An old retained metallic bullet with far distance displacement and unusual presentation

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Abstract: Legal medicine departments are almost always involved during the management of gunshot injuries; therefore, having enough knowledge about the management of gunshot victims is essential for the experts in this field. In cases of gunshot injuries without an exit wound, the retained bullet must be located. Migration of retained bullet should always be suspected but its pathway and direction is unpredictible. When the retained bullet is not detectable in the expected area exploratory imaging is necessary. In this report, we describe the case of an old woman who was shot accidentally in the suprascapular region, the bullet remained in her body and had a multistage migration: from the soft tissue of the suprascapular region (the primary site) to the biliary system where it remained for three years; it was afterwards displaced within the biliary system causing biliary obstruction and related symptoms; finally it migrated rapidly from the common bile duct to the colon. This article will discuss diagnosis and surgical problems associated with multistage bullet migration. This case reveals the importance of whole body inspection in gunshot victims for exit wounds, including through imaging methods and clarifies the need for regular follow-up in victims with retained bullets even when they are asymptomatic.

Key Words: retained bullet, migration, gunshot wound, missile, cholestasis.

During peace time, gunshot injuries are not common in most countries being usually suicidal, homicidal or accidental. Sometimes during a shooting bullets or their fragments may be retained in the body [1]. Foreign bodies including bullets are usually removed through surgery, but when the risks outweigh the benefits the surgical intervention may not be chosen as the primary therapeutic alternative. The most severe risks are neurological [1-3]. Retained bullets can migrate from their initial site to remote parts after many years. This event is not common, but has been reported. Migrated bullets may not be found in their primary place through imaging [1, 4]. Migration in the soft tissue [4, 5], including in the circulatory system [6-11], central nervous system [1, 11-13], genitourinary system [11], and even intradural [14] and intratechal spaces [15] have been reported. In this article, we describe a delayed and atypical migration of a retained bullet from the soft tissue of the suprascapular region to the colon where it was successfully extracted. In a brief review of relevant and valid articles, we found just another case with a similar evolution.

CASE DESCRIPTION

A 63 years-old woman was accidentally struck by a wandering bullet while walking in the yard of her house in 2012. The bullet was shot from the army headquarter in her neighbourhood during a war game and penetrated the posterior part her right shoulder, near the superior angle of scapula. The patient was first examined by a general surgeon in a small city; the exit wound was not identified and the bullet was not detected in plain neck and chest X-ray films. Two months later, another surgeon

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requested an abdominal CT scan and a metallic foreign body was detected at the T12-L1 level on the right side. She was told that the bullet moved downwards and because of its location, close to the spinal cord, surgical extraction was risky. She was asymptomatic and neglected the bullet thereafter.

Three years later, she developed jaundice and epigastric pain after lifting heavy objects during housework. There was no history of previous jaundice or digestive symptoms. The jaundice was intermittent in a crescendo-decrescendo manner and persisted for about one month. Important laboratory findings at this time were: leukocytosis (WBC=21200/mm³), a moderate increase of liver function tests (SGOT=65mg/dL, SGPT=94mg/dL), increased bilirubin (total=10.5mg/dL, direct=7.2mg/dL) and negative markers for viral hepatitis. An abdominal ultrasound found an echogenicity with a 7mm diameter in the distal part of the common bile duct and dilation of the intrahepatic bile ducts. She was admitted to the hospital with the diagnosis of biliary lithiasis. At admission, she did not mention the presence of the retained bullet and no documentation was at hand. During her hospital stay another ultrasound found a dilation of common bile duct and gallbladder and an increase in liver function tests (SGOT= 130mg/dL, SGPT= 105mg/dL). MRCP showed an hyperechoic foreign body near the “ampula of Vater”. Afterwards an endoscopy was performed that identified a bullet near “ampula of Vater”, which could not be extracted through endoscopy. After endoscopy, she stated her detailed history and abdominal X-ray and CT scan were requested to determine the exact location of the bullet. Abdominal X-ray showed the bullet at the level of L3 (Fig. 1), and the CT scan detected in the distal part of the common bile duct (Fig. 2).

During clinical examination, an old linear scar was found in the suprascapular region attributable to the entry wound of the bullet Head, neck and thorax X-rays showed no bullets or projectiles. Three days after the CT scan, she underwent laparotomy to extract the bullet tangled in common bile duct. Surprisingly, despite all findings that confirmed existence of bullet in common bile duct, during laparotomy, surgeons could not find the bullet in the “Ampula of Vater”, common bile duct, the pancreatic duct, or the gall bladder. During surgery were identified however a precholedocal abscess and regional lymphadenopathies. Therefore, in order to find the location of bullet, intraoperative fluoroscopy was done and bullet was detected in the ascending colon. The surgeon guided the bullet into the appendix and finally

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**Figure 1.** Abdominal X-ray of the victim, three days before surgery, showed a bullet in paravertebral region at L3, with diameters of 34 and 8 mm.

**Figure 2.** Abdominal CT scan without contrast, three days before surgery, reported a metallic foreign body in distal part of common bile duct causing upstream bile duct dilation with loculated peritoneal fluid in superior recess of lesser sac.

**Figure 3.** Retained bullet extracted via appendectomy.
extracted it through an appendectomy (Fig. 3).

The patient was discharged two weeks after surgery with a good general condition and a gradual decline in the level of liver function tests.

**DISCUSSION**

In gunshots accidents, the victim should always be explored for both entry and exit wounds. When an exit wound could is not identifiable, two scenarios are probable. First the bullet left the body via natural orifices such as the anus or the mouth [9, 16]. Secondly, the bullet remained in the body, hypothesis that must be confirmed usually through various imaging techniques [7, 9]. Imaging studies should be initially focused in the primary region of the bullet and if it is not detectable there, migration and impaction in another part of the body should taken into consideration [7, 17]. To confirm migration, graphics imaging studies of the rest of the body should be obtained; [7, 9, 11]. Whole body CT scan have also been proposed in these cases [11, 16, 18]. In our case the most likely scenario was: the bullet immediately migrated from the soft tissue of the suprascapular region to the biliary system or liver and remained there for about three years. After three years its late displacement in the biliary tree obstructed the common bile duct and caused jaundice. During her hospital stay, most likely favoured by medical interventions, the bullet rapidly migrated from the biliary system to the colon. The question is how did the bullet entered the biliary system? This question has a few potential answers, including: (1) a vascular migration that is contradicted by the size of bullet and lack of any vascular symptoms (2) an is intraspinal or subcutaneous downward followed by the formation of a biliary fistula hypothesis contradicted by the size of the bullet; moreover an intraspinal pathway must be accompanied by neurological symptoms; also, our patient did not report any neurological symptoms and no fistula was detected during the CT scan; (3) the bullet entered the gastrointestinal tract by perforating the esophagus and then migrated to the biliary system. The majority of the consulted physicians agreed with the third hypothesis. In order to confirm it, the patient underwent R-­xays using a swallowed Barium solution that could not find any leakage in esophagus, stomach, nor the small bowel.

The physicians concluded that the absence of GI leakage does not rule out the migration through esophagus because esophageal perforation most likely happened immediately after the shooting and it may have healed over time. To exclude vascular migration, we tried to convince the patient to accept angiography, but she did not accept.

Delayed and remote migrations of bullets have been reported in some cases: Ro et al. reported a bullet travelling from knee to the peritoneal cavity through soft tissue and then perforating and entering colon without any symptom [18]. Dulic et al. reported a venous migration of a bullet from knee to the pulmonary circulation that caused pulmonary emboli 10 years after being shot [10]. Bett et al. reported migration of a bullet from soft tissue of the neck to the right ventricle via carotid artery that was detected 59 years later due to cardiac symptoms [19]. Hussain et al. reported a retained bullet in the liver that migrated to the biliary tree after 9 years and caused recurrent episodes of acute cholangitis [20]. The most consistent with our case was the case reported by McKee et al. [11]. They described a young man who was shot to the superior border of his scapula and then the bullet passed retropharyngeal space and entered hypopharynx and finally was found in the stomach and from where it was extracted by gastrectomy.

**CONCLUSION**

In our study the bullet entered the soft tissue of the shoulder, immediately penetrated the esophagus, migrated to the biliary system (or liver), settled there for three years and its late movement in the biliary system caused obstruction, cholestasis and jaundice. Afterwards the bullet, travelled to the colon in three days. A bullet can gradually move in soft tissue adjacent to the entry wound, penetrate to other organs and pass even about half body length without any symptoms, until it causes obstructive or compressive effects or impact vital organs [18]. To recognize the direction of the bullet among shooting victims, immediate exploration of entry and exit wounds is necessary [16]. In cases of retained bullets without exit wound, early detection of the bullet by imaging methods is mandatory [7, 9]. When surgical extraction of retained bullet is inapplicable, frequent follow-up graphics even in asymptomatic persons in order to discover probable movements of bullet is valuable; this approach may prevent later consequences like obstruction in our case. Because of the probability of quick and unpredictable movements of bullets, any extraction attempt should be accompanied by concurrent imaging methods. In our case, if imaging was done immediately before surgery, unnecessary exploration of the biliary system may have been avoided.

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References