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An Abdominal Gunshot Wound and a Bullet with an Intramuscular Trajectory: A Case Report

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Abstract

Background: Gunshot injuries are always a challenging case, but is surgery always needed? Early assessment of the trajectory of bullet leads to an effective management plan. These cases require a multidisciplinary approach for a satisfactory outcome. **Case Presentation:** In this case, we present a 63-year-old male who was brought to our emergency department with a lower left flank gunshot wound. Imaging showed the location of the bullet in the abdominal wall musculature. **Discussion:** Atypical routes taken by bullets in firearm wounds can pose challenges in both surgical intervention and forensic medical diagnosis. Successful treatment necessitates a thorough clinical and radiological evaluation. Precise identification of the entry point, exit point, bullet's path, and the degree of tissue damage is crucial for preparing for Bullet removal and predicting patient outcomes. However, not all individuals with gunshot injuries exhibit uncommon bullet paths. In certain instances, surgical intervention may even be unnecessary. Nevertheless, precise radiological evaluation remains essential in these complex situations. **Conclusion:** For effective management of gunshot wounds, a good clinical as well as paraclinical assessment is needed. A multidisciplinary approach remains the best way to improve prognosis.

Keywords

Abdominal Wound, Gunshot, Ballistic

1. Background

Gunshot injuries to the abdominal compartment are associated with high morbidity and mortality due to the presence of various vital organs in this region. The liver, the spleen, the pancreas, the kidneys, the aorta, the vena cava or the mesentery are all vulnerable to injury with abdominal trauma. Complications associated with injuries include hemoperitoneum from liver or splenic bleeding, loss of sensory and motor function due to severe damage to the spinal cord, vertebral fractures, and various problems for which an interdisciplinary surgical approach is needed. Extent of the damage depends on a number of factors, such as, velocity of the bullet, magnitude and direction of energy transferred, distance travelled, form and hardness of the bullet, and the structures encountered before and on penetration [1]-[3]. Entrance profile, path travelled through the body, and the biological characteristics of the tissues also affect the extent of injury [4]. Internal lacerations, compression of the tissues or temporary cavitation along the projectile path were possible devastating results [5]. In rare gunshot injury cases, the bullet enters with no visible exit wound or vice versa [1] [3] [5] [6]. In such situations, the bullet's trajectory and final destination may be unpredictable [7]. To the best of our knowledge, an entry wound in the lower left flank from a bullet and travelling to the right iliac fossa without an exit wound has not yet been reported in the literature. Gunshot accounts for 10% of penetrating chest injuries in the United States. The incidence changes worldwide, and it is as high as 95% in those countries engaged in war [8]. Data availability and quality remain significant challenges in establishing comprehensive statistics on gunshot wounds across Africa. The aim of this presentation is to report on an unusual route of a bullet entering from the lower left flank wall and reaching the right iliac fossa's wall without leaving the body with an exit wound. This case report is in line with SCARE criteria 2020 [9].

2. Case Presentation

A 63-year-old male was brought to our emergency department with a lower left flank gunshot wound of about 1.5 cm long (**Figure 1**), sustained about an hour before consultation during an attack at his house. On arrival, he complained of left flank pain of severe intensity. There was no active bleeding from the wound. On physical examination, the upper respiratory tracts were patent, pulse oximetry was 90% with a RR: 25 cpm. BP: 128/82 mmHg HR: 105 bpm. The patient was conscious with GCS: 15/15 and no neurological impairment. The patient also presented some linear abrasions on the left forearm and elbow. The rest was unremarkable. Lab workup was unremarkable. A frontal thoraco-abdominal X-ray (**Figure 2**) and a computerized tomography (CT) scan (**Figure 3(a)** and **Figure 3(b)**) showed the location of the bullet in the abdominal cavity wall, which was, after analysis of its trajectory, extracted with a minor surgery (noninvasive, no laparotomy nor laparoscopy was required). Bullet's removal was done under local anesthesia, a small incision of about 2 cm was done with a depth of about 1 cm. The bullet was uncovered as it ended its course subcutaneously. Pharmacological

treatment included antibiotics and pain management and after five days of observation he was discharged. From a medico-legal perspective, a report was made to the police authorities and the bullet (Figure 4) was handed over to them.

Figure 1. Bullet entry hole.

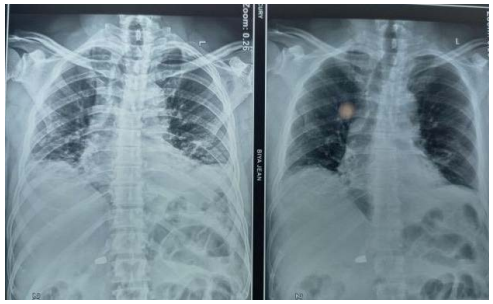
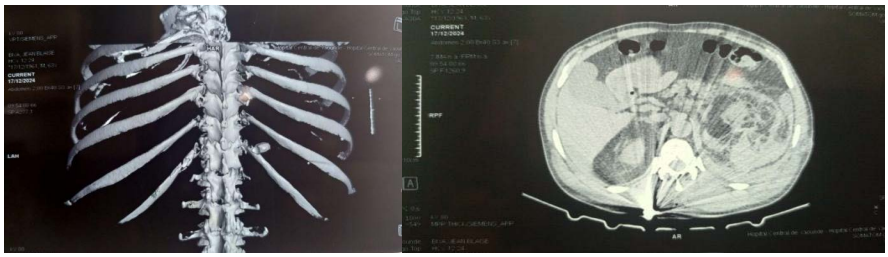


Figure 2. Frontal thoraco-abdominal x-ray.



(a) (b)

Figure 3. (a) and (b): Computerized tomography (CT) scan.

Figure 4. Bullet.

3. Discussion

Unusual presentations of bullet trajectory in gunshot injury can create surgical and/or medico-legal diagnostic problems [10]-[12]. The thorax is packed with vital organs, and the least penetrating projectile is then susceptible to injuring the heart, the lungs, the aorta, the superior and inferior vena cava simultaneously [13]. Given that the bullet has both forward and rotatory movements, it possesses much higher amounts of kinetic energy to cause more damage in the vital organs [14]. The energy is dissipated as the bullet slows within the soft tissues [14]. High-velocity injuries also cause secondary damage due to the fragmentation of bones, which are shattered by the bullet on impact and enhance the injury [15]. This is also the case in the abdominal department. Some unusual routes of bullets in gunshot injury (GSI) are reported in the literature [1] [3] [8] [10].

In these troublesome traumas, anticipating the path the projectile took proves quite challenging without supplementary imaging studies. Particularly when dealing with any high-speed projectile injury, medical professionals should recognize that the bullet's path is unlikely to be straight and will more than likely be intricate. Both points of entry and exit must be thoroughly examined. Excessive focus on the entry point can sometimes cause the exit point to be overlooked. In this instance, we meticulously investigated both the entry and any potential exit sites. Macroscopic criteria have been described by Lorin [16]. The appearance of an entry wound depends on the weapon, the bullet, the firing distance, the location of the impact, the morphological characteristics of the individual, etc. A typical entry wound takes the form of a contused wound consisting of a circular or oval loss of substance corresponding to the actual entry orifice, surrounded by an almost constant erosive collar and a highly variable smear collar. There may also be a deposit of soot and/or powder tattooing around the edge [17].

However, no exit wound was found. Precisely determining the exit wound, the pathway and the degree of tissue damage was hard using standard X-ray imaging. This necessitated further examinations to map the bullet's course. Computed tomography is the preferred method for identifying any bleeding, air pockets, the bullet itself, bone pieces, blood accumulation in the chest cavity, nerve damage, muscle and skeletal injuries, and blood vessel damage.

The predicted outcome of the injury hinges on the bullet's or shrapnel's path and a collaborative approach involving various specialists. Furthermore, even the criminal investigation could gain clarity by illustrating the bullet's route. We mapped the bullet's trajectory using a contrast-enhanced CT scan. A highly uncommon path of a bullet, entering the left frontal chest, moving across the upper abdomen, crossing the body's midline within the tissue layer beneath the skin, and terminating in the right lower abdomen, was revealed by the contrast-enhanced CT scan. Despite the area beneath the bullet's path being abundant in blood vessels and crucial organs, the patient fortunately did not sustain any life-threatening harm. The trajectory from the lower left flank to the right lower abdominal wall without harming any internal organs or major blood vessels was remarkable. As

the mechanics of the shooting were analyzed, it was deduced that he was injured by a shot traveling from a higher point to a lower one while he was fleeing the gunfire.

4. Conclusion

Though extremely uncommon, an atypical bullet pathway without organ damage is a reality. An unprejudiced multidisciplinary approach, coupled with clinical monitoring of the patient, is necessary for the management of gunshot wounds with an atypical course.

Conflicts of Interest

The authors have no conflict of interest to declare.

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