Case Report

Videothoracoscopic approach to the extraction of a cardiac retainer missile

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ARTICLE INFO

Keywords:
Cardiac injury
Cardiac missiles
Bullet embolus
Pericardium injury

ABSTRACT

The presence of foreign bodies (FB) retained in the heart or pericardium secondary to penetrating trauma in stable patients is a very rare event and its management is controversial. We present the case of a 19-year-old patient who was admitted to our trauma center hemodynamically stable because of two gunshot wounds in the lumbar region. A chest x-ray (CXR) revealed a blurred foreign body over the right heart chamber, thoracoabdominal computed tomography (CT) scan showed a free projectile over the left atrial wall, and transesophageal echocardiogram (TEE) showed a hyperrefringent pericardial sac image near the right ventricle. Finally, the patient went to surgery where a missile was removed from the pericardial sac by video-assisted thoracoscopic surgery (VATS).

Introduction

Patients with penetrating heart trauma are usually admitted to the Emergency Department (ED) in critical condition and require aggressive maneuvers to keep them alive. There are few situations where the patient is injured and remains hemodynamically stable with one or more FB retained in the heart or pericardium [1,2]. The management of these patients is controversial due to the limited number of cases and the characteristics of the retained FB. The surgical approach for removing FB is usually thoracotomy or sternotomy. However, other less invasive approaches can be considered. We describe an unusual case where we remove a missile from the pericardial sac by VATS in a stable patient without complications.

Case

A 19-year-old man was referred from a rural hospital to our ED because two gunshot wounds in his lower back 24 h ago his arrival. Since his admission he didn’t show any clinical deterioration, only intravenous fluids had been administered. On primary assessment, he had normal vital signs, normal lung and heart sounds, pain-free abdomen, Glasgow Coma Scale: 15/15. The exploration shows 2 missile entry holes in the right lumbar region. E-FAST was positive for free fluid in pericardium.

The CXR showed two FB, the first one, located in the right hemithorax on the cardiac silhouette and the second one in subcutaneous...
tissue at L1 level, and it was noteworthy that the FB located on the cardiac silhouette is blurred in the lateral projection (Fig. 1A–B). Thoracoabdominal CT scan revealed bilateral pleural effusion, mediastinal fluid and in the pericardium a metallic object in close contact with the lateral and posterior wall of the left atrium (Fig. 1C). In the TEE, we found a significant pericardial effusion with hyperrefringent free image located at in the right ventricle wall without any other alteration. The blood count showed a drop of 1 g/dL of hemoglobin and the electrocardiogram (EKG) was normal. The controls showed any change.

Because of the findings found in TEE, we performed a pericardiotomy by VATS. A 10 mm trocar was placed in the 5th intercostal space, with mid axillary line and a 30-degree lens was introduced, under direct vision, a 10 mm trocar was placed in 8th intercostal space with mid axillary line and a 5 mm trocar in 3rd intercostal space with mid clavicular line; we drained the left hemothorax and then pericardiotomy was performed observing the blood output, 400 cc of hemopericardium were drained. A free missile was extracted from pericardial sac (Fig. 2). During review, a small hole in the tendon center of the diaphragm occluded by a fibrin clot was observed, we removed it, and visualized the left hepatic lobe. No myocardial injury was observed and cardiac contractility was good. We washed the cavity with 0. 9% warm saline solution and placed a pleural drainage tube. Once this procedure was completed, he decides to close the diaphragm wound by laparoscopy (Fig. 3).

The patient tolerated the procedure, there were any complications. He was discharged 7 days after. In his last medical control (6 months after the event) the patient didn’t show any symptoms, he works and performs physical activity as usual.

Discussion

Intracardiac FB secondary to penetrating trauma are defined as any object that is partially or totally embedded in the myocardium or that is free in one of the cardiac chambers or pericardial space [3]. FB can be variable but in general they are usually bullets, pellets

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**Fig. 1.** Anteroposterior Chest X-ray (A), Lateral Chest X-ray (B). They show a missile on the right cardiac silhouette (red arrow) and another in subcutaneous tissue (blue arrow). (C) Thorax CT-scan with metallic fragment near the left atrium (yellow arrow).
or shrapnel [1,3,4]. There are 2 mechanisms for intracardiac FB, the first one, by direct injury usually through the chest wall and the second by embolization through the blood vessels and occasionally through the esophagus or bronchial tree. Most of the FB are from low velocity, small caliber gunshots [4–6]. When a FB migrates to a heart chamber, it can be trapped in the endocardial trabeculations and encapsulate in fibrous tissue, or it can migrate to a pulmonary artery if it is in the right chamber or embolize into a systemic artery if it is in the left chamber [3].

Symptoms may vary, some patients may have any symptoms, but others may have pain (retrosternal or precordial), dyspnea, asthenia, and neurotic manifestations. Auscultation may result in muffled heart sounds, signs of atrial fibrillation or heart block. The EKG may be normal or may show transient or persistent variations in the T, P, or extrasystolic wave [4].

Imaging tests such as CXR, CT and echocardiogram will help to confirm the trajectory, location, type and size of the FB, in addition they allow to diagnose intrathoracic lesions [1,5–8].
The decision to remove FB will depend on the severity of the cardiac symptoms and its location. Overall mortality for both operated and conservatively managed patients is similar, about 20% [1,4]. Decker [4] sets out several recommendations for extraction of an intracardiac FB, see Table 1.

If the surgeon decides to intervene, it is recommended to have a fluoroscope or ultrasound available in the operating room in case the FB cannot be found during the procedure, thus reducing the risk of a failed extraction. This can occur in 30% of cases [1]. The surgical approach depends on the surgeon’s preference and the location of the FB. Generally, because most patients with penetrating heart trauma have a critical clinical condition, a thoracotomy or sternotomy is considered the most indicated approach [1]. However, if the patient’s clinical condition allows it, other less morbid approaches, such as the use of VATS, can be considered. A minimally invasive procedure that allows to perform a pericardiotomy for hemopericardium drainage and the removal of a free projectile in the pericardial sac quickly, easily and without complications.

Conclusion

Stable patients with intracardiac FB are rare; their management should be individualized according to the clinical manifestations and the location of the FB. The surgical approach will depend on the surgeon’s preference, but we recommend the least invasive and morbid approach possible as long as the patient’s clinical condition and the location of FB allows it; as we did in this unusual case.

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Table 1
Recommendations for the removal of an intracardiac foreign body.

1. It is relatively safe to remove foreign bodies from the pericardium.
2. It is relatively dangerous to allow sharp foreign bodies to remain in the heart on account of the tendency to perforate fatally later.
3. It is relatively dangerous to leave foreign bodies free in the right heart on account of the risk of pulmonary embolism and infarction.
4. Large foreign bodies in the pericardium lead to fatal issue and should be removed as early as practical.
5. If, in the course of an operation to remove a foreign body, unfavorable cardiac symptoms develop, it is wise to desist. One is guided as to whether or not to operate later by the course of events.
6. Intramural fixed bodies usually do not cause death, nor shorten life.
7. Removal of foreign bodies usually gives relief from symptoms complained of and due to them.

Taken from Decker, H. R. (1939). Foreign Bodies in the Heart and Pericardium—Should They Be Removed? Journal of Thoracic Surgery, 9(1), 62–79.