Traumatic transection of the posterior descending coronary artery

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With expert commentary by Matthew J. Wall, Jr., MD

A 40-year-old woman presented to the emergency room with a self-inflicted penetrating stab in the upper epigastric region. A 12-cm length knife was used in this suicide attempt after alcohol intoxication. The patient had a history of depression, chronic alcohol and marijuana abuse. On admission, she was tachycardic with a regular heart rate (133 beats/min), and her blood pressure was 96/62 mm Hg. Chest examination revealed a 2-cm width penetrating wound in the subxyphoid area.

The initial electrocardiogram (EKG) showed sinus rhythm with ST elevation in leads II, III, aVF, V5, and V6 (Fig. 1). Laboratory results were as follows: hemoglobin, 121 g/L; serum troponin, I 2.6 μg/L; and serum creatinine kinase MB, 13.4 U/L. A chest computed tomography (CT) scan showed a 2-cm hematoma in the lower portion of the anterior mediastinum, a mild noncompressive pericardial effusion (1 cm), and a mild left pleural effusion. There were contusion signs suggestive of a mild hepatic laceration. A left-sided chest tube was inserted with no significant drainage noted (<200 mL). The patient was resuscitated with a 1-L bolus of normal saline.

The patient was admitted to the intensive care unit (ICU). She was hemodynamically stable. Overnight, serum troponin levels increased to 10.9 μg/L (vs. 2.6 μg/L on admission), and a trans-thoracic echocardiogram demonstrated a mild pericardial effusion without signs of cardiac compression. The left ventricular ejection fraction was estimated at 55% with diffuse hypokinesia. Due to the increase in markers of cardiac injury and the presence of ST changes on the initial EKG, the decision was made to perform a coronary angiogram. This showed complete transection and thrombosis of the distal posterior descending coronary artery (Fig. 2).

What Would You Do?
A. Continue nonsurgical conservative medical monitoring with anticoagulation.
B. Continue nonsurgical conservative medical monitoring without anticoagulation.
C. Balloon dilatation and coronary stenting.
D. Surgical attempt of direct repair or a saphenous venous graft coronary bypass anastomosed to the transected PDA.

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Figure 1. Initial electrocardiogram showing ST elevation in lead II, III, aVf, V5 and V6 (red boxes).
What We Did and Why

B. Continue nonsurgical conservative medical monitoring without anticoagulation.

No percutaneous dilatation was attempted to avoid dislodging the formed thrombus and initiating a life-threatening bleeding. The transection affected the distal third of the PDA and the patient was hemodynamically stable, thus an additional surgical intervention to directly repair or perform a coronary artery bypass grafting was excluded. No anticoagulation or antiplatelet therapies were initiated to avoid the risk of bleeding. The patient was observed in the ICU for 4 days with a diagnosis of acute myocardial infarction. Serum creatinine kinase MB levels decreased from 13.4 to 2.5 at discharge from the ICU. Control electrocardiogram showed Q waves in leads II, III, and aVf confirming an inferior wall myocardial infarction. At day 3, a control thoracic CT scan revealed a regression of the retro-sternal hematoma and mild liver segment laceration. The patient was transferred back to her referral center where a psychiatric evaluation was completed. (A.G., I.B., I.E., Y.L.)

Expert Opinion

This is an unusual case. This patient sustained an epigastric stab wound and presented hypotensive and tachycardic to the emergency room. EKG was consistent with ischemia in the inferior wall of the heart and CT scan showed a pericardial effusion. At many centers, the patient would have had a Focused Assessment with Sonography for Traumas examination. With a positive FAST, tachycardia, and hypotension, the patient would then likely have been explored and the coronary artery injury ligated. In this case, the patient responded to a single bolus of one liter of crystalloid, so was admitted and observed in the ICU.

Rising serum troponin levels led the next day to cardiac catheterization which revealed an abrupt cutoff of the proximal posterior descending coronary artery consistent with the pattern of ischemia. At that time, an echocardiogram demonstrated a mild pericardial effusion without signs of tamponade, and the ejection fraction was maintained at 55%. There were several proposed treatment options. One option was surgical attempt of direct repair or saphenous vein graft bypass of the injured posterior descending coronary artery. Due to their size, injuries to the coronary arteries are seldom managed by direct repair. Saphenous vein bypass of the injury is considered for proximal to mid major coronary artery injuries. In addition, with an evolving ST elevation myocardial infarction, delayed coronary bypass has higher morbidity and mortality. Balloon dilatation and coronary stenting would be hazardous as mentioned because it has the risk of disrupting the clotted injury. Anticoagulation by itself carries similar risks of rebleeding. Because the injury was not bleeding and the ejection fraction was adequate, the treatment was continued nonsurgical medical monitoring without anticoagulation, treating the patient as an evolving myocardial infarction with preserved function. At this point in the patient's course that recommendation was individualized and reasonable. The patient was observed and eventually sent back to the referring center. The potential downside of this course is the distal right/posterior descending coronary arteries are approximately 2 mm. There are concerns raised by a few case reports of coronary artery pseudoaneurysm formation after trauma, stenting, or coronary bypass grafting, as well as reports of delayed tamponade up to a week postcardiac injury. However, there are no clear data suggesting this commonly occurs to make an absolute recommendation. The important concept is to understand that rebleeding is a risk, and to be actively observing for it as described in the report. Thus, this was an unusual presentation that was successfully managed in this context. (M.J.W.)