Atypical Trajectory of a Thoracoabdominal Gunshot Injury without Penetration

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Abstract: Atypical trajectories of gunshot injuries are a major problem in forensic pathology. Thoracoabdominal gunshot injuries represent some of the most challenging injuries. A 25 years-old man applied to emergency department in consequence of multiple gunshot wounds. Thoracoabdominal helical computed tomography (CT) no injury at the intrabdominal and intrathoracic tissues. There was only a subcutaneous tissue laceration of 50 cm in length, through from thoracic to abdominal walls. The patient medically managed and no surgical intervention was performed due to thoraco-abdominal injury. In conclusion a trajectory of gunshot may not always be straight as is in our case. Helical CT is a useful tool in determining the real trajectory and therefore reduces the ratio of unnecessary surgical interventions.

Key words: Gunshot injury, thoracic wall, intraabdominal, penetration

Atypical trajectories of a gunshot wound can create surgical or medico-legal diagnostic problems. In patients with multiple gunshot wounds, rapid identification of the trajectory of each bullet is important to detect possible organ injuries and to determine the surgical strategy. However, in such patients, it can be difficult to identify the trajectory of the bullet. Additionally, a thoracoabdominal gunshot injury is sometimes critical due to the difficulty in determination of the damaged organs, and instant occurrence of massive bleeding [1]. Helical computed tomography (CT) is useful for determining a trajectory; however, with multiple trajectories, the accurate diagnosis is difficult. Therefore, gathering detailed information at the crime scene is important for the correct identification of multiple trajectories [1,2].

Herein, we have presented an unusual case of multiple thoracoabdominal gunshot injuries without penetration and reviewed atypical bullet trajectories in thoracoabdominal gunshot injuries in light of the current literature.

Case presentation
A 25-year-old man presented to our emergency department with multiple gunshot wounds. He was active, cooperative, and fully conscious. His Glasgow Coma scale score was 15. The vital signs and laboratory findings were within normal limits. On physical examination, there was a gunshot entrance wound in the left subclavicular region, two gunshot entrance wounds and an exit wound in
the right shoulder, a gunshot entrance wound in the right axillary region, and a gunshot entrance wound in the left forearm were observed.

On abdominal examination, a hard mass with 1 cm in diameter was observed in the right upper quadrant of the abdomen, and there was an area of ecchymosis around it. There was also ecchymosis on the left arcus of costa (Figure 1). In detailed examination of the abdomen no signs of an acute abdomen were observed.

The bilateral lungs and other intrathoracic organs were normal on chest X-ray; there was a bullet in the lateral wall of the left hemithorax and a bullet in right axillary region. A right humerus fracture was present and a bullet was noted in the left forearm in the X-ray of the extremities. The patient was alert and oriented, and his vital signs were stable. Thus it was appropriate to perform surgical intervention following CT examination.

A thoracoabdominal CT was performed by the Radiology Department and no injury was reported in the intraabdominal and intra-thoracic tissues. There was only a subcutaneous tissue laceration involving the thoracic and abdominal walls which was 50 cm in length. We did not obtain any evidence of additional thoracic and abdominal injuries (Figure 2).

Additionally, there were neurologic deficits involving the left forearm. The right humerus fracture was stabilized by orthopedists.

Discussion

The classic bullet trajectory in a gunshot wound involves an entrance and an exit site, or the bullet or its fragments retained in the body [3]. The trajectory is not always straight. The trajectory depends on the following: the status of the organs; the size, shape, and initial speed of the bullet; and the distance and direction of the shooting. Furthermore, the posture of a victim at the time of the injury is important [1]. Transition trajectories are irregular and variable, and sometimes no relationship is established between the entrance and exit sites of the bullet in injuries by civilian weapons, such as pistols and shotguns [4].

Civilian gunshot victims are sometimes managed depend on the theoretical tract of the bullet. For instance, patients with transperitoneal gunshot wounds are almost always applied exploratory laparotomy. Likewise, gunshot wounds with a confirmed tangential tract (either by inspection or by CT imaging) often require no additional intervention [5,6]. These instructions are derived from civilian trauma experience in which most gunshot injuries are occurred from handguns, which usually cause very small or non-existent temporary cavities [6,7]. An aggressive approach to potential tangential or
non-penetrating wounds in one series resulted in a 12% negative laparotomy rate. Other centers, recognizing that only 80% of bullets striking the anterior wall of the abdomen will actually enter the peritoneal cavity, advocate a conservative (non-operative) approach in stable asymptomatic patients with this type of wound [8]. In order to decrease the high negative exploration rates, hospitalization costs and associated morbidity, selective management come into prominence.

Determining the path of trajectories is sometimes difficult in patients with multiple gunshot wounds. Also, atypical trajectories are more frequent. Retrospective studies have reported that CT provides high accuracy for determining trajectory and peritoneal violation in selected patients with gunshot wounds to the torso [7]. In this study, the trajectory of the bullet was clearly tangential on CT imaging; the permanent cavity of the bullet remained in the soft tissues of the chest and abdominal wall of victim. Also, it is interesting that the bullet nucleus did not enter the body spaces (thorax and abdomen) and break through the skin of the present case. Another important aspect of our patient was lack of any dramatic deterioration in general health status and consciousness.

In conclusion, although the trajectory of the bullet can be estimated form the entrance and exit sites, firearm injuries are characterized by occult and unexpected findings. Computed tomography is an important diagnostic tool and CT images can prevent unnecessary surgical procedures in stable patients.
References


