

Right Gastroepiploic Artery Stab Wound Presenting as Massive Hemothorax: A Diagnostic Dilemma

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We present a case of massive hemothorax and hemoperitoneum caused by a single stab wound to the lower chest. The management of this case, which began with a hemodynamically stable patient in the emergency department, continued in the operating room with an exploratory thoracotomy and laparotomy that revealed a diaphragmatic tear and a rare isolated gastroepiploic artery bleeding. A diagnostic challenge indeed.

Patient Description

A 50 year old man was brought to the emergency department after sustaining a chest stab wound below his left nipple. At the scene the patient was conscious, breathing spontaneously, and hemodynamically stable. On arrival his blood pressure was 112/70 mmHg, heart rate 120 beats per minute, and respiratory rate 28 breaths per minute. He complained of local pain and shortness of breath. His Glasgow Coma Scale was 15. Physical examination showed a pale and tachypneic patient with a single horizontal stab wound – 3 cm long, 5 cm below and 5 cm medial to the left nipple – lateral to the lower left xyphoid border. There was no external bleeding or other visible injuries. Heart sounds were normal, the abdomen was non-tender, but breath sounds were decreased at the axilla and base of the left hemithorax. The rest of the examination was unremarkable.

A chest tube was inserted that drained approximately 1,000 ml of blood, resulting in a rapid clinical improvement in the patient's dyspnea. At that stage the patient had already received 2,000 ml of crystalloids via one large bore peripheral line and one high flow femoral line. Vital signs stabilized with blood pressure of 132/84

mmHg, heart rate 100 beats/min and respiratory rate 16. A nasogastric tube was inserted and drained small amounts of clear yellowish gastric secretions. An upright chest radiograph showed blurring and mild elevation of the left border of the diaphragm. There was no evidence of pneumothorax or free air under the diaphragm. An abdominal ultrasound did not show free peritoneal fluid or other pathology at that stage. Approximately 10 minutes later, still in the emergency department, the patient's condition began to deteriorate. Blood pressure dropped gradually, heart rate increased, and the patient developed mildly distended neck veins. He also became stuporous with several brief episodes of unresponsiveness. The additional bleeding from the chest drain was non-significant at this point.

A transthoracic echocardiography was performed showing a *possible* cardiac tamponade with a large fluid collection near the apex of the heart. Blood pressure dropped to 80/50 mmHg with a heart rate of 160/min. The patient was urgently transferred to the operating room, where, approximately 12 minutes after the deterioration in the emergency department, a left antero-lateral thoracotomy was performed. An additional amount of clotted blood was removed from the base of the left hemithorax and around the sub-pericardial fat pad (~300 ml). There was no evidence of cardiac tamponade, and no visible injuries to lung parenchyma or vessels. Removal of the clotted blood initiated active bleeding from the peritoneal cavity via a diaphragmatic laceration adjacent to the sub-pericardial fat pad. The surgical team then performed an exploratory laparotomy that revealed massive

hemoperitoneum (~1,500 ml). The source was a transected right gastroepiploic artery some 4–5 cm from the pylorus along the greater curvature of the stomach. There was no injury to the adjacent stomach or other injuries in the abdomen. The GEA was ligated at both cut ends and the bleeding stopped. Some bleeding from the edges of the lacerated diaphragm was controlled while suturing the small diaphragmatic defect. The patient lost an estimated total of 2,800–3,000 ml of blood (chest and abdomen) and received 4,000 ml of crystalloid solutions plus 7 units of packed cells during initial assessment and in the operating room. Thereafter, he was hemodynamically stable, and was discharged on day 7 after an uneventful recovery.

Comment

Trauma to the gastroepiploic vessels is a rare entity that has not been described in the English medical literature until now. An isolated injury to the gastroepiploic artery is even less probable. So far the only information we have regarding such an injury comes from case reports describing iatrogenic damage inflicted during invasive procedures such as endoscopic retrograde cholangiopancreatography [1], insertion of a pneumoencephalogram [2] or after using the GEA for coronary bypass [3]. Our case presents an isolated right GEA injury caused by a single chest stab wound. Such a stab wound to the chest can present a diagnostic dilemma to the trauma surgeon, especially in the thoracoabdominal region. Patients with lower chest or upper abdom-

GEA = gastroepiploic artery

inal stab wounds are at risk for both cardiac and intraabdominal injuries, with possible lacerations of the diaphragm. The overall incidence of diaphragmatic injuries in a left penetrating thoracoabdominal injury, as described by Murray et al. [4], is 42%. A quarter of these patients would have an occult diaphragmatic injury with no other indication for a celiotomy. Current options in the evaluation of these patients include observation, chest radiographs, sonography, spiral computed tomography, magnetic resonance imaging, diagnostic peritoneal lavage, laparoscopy/thoracoscopy and mandatory laparotomy/thoracotomy. In the hemodynamically stable patient with a suspected ruptured diaphragm, the non-conclusive X-ray will be followed by a CT scan and an MRI if necessary. Despite these multiple diagnostic tools, the unusual penetrating angle and trajectory in this case masked the correct diagnosis at the stage of initial assessment. Apparently, the knife had slid on the left pericardium to penetrate the diaphragm at the cardiophrenic fat pad without injuring the heart. Then, sliding on the anterior wall of the stomach it reached the right GEA and transected it without any lower penetration.

In penetrating abdominal injury, patients presenting with signs of shock or peritonitis are subjected to early laparotomy. For patients who are hemodynamically stable without the clinical signs described above, a more conservative approach is suitable. Indications for aggressive operative intervention include hypovolemic shock caused by exsanguination via the chest wound or through the thoracic drain (usually symptoms of cardiac or great vessel injury). Other indications are cardiac tamponade, significant false aneurysms, and perforation of the main aerodigestive tracts. In this case both hemodynamic instability and the cardiac

echocardiogram, suggesting tamponade, expedited early thoracotomy. The remaining question regarding this case involved the timing and use of diagnostic tools. Would different management have resulted in a more rapid or accurate diagnosis and treatment?

An evaluation of potential errors in diagnosis of pericardial effusion was done recently at the Wisconsin Medical College Level One Trauma Center. All participants had difficulty distinguishing between epicardial fat pads and true pericardial effusions. The overall sensitivity and specificity was only 73% and 44% respectively. Their conclusion was that a serious potential for misdiagnosis of pericardial effusion and tamponade still exists [5]. Nevertheless, surgeon-performed ultrasonography has become the diagnostic test of choice for patients suspected of having hemopericardium and cardiac tamponade.

We believe that in the case presented, the compromised hemodynamics and massive hemothorax, drained by the chest tube, required an emergency thoracotomy. That would have been the case even in the presence of a correct cardiac ultrasonography that ruled out a possible tamponade, if only to exclude the possibility of an occult cardiac or great vessel injury. As for the early negative abdominal ultrasound, since the examination was performed by an experienced radiologist, aside from the false negative option, the negative pressure in the thoracic cavity caused by breathing could have caused a possible shift of blood through the diaphragmatic tear and pooling of blood in the left hemithorax. This speculation regarding the thoracic blood pooling is not described in the literature on abdominal bleeding and diaphragmatic tears, but it explains the amount of blood that accumulated in the chest in early stages before the formation of the

massive clott in the base of the left hemithorax.

The availability and short time required for an abdominal ultrasound enables a repeated examination before the operation. Such a 'second look' might have revealed the accumulating blood in the abdomen and early laparotomy intervention with an option to exclude the need for thoracotomy with the use of a subxyphoid pericardial window.

Rapid transportation to the hospital, immediate triage and early blood replacement contributed to the favorable outcome after this class IV hemorrhagic injury.

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When two people part it is the one who is not in love who makes the tender speeches

Marcel Proust (1871-1922), French novelist who became a recluse after his mother's death in 1905, exploring in fictional form the psychology of human memory.