A retained intrahepatic bullet in the Bermuda triangle: A case report of surgical extraction

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ABSTRACT

INTRODUCTION AND IMPORTANCE: The management of retained gunshot injury in the liver is not properly discussed in the literature.

CASE PRESENTATION: We describe a rare case of intrahepatic retained foreign body (bullet). Our patient is a 39-year-old Yemeni soldier, who was exposed to firearm injury 10 months previously. The patient sought medical advice to extract the foreign body, and it was successfully extracted through abdominal exploration, with no intraoperative or postoperative complications.

DISCUSSION: Retained liver foreign bodies have three types, penetrating, medical, and migrating. Before the removal of the foreign body, good patient evaluation along with good surgical expertise should be present.

CONCLUSION: There is a need for general guidelines to manage such patients who should be assessed by high volume surgeons.

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1. Introduction

Retained foreign bodies in the human body could be the result of penetrating trauma, surgical intervention [1], or exposure to some chemicals [like sutures or pigment materials] [2]. To the best of our knowledge, there is a paucity of reports handling retained foreign bodies in the liver. Herein, we describe a rare case of intrahepatic retained foreign body (bullet).

2. Case description

Our case was a Yemeni soldier, aged 39 years, who had a firearm injury to the chest before 10 months. The bullet passed through the chest causing massive hemothorax. The condition necessitated exploration through thoracotomy that revealed a tear in the lower lung lobe and a hole in the diaphragm. Hemostasis was done in a Yemeni military hospital and an intercostal tube was placed for ten days. The patient was discharged and his postoperative course was uneventful. Then, the patient had a complaint of right hypochondrial pain. The patient’s condition was stable (normal hemodynamics and stable hemoglobin levels), and an abdominal ultrasound revealed minimal intraabdominal free fluid. Besides, other investigations revealed that the bullet was located adjacent to major hepatic vascular structures making surgical removal risky, so conservative management was suggested as long as no complications developed.

The patient got anxious as he was reported that the bullet was in a dangerous anatomical zone. Therefore, he sought more experienced advice. He presented to our private clinic in Mansoura city, Egypt, 10 months after injury with the retained bullet. The patient’s condition was well-assessed. On examination, the entry wound of the bullet was located in the right hypochondrium. The patient had no systemic comorbidities, and no other relevant findings were detected throughout his history and examination. There was no relevant family or drug history.

Triphasic pélviabdominal computerized tomography was ordered (Fig. 1). Reconstruction of the venous phased was done to have a 3-d drawing of the retrohepatic IVC, hepatic veins, and their precise relations to the bullet. The bullet was situated in the posterior part of segment VIII. Its boundaries were the middle hepatic vein mediially, the right hepatic vein laterally, segment VIII anteriorly, and inferior vena cava posteriorly. It was present just below the entrance of both right and middle hepatic veins into the IVC.

The patient was prepared for surgery after an anesthetic consultation. The patient was informed of the risks of surgery and
the possible post-operative sequelae and informed written consent was obtained before surgery.

The operation was done under general anesthesia, and abdominal exploration via hockey stick or Kehr incision. The procedure was performed by the first author. After abdominal exploration, there were dense adhesions between the right liver lobe and the diaphragm and thus the transhepatic approach was hazardous. The right hepatic lobe was mobilized by dissection of both coronary and right triangular ligaments. The suprahepatic IVC was also exposed after dissection of its covering peritoneum exposing the superior part of the bare area of the liver.

After that, the short hepatic veins passing between the right lobe and IVC were ligated and divided using prolene 4/0 or 5/0 sutures. We did not try to dissect around the right hepatic vein due to the presence of fibrosis which may carry a risk for vascular injury and massive bleeding. This was continued till the appearance of the fibrotic area in the posterior wall of the liver, anterior to the IVC. To enhance the feeling of the foreign body, the assistant gently pushed the hepatic area anterior to the entrance of right and middle hepatic veins into the IVC. This aided the downward movement of the granuloma, and part of the bullet was felt through the fibrous tissue by the operator’s hands. The site of the bullet was also confirmed by intraoperative C-arm fluoroscopy (Fig. 2).

Gentle manipulation was crucial to avoid injury to the middle hepatic vein. The fibrous capsule was carefully opened by coagulation diathermy until there was a sufficient opening for bullet removal. After bullet extraction, good wash and hemostasis were ensured. Blood loss was about 150 mL, and no blood transfusion was done. A drain was inserted in the Morrison pouch. The operative time was 90 min.

After surgery, the patient was transferred to the internal ward, and oral intake was allowed on the first post-operative day. The patient had a smooth postoperative course, and he was discharged on a subsequent day with no post-operative complications. Follow up by clinical examination and abdominal ultrasound was performed one month after surgery with no worrisome findings. The

Fig. 1. (A) Sagittal view of an abdominal CT with contrast (venous phase) showing the bullet in front of the IVC, and adjacent to the right hepatic vein. (B) CT hepatic venography showing the relation between the bullet (Blue arrow) and the three hepatic veins. (C) 3-d reconstruction of the previous image.
patient was satisfied with the outcome of surgery. This study was reported in line with the SCARE 2020 criteria [3].

3. Discussion

In the current report, we report a case presented with a retained bullet in a difficult anatomical area in the liver. Retained hepatic foreign bodies after penetrating injury are rare [4]. The patient was a Yemeni soldier, which makes him more liable to such type of injuries, based on the nature of his job, along with the presence of a political conflict in that region [5]. Other reported possible causes that may leave lodged parts in liver tissue include glass, wood, and shell fragments [6–9].

The mechanisms of penetrating abdominal trauma include gunshot wounds, sharp weapons, and impalement. The most commonly injured abdominal organs include the small intestine, liver, stomach, colon, and intraabdominal blood vessels [10]. It appears that the liver is the most commonly affected solid intraabdominal organ. Although gunshot and stab injuries may not cause liver injury, they remain the most common causes of penetrating liver injury [1].

Retained liver foreign bodies are mainly caused by penetrating injuries. Also, it may be caused by ingestion of sharp materials (fishbone), or after surgical operation. So, it could be classified into penetrating, medical, and migrated bodies [1]. Foreign bodies, especially chemical ones, can specific reactions that may lead to target organ dysfunction like kidney and liver [2].

Although our patient had tolerable symptoms, his knowledge about the potential hazards of this bullet made him anxious. The liver retained foreign body may be asymptomatic, or the patient may present with pain, mass, or a complication (abscess) [1]. This bullet remained in the liver tissue for 10 months in our case. However, a previous study reported a longer period for foreign body retention as it was 39 years [1].

Although focused assessed sonography for trauma (FAST) is preferred in emergency cases, as it is more rapid. However, it is
operator dependent. Conversely, in elective cases, CT would be more appropriate as it had more sensitivity and specificity [11].

The gold standard investigation in our case would be an abdominal CT with contrast. It precisely located the site of the bullet in the liver tissue and associated hepatic pathologies, and contrast allowed the reconstruction of the major vascular structures (hepatic artery, portal vein, and hepatic veins) to evaluate its relations with the foreign body [12]. Of course, magnetic resonance imaging (MRI) would be trouble in that case as it has a metallic foreign body, which is a contraindication for MRI examination [13].

The diagnosis of foreign body granuloma can be more challenging when the lesion has neoplasia like radiological findings. Poyanli and his associates reported a foreign body granuloma mimicking liver metastasis in their case report [2]. Detailed history taking is essential to differentiate between such lesions. History of penetrating trauma, previous surgery, and chronic exposure could justify the diagnosis of foreign body granuloma.

It was reported that penetrating liver foreign bodies are a surgical emergency that may need surgical exploration. Nevertheless, surgery should be appointed to the injured tissue itself rather than the foreign body itself [4,8]. Conservative management should be tried in stable cases especially with no retained foreign bodies [9].

In the current case, the site of the bullet was risky making the patient liable for a catastrophic complication especially if the bullet caused erosion of a major vascular wall by itself or it is complicated by an intrahepatic abscess. Furthermore, the long-term sequelae of this bullet are unknown.

Although the operation was risky, patient motivation along with our hepatobiliary surgical expertise supported our decision. The existing literature reported high success rates and low complication rates for liver foreign body surgeries, especially if performed in a large volume center [1,14].

We performed the operation through the Kehr incision that allowed easy mobilization of the liver, and meticulous surgical technique was followed to ligate the short hepatic veins at both ends, the divide in-between. Till the whitish fibrous area was reached, it was slightly high and difficult to be approached to prevent right hepatic vein injury. Hence, slight pressure was introduced from the superior surface of the liver making the border of the fibrous tissue more apparent enough to be opened, and the bullet was extracted.

Xu and his colleagues also managed to remove a foreign body (gauze) that caused a mass in the right liver lobe. Surgical exploration was done, and gauze pieces were extracted [1]. In the previous study, the post-operative course was uneventful like reported by ours. That supports the idea that in experienced hands, liver surgery would be safer.

Surgical resection may be also needed for other causes, especially if there is a doubtful diagnosis (suspicious liver lesion with a previous history of colorectal cancer surgery) [2].

To summarize, there is a need for a global consensus about the management of retained hepatic foreign bodies. Also, the long-term consequences in cases with retained foreign bodies and managed conservatively should be collected and correlated with the original foreign body location.

4. Conclusion

Retained liver foreign bodies have three types, penetrating, medical, and migrating. Before the removal of the foreign body, good patient evaluation along with good surgical expertise should be present.

Declaration of Competing Interest

The authors report no declarations of interest.

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Ethical approval

The study was approved by the local ethical committee (R: 1405).

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.

Author contribution

Mohamed Abdel Wahab: study concept or design.

Hosam Hamed: data collection, data analysis or interpretation, writing the paper.

Rihame M Abdel Wahab: writing the paper.

Khalid Marzouk: writing the paper.

Amr Kassen: writing the paper.

Registration of research studies

Not applicable.

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Prof. Mohamed Abdel Wahab.

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