Extraction of a bullet floating in the pulmonary artery after a gunshot wound

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Abstract

Background: Patients with thoracic trauma caused by gunshots face a high risk of death, and medical staff often encounter technical difficulties in resolving these cases. Most gunshot wounds result in an entrance and exit wound. In cases with no exit wound, missiles are seen in other areas with screening radiographs. The bullet may migrate depending on gravity, coughing, swallowing, blood flow, or local erosion.

Case presentation: We present the case of a teenager who was hospitalized in critical condition owing to a left hemithorax injury caused by an improvised explosive device. The patient underwent two surgeries: an anterior left thoracotomy during which a hole in the myocardium was sutured, and after radiography, anterolateral right thoracotomy was performed, in which a deformed projectile was found at the level of the intermediate right pulmonary artery.

Conclusions: This case highlights the crucial importance of repeated imaging to assess the possibility of projectile migration within the cardiovascular system in similar cases of penetrating injury. Immediate surgery was necessary and very important for the survival of our patient, despite the difficulties presented by this complicated case.

Keywords

Floating bullet, pulmonary artery, gunshot trauma, emergency surgery, heart trauma, thoracotomy

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Introduction

Patients with thoracic trauma caused by gunshots face a high risk of death, and medical staff often encounter technical difficulties in resolving these cases. Most gunshot wounds result in entrance and exit wounds.
In cases with no an exit wound, these missiles are seen in other areas with screening radiographs.¹

**Case presentation**

A 16-year-old boy was transferred from another hospital with a gunshot wound to his left hemithorax (LH). He was in critical condition owing to hemorrhagic shock from an actively bleeding wound at the level of the fourth intercostal space, on the midclavicular line. After written informed consent was obtained from his parents (owing to his critical state and his young age), the patient underwent emergent exploration of the wound via a left anterior thoracotomy, while also undergoing resuscitation procedures. Once the coagulated hemothorax was evacuated, we found a hole in the myocardium, which we sutured. The hemorrhage stopped, but the bullet was not located. His postoperative course was uncomplicated, and he remained stable, with minimal drain output.

During a second survey by cardiac surgeons, computed tomography (CT) revealed a foreign body in the right hilum, mild left pneumothorax, and contusion of the left lower lung lobe (Figure 1). A smooth friction murmur was present over the pulmonary artery (PA) trunk.

The patient was transferred to a specialized thoracic surgical center where he underwent a second intervention to extract the bullet. The intervention was performed without cardiopulmonary bypass, under general anesthesia with non-selective intubation owing to the lack of a double-lumen tube suitable for his age. Right antero-lateral thoracotomy was performed, and a rigid object was palpable inside the intermediate PA. Small hematomas were visible on the upper surface of the intermediate PA, and the PA and its branches were carefully dissected. After clamping the right PA, we performed an arteriotomy. The bullet was extracted from the artery with difficulty owing to its irregular shape (Figure 2). The wall of the PA was sutured with PDS 3.0 (Ethicon Inc., Somerville, NJ, USA) during heparin instillation. The patient’s postoperative course was excellent.

**Discussion**

Penetrating bullets may migrate depending on gravity, coughing, swallowing, blood flow, or local erosion.² In cases of non-military firearms trauma, bullets penetrating the pulmonary veins, left and right heart, aorta, or large-caliber arteries of the thorax, abdomen, and limbs, may have insufficient energy to transfix the vessel, and instead, may only penetrate the vessel. Therefore, the bullet travels through the bloodstream until a peripheral artery is occluded at a site that is distant from the initial perforation.³,⁴ Migration of bullets from systemic veins to the right heart

![Figure 1](image-url) Chest computed tomography (CT) image demonstrating the foreign body at the hilum of the right lung.
appears to occur more commonly than migration into the pulmonary arterial tree. Despite some reported cases of arterial and venous embolism owing to trauma, cases in which the bullet becomes an arterial embolus are rare.

As we described, our patient was transferred directly to the operation room because of hemorrhagic shock, and there was insufficient time to fully evaluate him. However, in retrospect, it is obvious that the bullet perforated the myocardium of the right ventricle and floated via the PA into the right lung. During the second surgery, the deformed bullet was trapped with half of the bullet in the intermediate artery and half in the pyramido-basal trunk of the right PA. The biggest difficulty we encountered was performing surgery with the lung inflated. Regarding double-lumen endotracheal tubes, in our hospital, the Carlens tube was the only available tube, which was inadequate for our patient because of his age. However, selectively intubating only the left lung was not recommended because this lung was not in good condition owing to severe bruising in the lower lobe.

Conclusions

This case highlights the crucial importance of repeated imaging to assess the possibility of projectile migration within the cardiovascular system in similar cases of penetrating injury from gunshot wounds with no exit wound.

Arteriotomy was inevitable despite the difficulties in this complicated case. Any delay in treatment would have been fatal in our case owing to the sharp shape of the bullet and the patient’s compromised health status.

Acknowledgement

This case was presented as a poster at the 23rd European Conference on General Thoracic Surgery, Lisbon, Portugal, 31 May to 3 June 2015. This study complies with the following Equator network guidelines: “The CARE Guidelines: Consensus-based Clinical Case Reporting Guideline Development”.

Ethics statement

Ethical approval was requested and obtained from the ethical committee of the University Hospital “Shefqet Ndroqi” of Tirana, Albania. Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written

Figure 2. The deformed bullet, which was extracted from the right pulmonary artery.
consent is available for review by the Editor-in-Chief of this journal.

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