



Case report

Gunshot injury to the chest wall with an unusual bullet trajectory: A rare case report

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ABSTRACT

Introduction and importance: Gunshot injuries are always a challenging case for a surgeon. Early assessment of trajectory of bullet leads to effective surgical plan. These cases require multidisciplinary approach for the satisfactory outcome.

Case presentation: We present a case of 38-year-old male with gunshot injury over left anterior chest wall with an entry wound and no detectable exit wound. Contrast enhanced computed tomogram (CECT) thorax and abdomen was suggestive of an unusual route of a bullet from left anterior chest wall at the level of 5th costochondral junction to the right iliac fossa region. Emergency exploration for the bullet was performed based on CECT findings which confirmed bullet in subcutaneous plane in right iliac fossa. Patient was discharged on 3rd post-operative with satisfactory clinical improvement.

Clinical discussion: Unusual presentations of bullet trajectory in gunshot injury can create surgical and/or medico-legal diagnostic problems. An effective surgical plan requires an effective clinic-radiological assessment. Accurate detection of entry wound, exit wound, path and extent of tissue damage is significant in preoperative planning and prognosis of patient. However not every patient with gunshot injury has an unusual trajectory. But accurate radiological assessment in such challenging cases is a necessity. Multidisciplinary approach with pre-operative planning is required for satisfactory outcome.

Conclusion: Management of patients of gunshot injury is challenging for the attending surgeon. Multidisciplinary approach for preoperative planning along with good post-operative care is required in such cases of gunshot injury with atypical course.

1. Introduction

Gunshot injuries to the chest wall are associated with high morbidity and mortality due to presence of various vital organs in this region. The heart, lungs, ascending and descending aorta and the superior and inferior venacava, the vertebra and spinal cord, are all vulnerable to injury with thoracic trauma. Complications associated with injuries include cardiac tamponade, pneumothorax and haemothorax, loss of sensory and motor function due to severe damage to the spinal cord, vertebral fractures, and various cosmetic problems in which interdisciplinary surgical approach was needed. Gunshot account for 10 % of penetrating chest injuries in the United States and incidence changes worldwide, and it is as high as 95 % in those countries engaged in war [1]. Extent of the damage depends on a number of factors, such as,

velocity of the bullet, magnitude and direction of energy transferred, distance travelled by the missile, form and hardness of bullet, and the structures encountered before and on penetration [2–4]. Entrance profile, path travelled through the body, and the biologic characteristics of the tissues also affect the extend of injury [5]. Internal lacerations, compression of the tissues or temporary cavitation along the projectile path were possible devastating results [6]. In rare gunshot injury cases, the bullet enters with no visible exit wound or vice versa [2,4,6,7]. In such situations, the bullet's trajectory and final destination may be unpredictable [8]. To the best of our knowledge, an entry wound in anterior chest wall with bullet in right iliac fossa without exit wound exit was not reported in literature. The aim of this presentation is to report an unusual route of a bullet-entering from the left anterior chest wall area and reaching in right iliac fossa without leaving the body with an exit

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wound. This case report is in line with SCARE criteria 2020 [9].

2. Case report

A 38-year-old male was presented to emergency department immediately after a gunshot injury (GSI). He was businessman by profession. Patient was conscious on arrival, the vital signs were within normal limits and haemodynamically stable. There was no neurological deficit noted. The patient had given presenting complaints of pain over the left side of chest. On physical examination, a single bullet entry hole over left anterior chest wall was found. The entry wound was oval in shape and diameter of 2 cm with inverted margin. This entry wound was situated 3 cm below and 2 cm medial to the left nipple. No detectable exit wound was present. Direct radiography of the chest, abdomen, pelvis and upper limbs revealed no bullet in the chest but one bullet was found in right iliac fossa [Fig. 1]. The route of the bullet was identified by contrast enhanced computed tomography (CECT) thorax and abdomen. The images were obtained in several projections and signs of damage along the path of the bullet entering from the left side of chest were confirmed [Fig. 2]. Emergency exploration for the bullet was performed under local anaesthesia by an additional professor and his team with 12 years of experience in trauma surgeries. On exploration, the bullet was removed from the right iliac fossa in subcutaneous plane [Fig. 3]. On 2nd postoperative day, patient had pus coming from the operated site and had fever for which pus swab was sent for culture and sensitivity. In view to consider infection antibiotics was upgraded with local cleaning of the wound. On subsequent day 3, there was no discharge and fever. Patient was treated with adequate analgesics, intravenous antibiotics, hydration, and nutrition during hospital stay. Patient was discharged on 3rd post-operative day with satisfactory clinical improvement.

3. Discussion

Unusual presentations of bullet trajectory in gunshot injury can create surgical and/or medico-legal diagnostic problems [10–12]. Since thorax is packed with the vital organs, even the smallest of movements by a penetrating bullet may injure a heart, lungs, aorta, superior and inferior venacava simultaneously [13]. As 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 bone, which is shattered by the missile on impact and enhance the injury [14]. Some unusual routes of bullet in gunshot injury (GSI) are reported in the

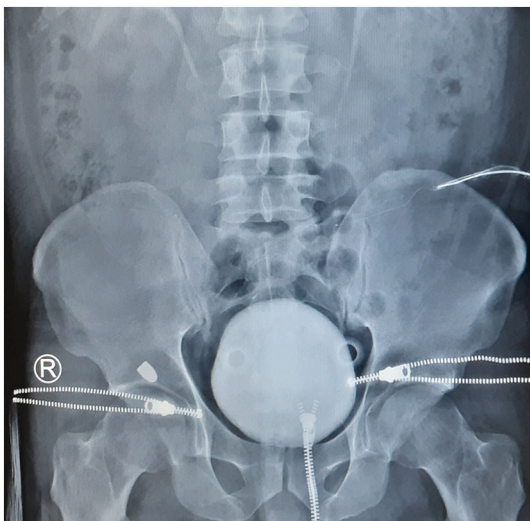


Fig. 1. X-Ray Pelvis showing bullet in right iliac fossa.

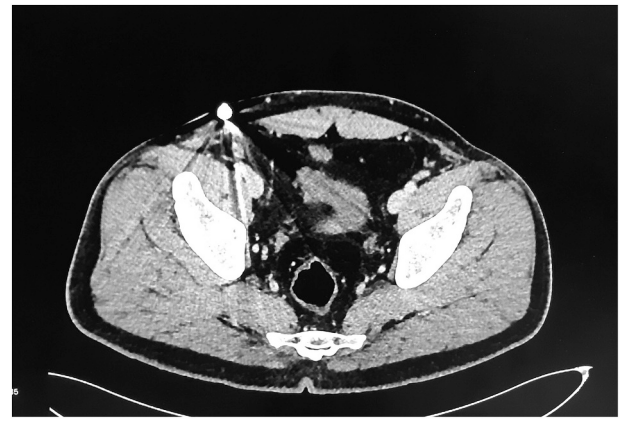


Fig. 2. CECT showing path of the bullet entering from the left side of chest.



Fig. 3. Scar of entry wound on left side of chest and scar of wound on right iliac fossa from where bullet was removed.

literature [2,4,8,10]. In these awkward injuries, the prediction of the trajectory is very difficult without additional radiological investigations. Especially in case of any high velocity projectile wounding, the physician must be aware of the fact that the bullet's course will not be a linear but most probably a complicated one. The entry wound and the exit wound should be both carefully explored. Over-concern with the entry wound may sometimes lead to ignorance of the exit wound. In this case, we carefully explored entry wound and the exit wound. But we didn't get any exit wound. The accurate detection of Xray radiography. This lead to further investigations for tracing the trajectory of the bullet. CT is the procedure of choice to detect any haemorrhage, air, bullet, bone

fragments, haemothorax, nerve lesion, musculoskeletal lesions, and vessels injuries. Prognosis of the injury depends on the course of the bullet or shrapnel fragment and the multidisciplinary team approach. Moreover, even the crime investigation might be enlightened by the demonstration of the bullet's route. We traced the trajectory of bullet from contrast enhanced CT scan. A very unusual route of a bullet entering from the left anterior chest wall, passing across epigastrium crossing midline in subcutaneous plane and ending at right iliac fossa is reported from contrast enhanced CT scan. Although the area underneath the trajectory of bullet was rich in vascular structures and vital organs-by chance the patient did not suffer any life-threatening injury. The trajectory from a left anterior chest wall to right iliac fossa without damaging any of the internal organs and vascular structures was astonishing. As the dynamics of the shot was investigated, he was thought to be injured with a trajectory from above to below while he was running away from the gunshot.

4. Conclusion

It is therefore an understanding regarding trajectory of the bullet, an unprejudiced approach, multidisciplinary approach, and clinical monitoring of the patient are necessary for the management in gunshot wounds with atypical course.

Patient's perspective

I am thankful to the trauma team for saving my life. I was helpless after gun shot over left side of chest.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Ethical approval

Not applicable.

Author contribution

Jijo Anto: Study Concept and assisted in surgery.
Anil Kumar: Writing the paper and operated the case.
Anurag Kumar: Data and image Collection.

Majid Anwer: References and drafting the manuscript.
Subhash Kumar: Radiological interpretation.
Deepak Kumar: Review of the literature.

Guarantor

Dr Anil Kumar.

Research registration

Our paper is a case report, no registration was done for it.

Provenance and peer review

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Declaration of competing interest

All authors have nothing to disclose.

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