from 0.09% to 1.42%. Most patients (104/118) underwent pericardiocentesis, up to 16 patients underwent pericardiotomy, and four underwent both treatments. 25–45% of patients required inotropes and 45% required blood transfusions [3].

The incidence of pericardial effusions is thought to occur in about two cases out of every 10,000 people. Patients with HIV, end-stage renal illness, occult malignancies, tuberculosis, autoimmune diseases such as lupus, or penetrating traumatic injuries to the chest have higher prevalences. The heart's chambers are compressed when the fluid volume accumulates quickly enough, and tamponade physiology quickly emerges with much smaller volumes. The fluid could be serosanguineous, chylous, or hemorrhagic. The underlying pathophysiology causing cardiac tamponade is reduced diastolic filling, which results in a lower cardiac output. To compensate for the decreased output, tachycardia is one of the earliest

compensatory symptoms. Additionally, the compression restricts systemic venous return, which hinders the filling ability of the right atrium and ventricle [1]. Here, I present a relatively rare case of a female patient diagnosed with cardiac tamponade presented with Iatrogenic LAD perforation after undergoing Percutaneous coronary intervention (PCI) at a tertiary care charitable hospital.

CASE SCENARIO

A 59-year-old female patient came to the Emergency department with a history of angina pectoris and dyspnea for the last twenty days. She had known case of hypertension for the last ten years. However, she had a negative family history of cardiac diseases. The patient had typical central chest pain and SOB on exertion 20 days ago for which she went to the hospital in Quetta where Angiography revealed 2-vessel coronary artery disease [mid-LAD 100% occluded Chronic Total Occlusion (CTO); mid diffuse RCA severe lesion] then she came to Karachi for further management. She went to one of the Cardiac specialized hospitals in Karachi where Coronary Artery Bypass Grafting (CABG) surgery was advised then she went to the tertiary care charitable hospital where she underwent angioplasty resulting in perforation of the left anterior descending (LAD) coronary artery then antidote for heparin, Protamine was given, 20cc blood was aspirated via pericardiocentesis, multiple fluid boluses were given, and kept on inotropic support, but a patient left against medical advice (LAMA) from that hospital and came to the emergency department of one of the tertiary care hospitals of Karachi on 21/11/2024. Upon workup, the patient was diagnosed with 2-vessel coronary artery disease and iatrogenic LAD perforation. The patient was shifted from the Emergency department to the Coronary Care Unit (CCU) for further management. After standard pre-operative optimization and preparation, the patient was shifted to the operating room where she underwent CABG × 2 (LIMA to LAD; RSVG to PDA) on 26/11/2024. Intra-operative findings included hematoma surrounding the mid-LAD. However, no active bleeding was reported from the LAD. Chest tubes and pacing wires were placed. Post-operatively, the patient was kept on inotropic support and was shifted to the CICU in a vitally stable condition. The patient was successfully extubated on the same day. The patient was then shifted to the Step-down unit on 29/11/2024. Chest tubes and pacing wires were removed and no complications were noted. She was then shifted out to a Telemetry ward bed on 02/12/2024. The patient remained hemodynamically stable and was discharged home on 06/12/2024.

CLINICAL PRESENTATION AND PHYSICAL EXAMINATION FINDINGS

Upon arrival, her vital signs were as follows: blood pressure was 144/68mmHg, heart rate was 82 per minute, respiratory rate was 19 per minute, oxygen saturation was 94%, and she was afebrile. The patient's Glasgow Coma Scale was 15/15, alert, and oriented to time, place, and person. During physical assessment, no apparent pallor, jaundice, edema, cyanosis, clubbing, or lymphadenopathy were observed. On cardiovascular assessment, S1+S2+0 with no added sounds on auscultation. The apex beat was palpable. The chest was clear on respiratory assessment, and there was normal vesicular breathing. The abdomen was soft and non-tender with no visceromegaly. During the review of the system (ROS), no significant finding was noted in any other system.

LABORATORY AND DIAGNOSTIC TEST FINDINGS WITH RATIONALE

Based on the symptoms, there are several diagnostic tests to rule out cardiac tamponade and its associated risk factors. It includes Electrocardiography (ECG) to check for electrical alternans and sinus tachycardia, Echocardiography to confirm the diagnosis, the presence of pericardial effusion and its size, and to check the cardiac function. Chest X-ray or CT chest to rule out an enlarged heart or to pick pericardial effusion. Angiography or Cardiac catheterization to rule out obstructions in coronary arteries. Moreover, multiple blood tests include CBC to rule out infection by WBC and other leukocytes and to check blood loss by hemoglobin. HIV testing due to risk factors in HIV positive patients in causing cardiac

tamponade. ESR, procalcitonin, and C-reactive protein to rule out underlying infection. BUN and Creatinine to check for the Kidney function due to the cardiac disease. Electrolytes to check for electrolyte imbalance due to cardiac disease or ECG changes and volume loss. Trop-I to check for heart damage due to the angina pectoris. Coagulation profile due to blood loss. Tables 1 and 2 present a summary of the diagnostic and laboratory investigations of the patient.

Table 1. Summary of Diagnostic Investigations of the Patient

Diagnostic tests	Results
Electrocardiogram (ECG)	Atrial Fibrillation
Echocardiogram (ECHO)	Ejection Fraction: 35% Mild basal septal hypertrophy Moderately reduced left ventricular systolic function Grade I left ventricular diastolic dysfunction Trace to mild (predominantly anteriorly located) pericardial effusion without echocardiographic evidence of cardiac tamponade. Akinetic apex, mid-septal, basal lateral, and basal mid-posterior segment.
Angiography (LHC)	Left main artery (LM): Normal LAD: Total mid occlusion Circumflex: mild irregularities RCA: Severe diffuse stenosis Impression: 2-vessel coronary artery disease (2VCAD)
Chest X-ray	Evidence of developing edema but cardiac silhouette intact.

Table 2. Summary of Laboratory Investigations of the Patient

Labs	Results	Labs	Results
Trop I	1162 ng/L ↑	HB	10.5 g/dl ↓
Mg	2.1 mg/dl	HCT	33.5% ↓
BUN	17 mg/dl	WBC	19.7 ×10E9/L ↑
Cr	1.1 mg/dl	Neutrophils	89.5% ↑
Na	132 mmol/L ↓	Lymphocytes	7.0% ↓
K	3.6 mmol/L	Eosinophils	0.0% ↓
Cl	104 mmol/L	Monocytes	3.4% ↓
BIC	23.8 mmol/L	PLT	352 ×10E9/L
Ionized Calcium	4.51 mg/dl ↓	PT	11.8 seconds
INR	1.1 ratio	APTT	22.7 seconds ↓
Lactic acid	3.1 mmol/l ↑	Procalcitonin	1.99 ng/mL ↑
C-reactive protein	13.70 mg/L ↑	Blood Culture	No growth
Urine Culture	No growth	Calcium	7.9 mg/dl ↓

Arterial Blood Gas (ABGs) of the patient

Initial ABGs were sent and the results were suggestive of primary respiratory alkalosis with partial metabolic compensation as presented in Table 3.

Table 3. Arterial Blood Gas result of the patient

PH	7.46 ↑	**PO2**	63.60 mmHg ↓
PCO2	26.80 mmHg ↓	**O2 Sat**	93.10% ↓
BIC	18.60 mEq/L ↓	**BE**	-3.5 mEq/L

DIFFERENTIAL DIAGNOSIS FOR CARDIAC TAMPONADE WITH RATIONALE

- Cardiogenic Shock or Hypovolemic Shock is due to hemodynamic instability due to volume loss.
- Acute Myocardial Infarction is due to the 2VCAD on LHC, elevated Trop I in blood, and chest pain.
- Pulmonary Embolism is due to dyspnea and chest x-ray findings of edema.
- Constrictive Pericarditis is due to the pericardial effusion on the echocardiogram.
- Heart Failure is due to the low ejection fraction of 35%.
- Tension Pneumothorax or Hemothorax is due to the accumulation of air or blood in the pericardium or chest.

MANAGEMENT OF THE CARDIAC TAMPONADE

Cardiac tamponade can be treated by removing the pericardial fluid to help reduce the pressure around the heart. Needle pericardiocentesis can be performed at the patient's bedside to accomplish this. One surgical method is to remove the pericardium or create a pericardial window. In traumatic arrests with suspected or confirmed cardiac tamponade, emergency department resuscitation thoracotomy and pericardial sac opening are two possible treatments. Pressor support and volume resuscitation may be beneficial [1].

PHARMACOLOGICAL THERAPY

Several medications were used to treat the patient's condition. Below are the lists of medications given at the time of discharge.

- Aspirin 150mg PO QD
- Clopidogrel 75mg PO QD
- Calcium with Vitamin D 1 Tablet CHEW QD
- Ipratropium Bromide 500mcg Nebs q6hrly
- Fluoxetine HCl 20mg PO QD
- Lipiget 40mg PO HS
- Ispaghol 1 GRM PO Bid
- Movcol Sachet 1 SAC PO Bid
- Perindopril 1mg PO HS
- Cefixime 400mg PO QD
- Tramadol 50mg PO q8hrly
- Paracetamol 1000mg PO q6hrly
- Metoprolol 37.5mg PO q8hrly
- Furosemide 40mg PO BD
- Apixaban 2.5mg PO Bid
- Pantoprazole 40mg PO BBF
- Metoclopramide HCL 10mg PO q8hrly
- Amiodarone 200mg PO q8hrly

DISCUSSION

This case emphasizes a rare but potentially life-threatening complication of angioplasty, that is, iatrogenic left anterior descending (LAD) coronary artery perforation resulting in cardiac tamponade. Even though they are rare, these complications highlight how crucial it is to be vigilant, prepared, and competent when doing invasive cardiology procedures. Unintentional injury to the arterial wall during interventional procedures might result in iatrogenic coronary artery perforation. There are complications associated with coronary interventions. Myocardial infarction, cerebrovascular accidents, arrhythmias, vascular problems, allergic reactions to contrast, heart chamber perforations, and death are among them [4]. It has been reported that the most common injured artery was the LAD artery. Stent placement, angioplasty guiding wires, and balloon

dilations were the causes of perforations [5].

The symptoms of cardiac tamponade, such as tachycardia, hypotension, and high jugular venous pressure, might be mistaken for those of other acute illnesses including pulmonary embolism or myocardial infarction. The diagnosis in this case is confirmed by a bedside echocardiogram, which showed a large pericardial effusion along with the diastolic collapse of the right atrium and ventricle [1]. The management of iatrogenic LAD perforation and tamponade requires a multidisciplinary approach and immediate action. In this case, upon early recognition of the hemodynamic instability and LAD perforation, a central venous catheter (CVC) and arterial line were inserted and fluid resuscitation and inotropic support were given to a patient to maintain volume in the body due to fluid loss by LAD perforation. Moreover, blood was also aspirated via pericardiocentesis, and Protamine was also given to reverse the effect of Heparin. The patient's hemodynamic recovery was made possible by the subsequent care of artery perforation, which included localized balloon inflation, anticoagulation reversal to encourage closure by hemostasis at the injury site, and the immediate insertion of a pericardial drain to remove pericardial effusion [4].

Careful planning and adherence to best practices are the first steps in preventing iatrogenic complications. Having a well-trained team and emergency protocols in place ensures prompt response to complications, and the selection of appropriate guidewires, balloons, and stents based on the patient's anatomy and lesion characteristics is essential. In this case, the successful outcome emphasizes the importance of early diagnosis and the availability of interventional competencies.

CONCLUSION

This case highlights the importance of early recognition, timely intervention, and specialized cardiac care for successful management. Hospitals performing high-risk interventions should implement protocols for the prompt management of cardiac tamponade, such as access to pericardiocentesis kits, covered stents, and surgical backup. Additionally, ongoing education and awareness among interventional cardiology teams are crucial for enhancing patient safety.

Ethical Consideration: The case report was submitted with the patient's permission.

Conflict of Interest: There is no conflict of interest.

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Author's Contribution:

NJ: Concept & design, writing, final approval of manuscript and responsible for accuracy and integrity of research

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* The editors of both journals concerned are fully informed; the editor concerned with secondary publication should have a photocopy, reprint or manuscript of the primary version.

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