

## Clinical Communications: Adult



### ST-ELEVATION MYOCARDIAL INFARCTION AFTER PENETRATING THORACIC TRAUMA

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**Abstract—Background:** ST-segment elevation myocardial infarction (STEMI) may complicate penetrating thoracic trauma. **Case Report:** This report describes a 42-year-old man who sustained a self-inflicted gunshot wound to the left chest. Electrocardiogram showed ST elevation in the inferior leads. Emergent catheterization was not recommended and conservative management was initiated. Cardiac catheterization 4 days later showed no perturbation of the coronary arteries, neither atherosclerotic nor traumatic. **Why Should an Emergency Physician Be Aware of This?:** This case is unusual because it demonstrates a STEMI with no detectable plaque rupture or gunshot pellets on coronary catheterization. The decision to aggressively manage these patients with early coronary angiography depends on the hemodynamic status of the patient, their cardiac risk factors, and their ability to tolerate ischemic insult. In asymptomatic hemodynamically stable patients, conservative medical management should be considered. Myocardial infarction is a complication after penetrating thoracic trauma and should be considered in initial evaluation. © 2017 Elsevier Inc. All rights reserved.

**Keywords—**ST-segment elevation; infarction; penetrating trauma; gunshot wound

#### INTRODUCTION

Myocardial infarction (MI) is a known complication of both blunt and penetrating thoracic trauma. Due to the urgency of the trauma, this complication can be overlooked

(1–3). In reported cases where patients developed symptomatic chest pain or became hemodynamically unstable, further cardiac work-up including an electrocardiogram (ECG) has shown an ST-segment elevation myocardial infarction (STEMI)/injury pattern. The recommended treatments for STEMI, including anticoagulation and thrombolysis, may be contraindicated due to hemorrhagic risk from trauma (4). Emergent cardiac catheterization is effective in determining the extent of coronary artery damage in the acute phase of injury (2,4). Little evidence is available to guide emergency physicians with regard to when to proceed with cardiac catheterization and what treatment(s) (pharmaceutical management or percutaneous intervention) yields successful patient outcomes. This report provides an algorithm for the medical management of STEMI in the acute phase of trauma.

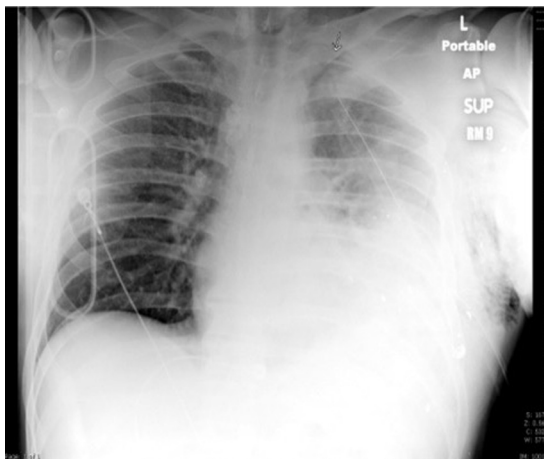
#### CASE REPORT

Our patient was a 42-year-old man who sustained a self-inflicted gunshot wound to the left anterior chest. The patient used a .22 caliber rifle. He was brought into our Trauma Center by air medical services. En route, the air transport team noted decreased breath sounds in the left upper lung, jugular venous distention, subcutaneous emphysema in the left anterior chest, and a blood pressure

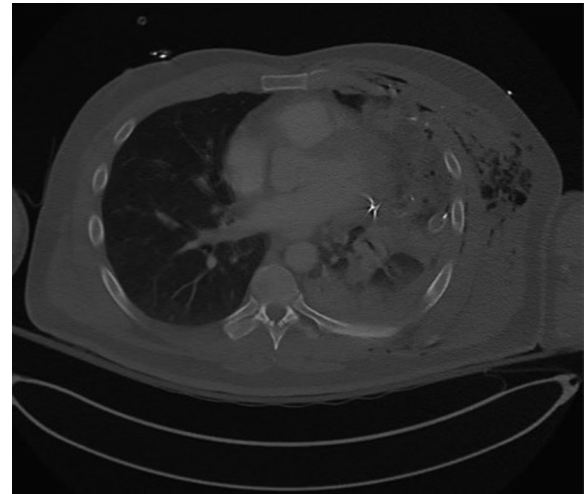
of 87/55 mm Hg. Needle decompression was performed prior to arrival due to suspected left-sided pneumothorax.

In the Emergency Department (ED), joint resuscitation efforts by emergency medicine and trauma teams included a left-sided 36-French tube thoracostomy and packed red blood cell transfusion. The patient's hemodynamic status improved. A chest x-ray study showed a small left apical pneumothorax (status post chest tube insertion), bullet fragments in the left lower lobe, and a large left hemothorax (Figure 1). The patient's computed tomography (CT) of the chest confirmed a large left hemothorax with appropriate chest tube placement (Figure 2). His hemoglobin was 11.8 g/dL (reference range 13.7–17.5 g/dL). His coagulation studies were within normal limits. Approximately 1 L of blood was drained from the left chest within 5 h. A 12-lead ECG was obtained 3 h after presentation (Figure 3). The tracing showed sinus tachycardia and ST-segment elevation in the inferior leads, with reciprocal ST-segment depression in the right precordial leads (V1 and V2). A Cardiology consult was obtained. The patient's only known cardiac risk factor was heavy tobacco use. Anticoagulation was initially withheld given the penetrating trauma and hemothorax. A bedside transthoracic echocardiogram revealed an ejection fraction of 40–45% with posterior wall hypokinesis, moderate to severe lateral wall hypokinesis, moderate to severe inferior wall hypokinesis, and moderate right ventricular hypokinesis. No pericardial effusion, cardiac tamponade, or bullet fragments were identified.

The patient's cardiac biomarkers rose from hospital day 1 to 2, with a maximum troponin of 40.6 ng/mL (reference range 0.000–0.034 ng/mL) and a maximum creatine kinase-MB total of 77.2 ng/mL (0.03–3.2 ng/mL). His creatine kinase-MB normalized by hospital day 7 while his troponin remained slightly elevated until hospital day 10.



**Figure 1.** Chest x-ray study upon initial presentation demonstrates the left hemopneumothorax status post-chest tube insertion and bullet fragments in the left lower chest.



**Figure 2.** Computed tomography image of the chest showing the bullet fragment adjacent to the pericardium and the chest tube draining the large left hemothorax.

After coordinated discussions between the Trauma and Cardiology teams, it was decided that the patient would be managed acutely with medical therapy alone. In accordance with American College of Cardiology guidelines, dual antiplatelet therapy was initiated (5). The patient received aspirin and loading and maintenance doses of clopidogrel on hospital day 1. On hospital day 4, a cardiac catheterization was performed. A distal right coronary artery thrombus that comprised 50–60% of the vessel showed excellent distal flow (Thrombolysis in Myocardial infarction [TIMI] 3) (Figure 4). There was normal left ventricular filling pressure and preserved left ventricular function. His ejection fraction had improved to 50–55%. Numerous bullet fragments were visualized in the left hemithorax, with one fragment located in the pericardial space on the lateral wall. None of the bullet fragments transected the coronary vessels.

Postcatheterization anticoagulation with heparin was started on hospital day 5 after his left hemothorax reabsorbed. This was discontinued on hospital day 9 when the patient developed hemoptysis. His hospital course was complicated by retained loculated hemothorax, which required left video-assisted fluoroscopic decortication with pleurodesis. The patient was discharged on hospital day 15 on dual antiplatelet therapy and a beta-blocker. A repeat cardiac catheterization 1 month later showed near resolution of the right coronary artery occlusion with TIMI 3 flow.

## DISCUSSION

A patient's complaint of chest pain in the setting of penetrating thoracic trauma can be representative of cardiac

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