

A Fragmented Bullet Located in the Right Upper Thoracoabdominal Area

Arife ZEYBEK¹, Serhat ÖZER², Serdar KALEMCI¹

¹ Department of Chest Diseases, Mugla State Hospital, Mugla, Turkey

² Department of Internal Medicine, Izmir Atatürk Training and Research Hospital, Izmir, Turkey

ABSTRACT

In gunshot wounds penetrating the thoracoabdominal region, it is important for the surgical approach to define the localization of any foreign body. Clinical and radiological assessments are of major significance. Right thoracotomy–frenotomy is a safe and efficient approach to a fragmented bullet located in the right upper thoracoabdominal area, which may lead to delayed peritonitis. We report the case of a 21-year-old male soldier. He was wounded by a penetrating gunshot to his right paravertebral–thoracoabdominal region during firearm training. He underwent abdominal exploration by a general surgeon in a private hospital. He was referred to us due to the development of delayed peritonitis in the first week. It seems safer to apply right thoraco-frenotomy in intraabdominal injuries penetrating the right subcardiophrenic crus and posterosuperomedial hepatic area. Recently, nonoperative treatment methods are generally being recommended in right thoracoabdominal injuries. A fragmented bullet in the right thoracoabdominal area requires surgery in cases of delayed peritonitis, abdominal pain or tenderness in the right upper quadrant.

Key words: Gunshot wound, Right thoracoabdominal wound, Thoraco-frenectomy

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ÖZET

Sağ Üst Torakoabdominal Bölgede Lokalize Kurşun Parçası

Abdominal bölgeye penetre ateşli silah yaralanmalarında yabancı cismin lokalizasyonunun saptanması önemlidir. Klinik ve radyolojik değerlendirmeler çok değerlidir. Sağ üst torakoabdominal yerleşimli geç peritonitise neden olan yabancı cisme sağ torakotomi-frenotomi güvenli ve etkin bir yaklaşım yöntemidir. Yirmi bir yaşında erkek hasta askerdir. Atış talimi esnasında sağ paravertebral torakoabdominal bölgeye penetre ateşli silahla yaralanmıştır. Özel bir hastanede genel cerrahi uzmanınca değerlendirilen hastaya eksploratris laparotomi yapılmış. Hastada birinci haftada geç peritonitis kliniği gelişmesi nedeniyle kliniğimize refere edildi. Sağ subkardiyofrenik krus-süperoposteromedial hepatik alana penetre intraabdominal yaralanmalarda sağ torakofrenotomi ile yaklaşım daha güvenlidir. Genelde son zamanlarda sağ torakoabdominal yaralanmalarda nonoperatif yaklaşım önerilmektedir. Sağ torakoabdominal yerleşimli yabancı cisimler geç peritonit, karın ağrısı, sağ üst kadranda hassasiyet ve geç peritonitis kliniği gelişmesi durumunda operasyon gerektirir.

Anahtar kelimeler: Ateşli silah yaralanması, Sağ torakoabdominal yaralanma, Torakofrenotomi

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CASE REPORT

A 21-year-old male patient was referred to a local hospital due to gunshot wound penetrating the right paravertebral thoracoabdominal area during firearm training. With normal vital signs, he underwent abdominal exploration by a general surgeon since no computed tomography (CT) was available. The fragmented bullet located in the right infradiaphragmatic and posterosuperomedial hepatic area (Figures 1-3) could not be reached via laparotomy. Neither active bleeding nor luminal organ injury was observed. Still with normal vital signs, he was referred to a different facility due to development of abdominal pain and signs of delayed peritonitis in the first week. He underwent right thoracotomy-frenotomy in our clinic. The foreign body located adjacent to the inferior vena cava (IVC) and around the subdiaphragm and posterosuperomedial hepatic area was reached via frenotomy (Figures 4, 5). During the surgery, the fragmented bullet was seen to be located between the 11th and 12th thoracic vertebrae. It had caused a contusion in the right lower lobe of the lung and a localized laceration at the posterosuperior aspect of the liver, together with a subcapsular hematoma. The foreign body was removed (Figure 6). Frenotomy was sutured as the drain was placed. The patient was discharged with no postoperative complication.

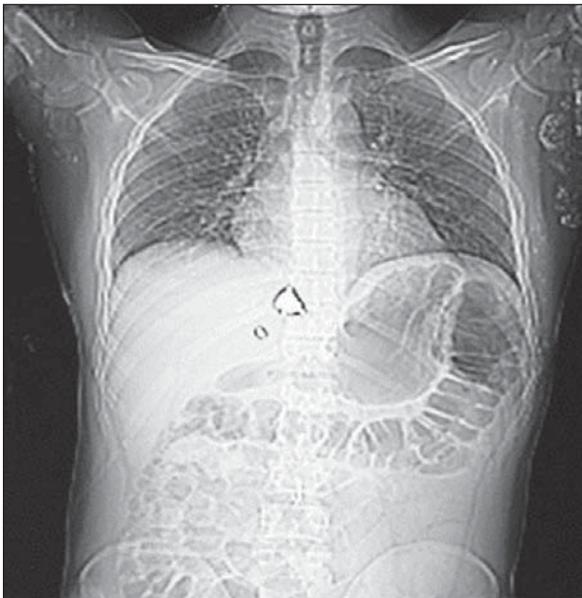


Figure 1. Foreign body located at the right cardiophrenic subdiaphragm is seen in thoracoabdominal X-ray.

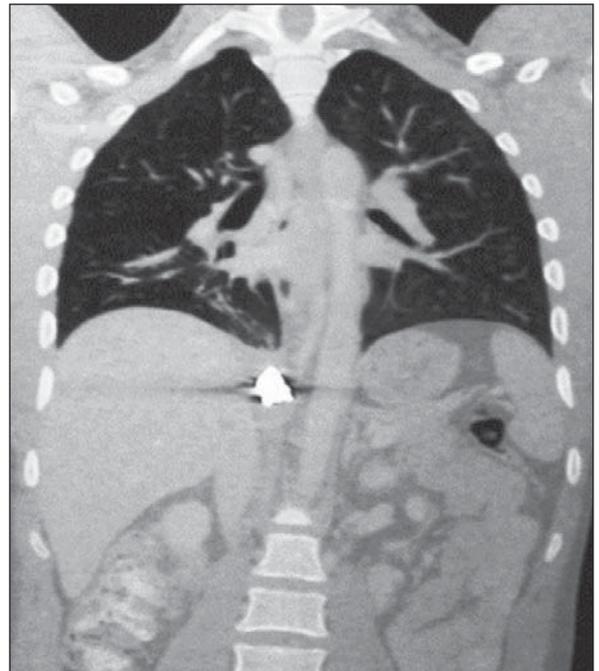


Figure 2. Coronal thoracoabdominal CT slice showing the fragmented bullet.

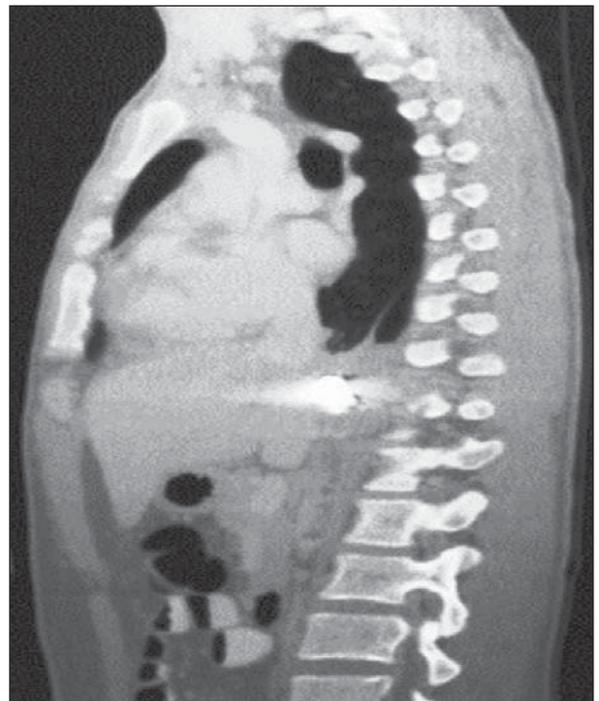


Figure 3. Sagittal thoracoabdominal CT showing the fragmented bullet.

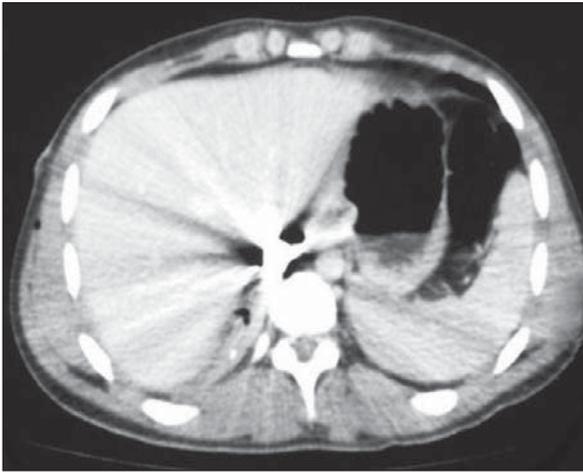


Figure 4. Abdominal CT slice showing the close proximity of the fragmented bullet to the IVC.



Figure 5. Appearance of the fragmented bullet removed via thoraco-frenotomy.



Figure 6. Appearance of the removed fragmented bullet.

DISCUSSION

In cases of gunshot wounds, entrance and exit wounds of a bullet or foreign body are of particular significance in predicting the localization of foreign bodies and/or presence of organ damage. In some cases, an atypical trajectory of a foreign body is determined. Assessment of hemodynamically stable patients with such a wound via CT is a guide in determining the degree of the injury and trajectory of the foreign body. However, laparotomy is required to make an accurate diagnosis in the majority of cases.

The main organs affected by a trauma penetrating the right upper thoracoabdominal area include the liver, lung, diaphragm, and kidney on the right side, along with the duodenum, colonic angle and IVC. In general, although no sign of peritonitis or hemodynamic instability is detected, any injury penetrating the right upper thoracoabdominal area that cannot be evaluated via CT in an emergency room is approached with diagnostic laparotomy.

Laparotomy will be warranted in most of the patients with a gunshot wound to the right thoracoabdominal area. Such injuries most commonly affect the liver, which should be approached with a safe and complete surgery while considering the size and location of the injury. Particularly in cases of posterior and superior injury, the operation must be performed using an incision providing ample access, with specific adjustable retractors and releasing all hepatic ligaments. In our case, the fragmented bullet located in the right upper posteromedial abdominal region was not removed via laparotomy. The fragmented bullet found adjacent to the IVC was removed via right thoraco-frenotomy.

In cases of lung injury, thoracic drainage is generally preferred. It remains controversial as to which treatments are the most reasonable for hepatic, renal or phrenic injuries. In this case, right lung lower lobe contusion and minimal hemothorax were detected, but thoracic drainage was not required.

Recently, in some selected cases with injury penetrating the right thoracoabdominal area, surgery was not recommended^[1-4]. Abdominal and right thoracoabdominal gunshot wounds are associated with a higher risk of intraabdominal injury, which necessitates surgical modalities^[5,6]. However, some authors have been discussing whether non-operative treatment can be preferred in selected cases with gunshot wound. One must determine the exact sites of perfo-

ration, evaluate the clinical aspect entirely, and pay additional attention to hemodynamic signs and abdominal examination before treating patients with right thoracoabdominal gunshot wound conservatively, which is non-operative management^[1].

Presence of signs of peritonitis, such as chronic pain, tenderness at the right upper quadrant and subphrenic abscess in the late term, indicates the need for surgery. Due to development of adhesions in the late term, it may be harder to perform surgery and localize the foreign body. Risk of infection is usually considered to be high in gunshot wounds.

We recommend an operative approach in the presence of the following: close proximity of the fragmented bullet to vascular structures, possible relocation of the bullet due to gravitational effect and increased risk of infection in the presence of a rough bullet edge. Another reason for an operative approach is the possible development of lead poisoning due to the fragmented bullet.

In conclusion, in cases of gunshot wounds to the right upper thoracoabdominal area, thoraco-frenotomy is a safe and efficient method of surgical removal of a fragmented bullet leading to delayed peritonitis - particularly with bullets located posterosuperomedially to the liver.

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Address for Correspondence

Arife ZEYBEK, MD

Department of Chest Diseases
Mugla State Hospital
Mugla-Turkey

E-mail: aytenzeybek@gmail.com