Femoral artery embolization of a thoracic stray bullet
Tanous Aoun, MD, Fikani Amine, MD, and Khabbaz Ziad, MD, Beirut, Lebanon

ABSTRACT
Arterial bullet embolization after a thoracic gunshot wound represents a diagnostic and therapeutic challenge. The absence of an apparent exit wound should alert the clinician. Cardiac bullet injuries are mostly fatal. However, in some cases, patients may remain stable, and conservative management can be an acceptable strategy. We present a case report of a 7.62-×-39-mm thoracic stray bullet that embolized to the femoral artery. (J Vasc Surg Cases and Innovative Techniques 2017;3:123-5.)

Thoracic gunshots with arterial bullet embolization present a confusing clinical picture. Bullets enter the arterial circulation through the aorta or the heart cavities, and patients usually present with signs of acute hemodynamic instability.

However, in some cases, cardiac wounds might be self-contained, and the victim presents with signs of distal organ ischemia in a relatively stable hemodynamic condition. Arterial embolization of bullets can cause misleading symptoms that delay diagnosis and management.

First described during World War I, arterial embolization remains a rare phenomenon. It should be taken into consideration, however, anytime patients present with no apparent exit wounds and unexpected symptoms. We present a case of a large thoracic stray bullet that embolized to the left femoral artery. Informed consent for publication was obtained from the patient.

CASE REPORT
A 25-year-old man presented to the emergency department for acute left lower limb ischemia a few minutes after a left thoracic stray bullet injury (7.62-×-39-mm caliber bullet). The patient was awake and hemodynamically stable. On physical examination, the bullet had entered the body just beneath the left scapula with no apparent exit wound. Cardiac examination findings were normal. Lung sounds were decreased on the left side. The left femoral pulse was absent, and the left lower limb was cold. The rest of the examination findings were normal.

Urgent computed tomography scan with intravenous administration of contrast material showed the bullet lodged in the left common femoral artery as well as free air in the pericardial cavity (Fig 1). It also showed a hematoma surrounding the inferior wall of the left ventricle and a left pneumothorax with mild pleural effusion. No free fluid or air was found in the abdomen. The bullet had presumably entered the systemic circulation through the left ventricle and embolized to the left common femoral artery. Bedside cardiac ultrasound examination showed a small hematoma on the inferior wall of the left ventricle without any signs of compression or tamponade.

Our strategy was to perform cardiac exploration simultaneously with bullet extraction from the femoral artery. However, the patient refused to undergo cardiac surgery and insisted on a limited procedure of bullet extraction.

Under strict hemodynamic monitoring with pain and blood pressure control, a chest tube was inserted under local anesthesia; then, general anesthesia was initiated. A skin-line incision was made in the groin over the femoral artery. The bullet was lodged at the level of the femoral bifurcation. Following control of the common, superficial, and profunda femoral artery, the bullet was surgically removed (Figs 2 and 3). No systemic anticoagulation was administered for fear of a potentially life-threatening pericardial hemorrhage. Fogarty thrombectomy was not performed as blood backflow was satisfactory. The patient was closely observed for a week with daily echocardiography and then discharged on day 8. Echocardiography was done weekly for a month and then monthly. It did not show any sign of aggravation up to the third month.

DISCUSSION
Arterial bullet embolization is an unusual complication after a thoracic gunshot and represents a diagnostic and therapeutic challenge. It is of the utmost importance to localize the bullet whenever an exit wound is absent. A contrast-enhanced total body scan is the preferred imaging modality for this purpose.

Penetrating cardiac projectiles are usually fatal, and the victim presents with signs of hypovolemic or cardiogenic shock. However, in some cases, a bullet can lose its kinetic energy and remain inside a cardiac cavity or the lumen of the aorta. Several factors might influence the amount of kinetic energy lost by a bullet at the time of impact, namely, a low initial kinetic energy, the shape of the bullet nose; the strength, density, and elasticity of the tissues; and the location of the missile’s penetration into the
circulation. Low-velocity bullets cause limited damage to the tissues, and the myocardial lesion can seal itself with a flap or a localized hematoma.

There is no consensus regarding the optimal management of these patients with cardiac injuries. Surgical exploration and repair are usually preferred. However, successful nonoperative management in stable patients has been reported. Conservative management requires close surveillance and repeated cardiac echocardiography. Hemodynamic instability or an aggravated pleural or pericardial effusion should prompt emergent surgical cardiac exploration, preferably under cardiopulmonary bypass.

Regular follow-up by echocardiography is mandatory for a few weeks after the patient’s discharge. The patient should be taught to consult in case of palpitations, fever, chest pain, or shortness of breath. Delayed cardiac complications are frequent and include shunts, valvular lesions, and ventricular aneurysms.

Arterial embolization often occurs directly after the injury but in some cases can be delayed for hours or days. Left lower extremity embolization is more frequent than on the right side because of anatomic features of the aortic bifurcation. Arterial bullet emboli cause symptoms in >80% of cases, and presentations for early end-organ ischemia are frequent. Therapeutic options include surgical or endovascular extraction. Miller et al advocated the removal of all arterial bullet emboli. Recent endovascular techniques have become the preferred method for treating these conditions. However, in our case, with the size of the bullet and the ease of access, open surgical extraction seemed the easiest, safest, and fastest method.
CONCLUSIONS

Our case describes an infrequent but important phenomenon of arterial embolization of a thoracic stray bullet. The absence of an exit wound and the presentation for unexpected symptoms should alert the clinician, and a rapid diagnosis should be made to avoid irreversible damage. Although the lack of concentrated experience at any single institution leads to variation in the management of these patients, endovascular retrieval of bullet embolism should be considered when it is feasible.

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