

Air gun pellet: cardiac penetration and peripheral embolization

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ABSTRACT

Use of high-velocity air guns can lead to serious injuries. Management options of cardiac pellet gun injuries are based on patient stability, and course and location of the pellet. Presently reported is the case of a boy who was shot with an air gun pellet. Following right ventricular entry, the pellet lodged in the left atrium and embolized to the right iliac and femoral artery. Following pellet localization, right ventricular injury was repaired, and the pellet was removed successfully.

Keywords: Air gun pellet; heart; penetrating trauma.

INTRODUCTION

Air gun injuries to the extremities are common, though a penetrating injury to the heart is very rare. In addition, pellet embolization occurs infrequently in cases of penetrating trauma.

Lack of adequate experience at any single institution contributes to controversy regarding diagnostic and therapeutic approaches to management. Presently described is a case of pellet embolization from the left atrium to the right femoral artery.

CASE REPORT

An 11-year-old boy presented to another hospital with single air gunshot wound to the chest. Cardiac computed tomography (CT) was performed, and the pellet was localized in the left atrium cavity (Fig. 1). The patient was transferred to the present institution for further evaluation and management. Upon arrival, the boy was sedated but conscious, with complaint of pain over the anterior chest wall. He had no significant medical or surgical history.

On initial assessment he was fully conscious and alert, with patent airway and normal respiration. He was hemodynamically stable with no evidence of external bleeding or cardiac tamponade. No jugular venous distention was observed. Lung examination showed decreased breath sounds in the right lung base. A 0.5-cm entry wound was localized over the right fifth intercostal space, between the sternum and nipple. The wound was not bleeding, and no exit wound was found.

Secondary physical examination revealed weakened right femoral pulse with weakened popliteal and pedal pulses. Handheld Doppler insonation revealed monophasic signals over the pedal arteries. No motor or sensory deficits were present. Electrocardiogram showed sinus rhythm with no alterations. Chest radiography showed widened mediastinum and right-sided hemothorax. No foreign body was found.

CT of chest, abdomen, pelvis, and upper thigh showed retrosternal hematoma, pericardial effusion, right-sided hemothorax and foreign body (pellet) in the right common iliac artery (Fig. 2). Decision to operate on an emergency basis was made. Conventional median sternotomy approach was selected. On opening the pericardium, hemopericardium was present. Tract of the missile could be made out from a small wound in the right side of the pericardium and in the adjacent right ventricular anterior wall. The ventricular wound had apparently sealed on its own. The wound was repaired using 5-0 polypropylene stitches with Teflon pledgets. No other wound was found on anterior or posterior walls of the heart. Intraoperative transesophageal echocardiography revealed a 2-mm atrial septal defect, intact ventricular septum, and normal valvular structures. Atrial septal defect shunt was unremarkable. Chest was closed after mediastinum and chest wall homeostasis.

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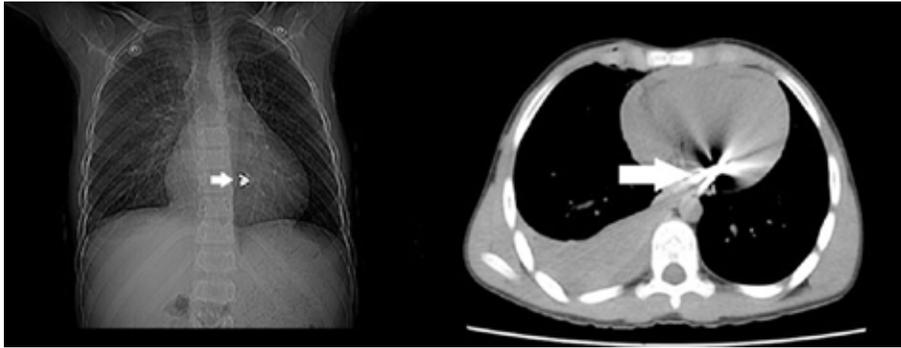


Figure 1. Chest radiograph with radiopacity (pellet) in the mediastinum. Computed tomography indicated the location of the radiopacity (pellet) in the left atrium.

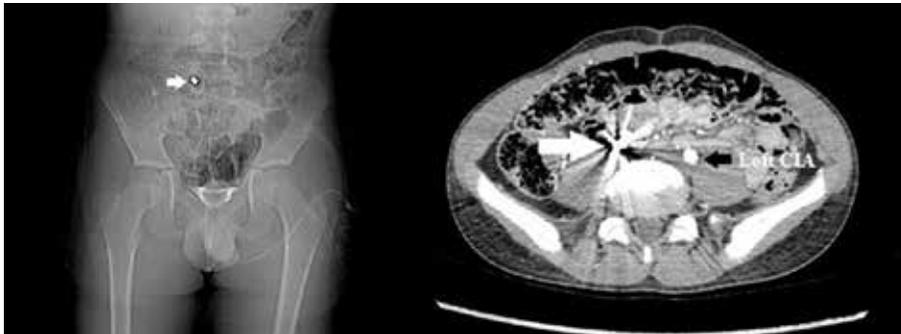


Figure 2. Chest radiograph with radiopacity (pellet) in the abdomen. Computed tomography showed migration of the pellet in the likely location of the right common iliac artery.

A right vertical groin incision was made, and the pellet was palpated in the common femoral artery. After preparing for incision, the pellet was removed from the femoral artery. The patient did well after surgery and was discharged on the fifth postoperative day.

DISCUSSION

Air guns, though perceived as toys, can cause life-threatening injuries. Muzzle velocities range from 290 to 940 ft/s, and some are comparable to 0.22 long or short conventional rifles, or 0.38 revolvers.^[1] Though these guns are not legally considered firearms, such high velocities exceed the speed needed to penetrate the eye (39 m/s) and bone (106 m/s).^[2,3] Few cases of cardiac injury caused by air gun pellets in the pediatric age group have been reported.^[4]

Air gun pellet cardiac injuries differ from other penetrating cardiac injuries in clinical presentation, outcome, and management. Low incidence of air gun injuries makes management strategy more difficult. Clinical presentation may vary from adequate vital signs to hemodynamic instability. Such penetrating injuries to the heart may be mortal due to hemorrhagic shock and pericardial tamponade. Presence of missile in the heart or great vessels may be caused by penetrating injury or embolism. Important variables for missile embolism are force and direction of blood flow, arterial lumen (including size and take-off angle), missile size and weight, body

position immediately after injury, and point of entry to the cardiovascular system.^[5]

Strategies for the management of air gunshot injuries include observation, pericardial drainage, and cardiac exploration. Cardiac injuries were described as plugged, with a blood clot or without active bleeding, in most reported cases in which full cardiac exploration was undertaken.^[6]

Emergency surgery was presently selected due to location of the pellet wound on the anterior chest wall and location of the pellet in the left atrium cavity. A pellet may cause multiple injuries to the heart, and repair must be performed, even in the absence of signs of cardiac tamponade. Preoperative or intraoperative echocardiography is crucial when deciding whether or not to perform intracardiac exploration. In addition, peripheral pulse examination is a useful tool in cases of pellet embolization/migration. When peripheral pulses are absent or weakened, reimaging of the pellet must be performed. Embolization was suspected after the second physical exam, and CT was repeated. No foreign body was found in the thoracic cavity during the second exam, and the pellet was located in the femoral artery. The present authors conclude that cardiac exploration is necessary in all cases of cardiac or pericardial penetration by missile.

Conflict of interest: None declared.

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OLGU SUNUMU - ÖZET

Havalı tüfek saçması kardiyak penetrasyon ve periferel embolizasyonu

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Havalı tabancalar atıldıktan doğru rultuda yüksek hızlara çıkabilir ve ciddi yaralanmalara neden olabilirler. Kardiyak havalı tüfek saçması yaralanmalarında yönetim hastanın stabilitesine; saçmanın izlediği yola ve yerine göre planlanmaktadır. Biz havalı tüfek saçmasıyla sağ ventrikülden yaralandıktan sonra saçmanın sol atriyumuna ilerleyip sağ iliya ve femoral artere embolize olduğu erkek hastamızı sunuyoruz. Saçmanın lokalizasyonunun ardından sağ ventrikül yaralanması tamir edildi ve saçma başarıyla çıkartıldı.

Anahtar sözcükler: Havalı tüfek saçması; kalp; penetre travma.

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