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Gunshot Wound to The Flank with Abdominal and Cardiac Injuries

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A 19-year-old male presented to a level 2 trauma center with a gunshot wound to his flank. The entrance wound was on the right flank (midaxillary line below the costal margin) without an associated exit wound. On admission his vital signs were: Blood pressure 98/82 Pulse – 84, Respiration 14 and oxygen saturation 92% on room air. The abdomen was tender and the initial FAST was positive only in the right upper quadrant. A CXR was done and the bullet was noted in the left chest. A left chest tube was inserted. No significant output was noted. He was transported to the operating room and abdominal exploration ensued. Multiple intra-abdominal injuries were identified and addressed. Two gastric perforations were repaired. Two transverse colon perforations were repaired. Multiple small bowel perforations were noted and a segmental jejeunal resection and side to side stapled anastamosis performed. A left lobe liver injury was identified but was not bleeding. A hole in the central tendon of the diaphragm was noted with blood oozing from this area. A median sternotomy was performed. Two holes in the right ventricle were identified and repaired with 3-0 Tevdek pledgeted sutures. After the cardiorraphies were completed, a mediastinal tube was placed and the median sternotomy was closed in the standard fashion. The midline abdominal incision was closed and the patient transferred to the recovery room in critical but stable condition.

He was extubated on day two and the mediastinal tube was removed on day 3. A post-op echocardiogram did not reveal any valve abnormalities. Minimal pericardial fluid was noted. The ejection fraction was normal. The left chest tube was removed on day 5. An episode of pericarditis occurred (documented by EKG) and this responded to ibuprofen. He was seen by psychiatry for post-traumatic stress disorder and citalopram was prescribed. He was subsequently discharged to home after a 7-day hospitalization. He was tolerating a diet and having normal bowel activity.

Discussion

Patients with penetrating abdominal trauma may have associated thoracic injuries. Penetrating thoracoabdominal injuries provide unique challenges regarding management . These wounds are associated with increased mortality and opening the correct cavity first may be life-saving [1]. In our patient the positive FAST documenting blood in the right upper quadrant without blood in the pericardial sac supported proceeding with laparotomy after left chest tube insertion. In general, any injury at the level of the 4th intercostal space or below should be considered a thoracoabdominal wound until proven otherwise [2]. As a principle, a flank or back wound should always make the clinician suspicious of extra-abdominal injury. The cardiac box is three dimensional and has a clear posterior component [3].

Following the trajectory of the missile is essential in identifying all injuries. Injury to the central tendon mandated either subxiphoid window or formal median sternotomy to avoid a missed cardiac injury. A subxiphoid window is a useful technique. It has high sensitivity and specificity regarding cardiac injury [4]. Nicol and colleagues have used this technique in patients with delayed presentation to select those who require formal exploration [5].

In their series patients with old blood in the pericardium that is irrigated to a clear effluent are assumed to have a cardiac injury that has sealed. Additional data from the selective use of pericardial window and drainage as definitive treatment for hemopericardium provides support for this approach. In a small series of 5 patients all with stab wounds treated with pericardial window and drainage, all patients recovered after 5 days in the hospital [6]. It is likely that most of these injuries involved the right ventricle and were small and self-sealing in nature.

Repair of right ventricular wounds with pledgeted sutures is standard technique (7). There is usually no need for formal bypass to achieve a secure repair. Post-operatively an echocardiogram should be performed to detect complications. Changes in the ejection fraction, wall motion abnormalities, valvular or ventricular septal defects may be detected(8). Pericarditis is a well-recognized complication that is effectively addressed with anti-inflammatory medications like ibuprofen or decadron (9).

Addressing the psychological sequelae of interpersonal violence is essential. In this instance a formal psychiatric consultation and a recommendation for citalopram (selective serotonin re-

uptake inhibitor) was obtained. Interpersonal violence often involves issues of mental wellness, social deprivations like poverty, alcohol and other drug use, gang violence and other factors that contribute to this continuing crisis(10). As trauma surgeons, it is our duty to provide comprehensive support(including emotional support) for each patient in the hopes that their recovery will be complete and that recurrent episodes can be prevented.

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