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Case Report

Innocuous cardiac gunshot that proved fatal: A bitter lesson learned

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ABSTRACT

The management of hemodynamically normal patients with retained intra-pericardial foreign body remains a matter of conjecture. The available literature supports non-operative management of such innocuous foreign bodies. We report our experience of a hemodynamically normal patient with a retained intra-pericardial pellet from a firearm injury. He initially received successful non-operative management but developed fatal hemopericardium 21 days after injury. In this paper, we discussed the pitfalls in the management of such injuries in light of the available literature and summarized the clinical experience.

The burden of firearm injuries is significant worldwide. Cardiac firearm injuries are rare. The management of patients with cardiac gunshot injuries is based on their hemodynamic status, and patients with hemodynamic instability are explored urgently while non-operative management may be prudent for the ones with stable hemodynamic parameters. There is no consensus on the management of hemodynamically normal patients with retained intra-pericardial foreign body. Largely no attempts are made to retrieve them as there are no reported short-term adverse consequences. We tried to manage a young man with a retained intra-pericardial pellet from a gunshot non-operatively and indeed discharged him in a stable condition, but 3 weeks later he arrived at our center dead due to massive hemopericardium because the shot eroded the inferior pulmonary vein, resulting in fatal hemorrhage. We reviewed the literature on this issue, scrutinized the current practice and presented our viewpoint in managing this rare injury.

Case report

A 26 years old man was admitted 10 h after sustaining a gunshot injury. On arrival, his heart rate was 94/min, blood pressure

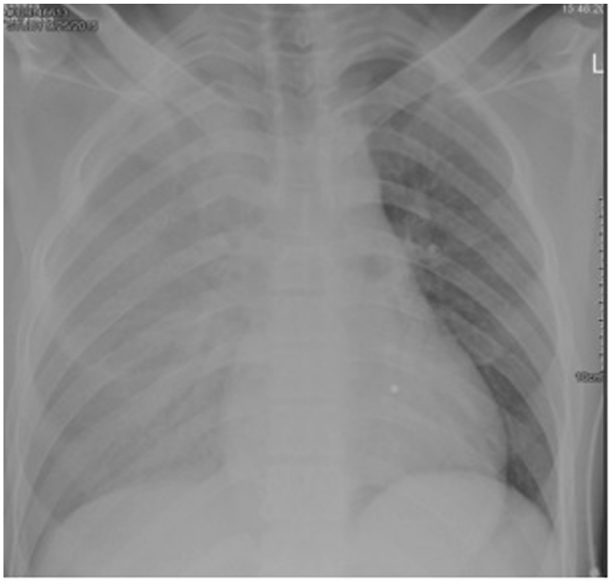

Fig. 1. Posteroanterior view of chest radiograph on admission showing radio-opaque metallic density (pellet) in left retro-cardiac region and right hemothorax. The pellet was seen along the posterior pericardial border on left side of heart, with no hemopericardium.

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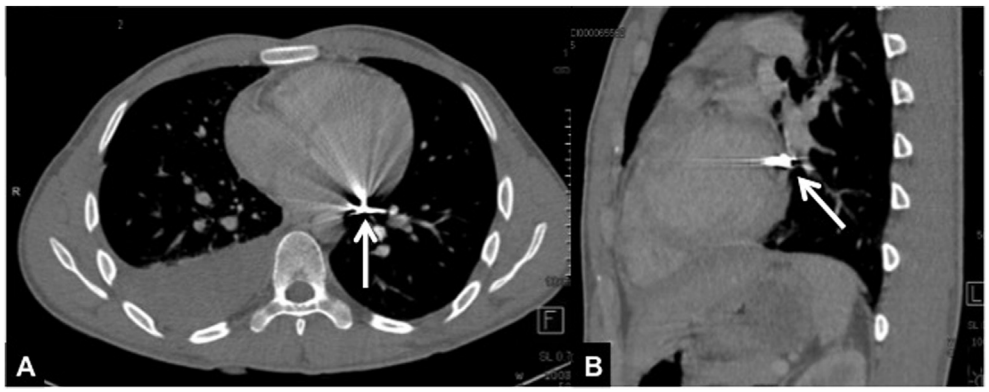

Fig. 2. Axial (A) and sagittal reformatted (B) images of CT scan on admission. The pellet was seen overlying the left margin of vertebral body. The right hemi-thorax had chest tube *in situ* and showed no hemopericardium.

was 122/82 mmHg and respiratory rate was 18/min. There were multiple puncture wounds over the anterior part of thorax, abdomen and thighs. The air entry was reduced on the right side and there was tenderness in the upper abdomen. A chest X-ray showed a right hemothorax with a rounded metallic foreign body (pellet) in the retro-cardiac region on the left side (Fig. 1).

A contrast-enhanced computed tomography (CECT) of chest and abdomen revealed contusion in upper lobe of right lung with moderate hemothorax. A pellet was seen at posterior pericardial border on left side in the vicinity of inferior pulmonary vein, with no hemopericardium (Fig. 2). In addition, there was evidence of injury in the first part of duodenum. Based on these findings, a freely-lying retained pellet in pericardium was suspected. The patient remained hemodynamically stable and underwent laparotomy with primary repair of duodenal perforation and right intercostal tube drainage. In subsequent serial chest X-ray, the pellet was seen overlying the left margin of vertebral body and remained in the same position (Fig. 3). Echocardiography confirmed the presence of the retained shot in the same position, however, there was no hemopericardium or regional motion wall abnormality. The pellet did not move on changing the position of the patient. The patient remained hemodynamically normal during his course, made an uneventful recovery and was discharged on postoperative day 10 after removal of intercostal tube.

On day 21 after injury, the patient had sudden onset of respiratory distress and altered consciousness presenting as increased drowsiness and poor response to verbal commands for 2 h. On arrival in hospital, he was found dead. The relatives reported that he remained well after discharge except for these symptoms lasting 2 h.

Autopsy showed 350 ml of well-formed clot in pericardial sac with small tear in the intra-pericardial portion of left inferior pulmonary vein and adjoining pericardium (Fig. 4). A pellet was found adjacent to the venous tear. We concluded that the cause of death was cardiac tamponade secondary to massive hemorrhage from erosion of inferior pulmonary vein by the pellet.

Discussion

The optimal management of a hemodynamically normal patient with retained gunshot in pericardium or near major blood vessels is not clear because of relative lack of evidence due to the rarity and variable outcome following this injury. Reported literature is

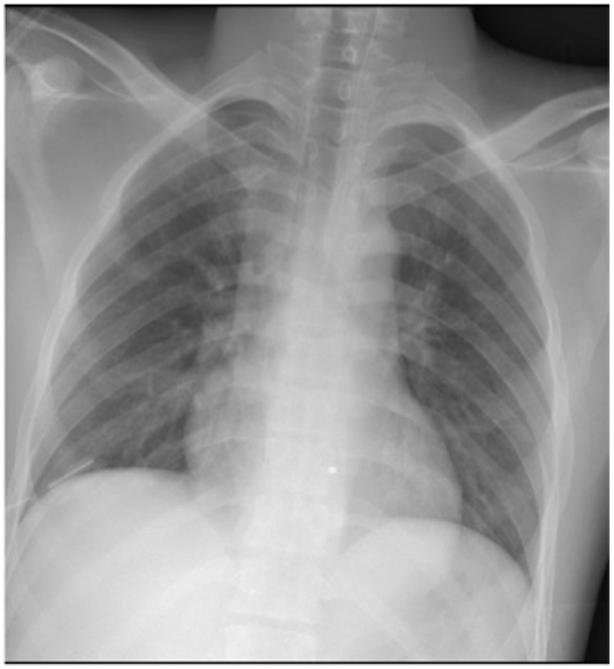

Fig. 3. Posteroanterior view of chest radiograph 2 days after injury.

Fig. 4. Post-mortem specimen of heart showing massive hemopericardium.

largely limited to case reports and the outcomes have varied from asymptomatic patients to a few who developed long-term sequelae of their cardiac wounds.

Cardiac gunshot wounds are associated with high mortality.[1] The management of such patients is determined by their hemodynamic status. The patients with hemodynamic instability are explored urgently. However, at times they remain asymptomatic. It is in these patients the management remains challenging. In literature, such patients were managed conservatively with no adverse outcomes.[2,3]

A general recommendation for retained firearm in a hemodynamically stable patient is not to interfere with the projectile. It is considered that the risk of injury caused by attempts at removal of such innocuous projectile is higher than that due to its presence.[4,5] The indications of removing a retained asymptomatic bullet are limited to: (1) bullets close to the joint or skin; (2) bullets lodged in hand, foot, globe of eye or intra-discal space; (3) bullets in contact with cerebrospinal fluid; (4) documented elevated level of lead; (5) bullets with risk of embolization to heart or peripheral vessels.[5,6]

In addition, a few relative indications are also mentioned, such as in patients who need MRI and in women who wish to conceive.[7] Bullets lodged near blood vessels may cause late aneurysms and may be removed electively.[6] They may also be removed if there is risk of vascular embolism, possibly in patients with ischemic pain or with vessel wall indentation by the retained bullet.

Although in our patient, the pellet was proximal to inferior pulmonary vein, the vein was not indented. Moreover, the patient remained hemodynamically normal, which made us prioritize management of his abdominal injuries. Subsequently the intrapericardial position of the pellet was confirmed, but the patient remained asymptomatic, so non-operative management was considered optimal.

Some authors have advocated removal of retained free intrapericardial bullet in all patients with complications such as pericarditis and pericardial effusion, while others have managed those patients conservatively.[8,9] In our patient, although the pellet was lying free initially, subsequent serial imaging revealed it to be fixed. There were some reports in literature that such pellets remained asymptomatic and were indeed detected incidentally.[3,10] It is therefore difficult to anticipate the course of patient with retained intra-pericardial bullet. Pericarditis and pericardial effusion are long-term sequelae of such injury that may be dealt with at an appropriate time and urgent or semi-urgent exploration for retrieving them may not be required. Short-term adverse sequelae of such injury have not been reported in literature so far. However, we experienced an unusual adverse outcome of such innocuous shot that proved fatal in a short course. Based on our experience, trauma surgeons are suggested to keep a low threshold for removal of such foreign bodies. This management plan can not be generalized and the decision should be individualized. More experiences of trauma surgeons worldwide are needed on similar issues so that a consensus will be achieved in management of this injury someday.

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