

CASE REPORT

A STAB IN THE FORBIDDEN TERRITORY

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Penetrating heart injuries are associated with higher mortality rates. Coronary lesions caused by penetrating trauma are considered even rarer and universally fatal. We present a case of a fortunate survivor who had complete transection of left anterior descending (LAD) artery with right ventricular (RV) tear after being stabbed by knife, arriving in emergency unit with massively bleeding chest wound. Complex cardiac trauma involving coronaries and cardiac chambers is a challenge to surgeons if patients miraculously reach the hospital alive. This patient had complete transection of LAD artery with penetration into RV cavity, he was successfully managed by timely and prompt surgical intervention by on call team. This case highlights the importance of team dynamics working in harmony during emergency situations, we stress upon conducting routine drills to train surgical residents, perfusionists and operation theatre staff.

Keywords: Penetrating Cardiac Injuries; Complete LAD Transection; Emergency cardiopulmonary bypass

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INTRODUCTION

Cardiac trauma secondary to penetrating wound includes myriad of injuries, including myocardial rupture, contusion, laceration, pericardial insults, coronary artery injury, valvular damage, arrhythmias and conduction abnormalities, with by far the most common being simple lacerations¹ and right ventricle to be the most commonly injured chamber. The involvement of cardiac chambers and coronaries add into the fatal outcomes.

This case being reported here has not been previously come across in context of emergency conduct of bypass. National institute of cardiovascular diseases, Pakistan, is a leading cardiac care hospital at national level, this case was successfully managed there. Literature has showed such cases being managed off bypass with delayed revascularization, poor outcomes have been seen without the use of cardiopulmonary bypass especially in cases where coronary surgery is required. It emphasizes on emergency team dynamics and working in collaborations as one unit for better outcomes.

CASE PRESENTATION

This is a case of 27 years old male patient, presented in Emergency unit of National institute of cardiovascular diseases, with a massively bleeding stab wound on left lateral border of sternum, 2–3 cm above the level of nipple. The wound was found to be approximately 1.5 inches long.

His chest x-ray showed enlarged cardiac shadow (Figure-1) and echo indicated pericardial effusion. His EKG demonstrated prominent ST elevation in anterior leads (Figure-2).

Patient was immediately shifted to operative room, he was hemodynamically unstable and collapsed on induction of anaesthesia while performing cardiopulmonary resuscitation, and emergency sternotomy carried out, pericardiotomy done which relieved the tamponade with gush of blood. Bleeding site was found to be mid LAD territory, penetrating down into right ventricle, which was immediately snugged proximally and distally with establishment of cardiopulmonary bypass. Wound was further traced from inside left internal mammary artery also fell in range of stab and got divided. Lung was marked safe. LAD was completely transacted at its mid. Distal to this injury saphenous vein graft was anastomosed as can be seen in figure 3, transacted ends of LAD ligated and RV cavity closed with buttressing felt strips on each side, interventricular septum was intact. Patient smoothly weaned off bypass.

Chest drains placed in left pleura and anterior mediastinum; sternal closure done as per routine. Patient remained hemodynamically stable afterwards. He got extubated next morning. His post-op electrocardiogram showed no abnormality. His echocardiogram showed normal sized left ventricle with good function except for hypokinesia of left ventricular apex. The patient's hospital course remained smooth and he was sent out for home on fifth post operative day.

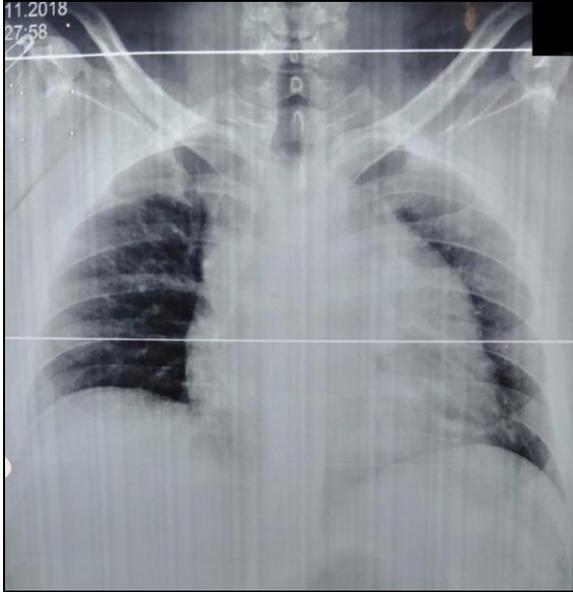


Figure-1: Chest X ray showing enlarged cardiac silhouette

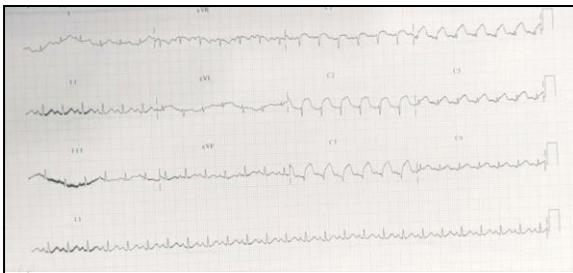


Figure-2: ECG showing marked ST elevation

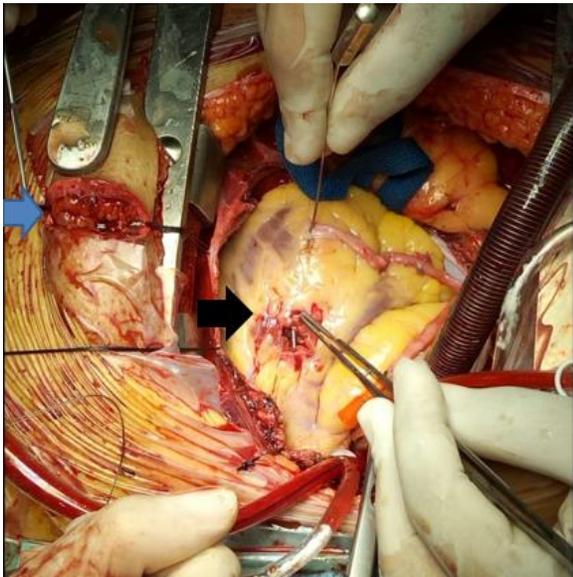


Figure-3: Complete transection of LAD, probe coming out of transacted end (black arrow). Blue arrow shows site of stab injury

DISCUSSION

Penetrating cardiac injuries are lethal. Hemodynamic instability can develop rapidly and bears marked risk to patient survival. Urgent surgical intervention remains the mainstay of treatment and can be life-saving. Literature reveals that 50–81% of patients with heart trauma succumb to death shortly after injury before reaching any medical facility, either for patients who have been taken to the operating rooms, the survival is close to 70% for gunshot wounds (GSW) and 80–85% for stab wounds (SW).^{2,3} Asensio et al mentioned survival for SWs to be 76% and for GSW to be 10% in his series regarding predictive model from National Trauma Data Bank.⁴ The poor survival in GSW mainly owes to multichambered and cavities involvement with larger area of impact.⁵

In a study by Attar S and colleagues⁶, the time ticked away between trauma and initiation of resuscitation was directly related to survivorship following penetrating injuries to the heart. The clinical condition and hemodynamic status on arrival to the emergency room area, the mechanism and extent of injury, the need for emergency room thoracotomy, and the presence of cardiac tamponade were the other parameters for prediction of outcomes. Moreno *et al*⁷ observed that the presence of tamponade favoured better outcomes for patients with stab and GSW involving right and left ventricle. They dictated survivability of 73% in patients with tamponade compared with 11% without its protective effect. According to their study that the presence of tamponade, vital signs, and wound site were the most critical factors in determining the fate of injured. Wounds hitting the “cardiac box” evoke potentially lethal injuries. The “Cardiac box” is anatomically defined as a region bordered by clavicles superiorly, xiphoid inferiorly and bilaterally by nipples.⁸

The wound in our case penetrates the cardiac box traversing through LIMA, LAD and RV cavity, creating a massive hemopericardium which required immediate surgical intervention. The main principal of surgical intervention remains the damage control surgery, focusing on resuscitation and planned reoperation. Few temporizing manoeuvres have been foley balloon tamponade, stapled cardiography and suture ligation depending on nature of injury.⁹

There is 20% higher in-hospital mortality rate noted with Coronary injuries in penetrating wounds, mainly because of high incidence of arrhythmias and cardiogenic shock.¹⁰ There are few reports in literature that have documented favourable outcomes after conservative or non-CPB management of penetrating injury to coronary

arteries. A case reported by Santavy advocates delayed revascularization following complete transection of left anterior descending artery after a stab wound.¹¹ What treatment at what time majorly depends on hemodynamic status of the patient at presentation.

In our case, patient was in haemorrhagic shock with complete transection of LAD and profusely bleeding wound site, the most appropriate choice was to establish an emergent CPB and perfuse the LAD territory distal to injury with a vein graft and save patient's life.

CONCLUSION

Complex cardiac injuries including injury to the LAD carry higher mortality rates. Well timed and appropriate surgical intervention is often pivotal for survivorship, mandating the team dynamics working in harmony. In emergency situations where patients become hemodynamically unstable, cardiopulmonary bypass is a saviour.

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