

A rare case of migration of ballistic projectile from left to right main bronchus

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ABSTRACT

A foreign body in the bronchus due to a ballistic projectile is very uncommon. A 45-year-old man presented to the hospital after being accidentally shot. The initial radiographic assessment found a bullet in his left thoracic cavity. With the help of an X-ray, an urgent left posterolateral thoracotomy was conducted, but no foreign body was found. The foreign body had migrated to the contralateral chest cavity, as determined by the C-arm. On the following day, a thorax computed tomography scan was conducted, and it was discovered that the foreign body had already migrated to the right lower bronchus. A right thoracotomy was then performed to remove the foreign body. He was moved to the intensive care unit and discharged with a stable condition. In conclusion, migration of a foreign body in the bronchus is rare. A thorough strategy is required to prevent the object from migrating even further.

KEYWORDS ballistic projectile, bronchus, foreign-body migration, thoracotomy

A foreign body in the respiratory tract is rare and is mostly associated with aspiration events.^{1,2} However, foreign bodies in the trachea are common, especially in children, and are mainly caused by aspiration. Although penetrating tracheal injuries have been frequently documented, bullet components remaining in the airway are rarely reported. After maxillofacial or chest trauma, bullet migration to the airway occurs in some situations. Tracheal damage is usually not difficult to diagnose. Respiratory discomfort, hemoptysis, air escaping from the incision, and subcutaneous emphysema are the possible symptoms. The airway injury might be minor or fatal, and local trauma such as

vascular and esophageal injuries may impact mortality and morbidity.^{3,4}

A foreign body in the respiratory tract due to a ballistic projectile is an extremely rare case. It is usually sterile due to its physical characteristics. However, it can develop into a life-threatening condition if left untreated. The migration of the foreign body is a common case in the upper airway system, judging by the size of the lumen. It is extremely rare to find a migrating foreign body once it is located in the distal airway tract, namely after the tracheal bifurcation. In a common situation, the lodging of the foreign body in the lower airway tract prevents them from dislodging.

However, several possibilities may promote migration within the lower respiratory tract. Mucous secretion from the Goblet cells, ciliary movements, and cough reflex are the body's physiological mechanisms in response to the foreign body. This projectile of a long-range rifle has a slim and smooth characteristic, making it easily dislodged within the bronchial lumen. Furthermore, a special strategy is required to prevent the migration of this kind of foreign body inside the bronchus. Proper positioning, diagnostic modalities, and double-lumen endotracheal tube use play a major role in successful evacuation surgery in these cases. This study aimed to report an uncommon presentation of a foreign body (ballistic projectile of a rifle) inside the bronchus.

CASE REPORT

A 45-year-old man came to the hospital with a chief complaint of non-radiating pain in his left shoulder and shortness of breath. He was doing his regular job as a ship painter when suddenly he heard a blazing sound before he collapsed. When he woke up, he felt pain in

his shoulder and noticed blood trace on his clothes. Upon arrival at the hospital, only an entry wound was found on his left shoulder (Figure 1a), without any exit wound.

On the initial assessment, there was only an entry wound with stable hemodynamic status, and he was in a good condition. The first chest X-ray showed a bullet in his left thoracic cavity. A thorax computed tomography (CT) scan was then performed and showed a foreign body in the inferior lobe of the left lung (Figure 1b). Unfortunately, there was no serial X-ray evaluation.

An urgent left posterolateral exploratory thoracotomy was then performed to evacuate the foreign body, and the intubation was performed with a regular endotracheal tube. A posterolateral thoracotomy from the inferior angle of the scapula was palpated and delineated, as well as its spinal and axillary borders. The nipple and the location of the spinal spines were observed. The conventional incision followed the course of the underlying ribs, extending 3 inches from the mid-spinal line to the anterior axillary line, thus going below the scapular tip. The tip of

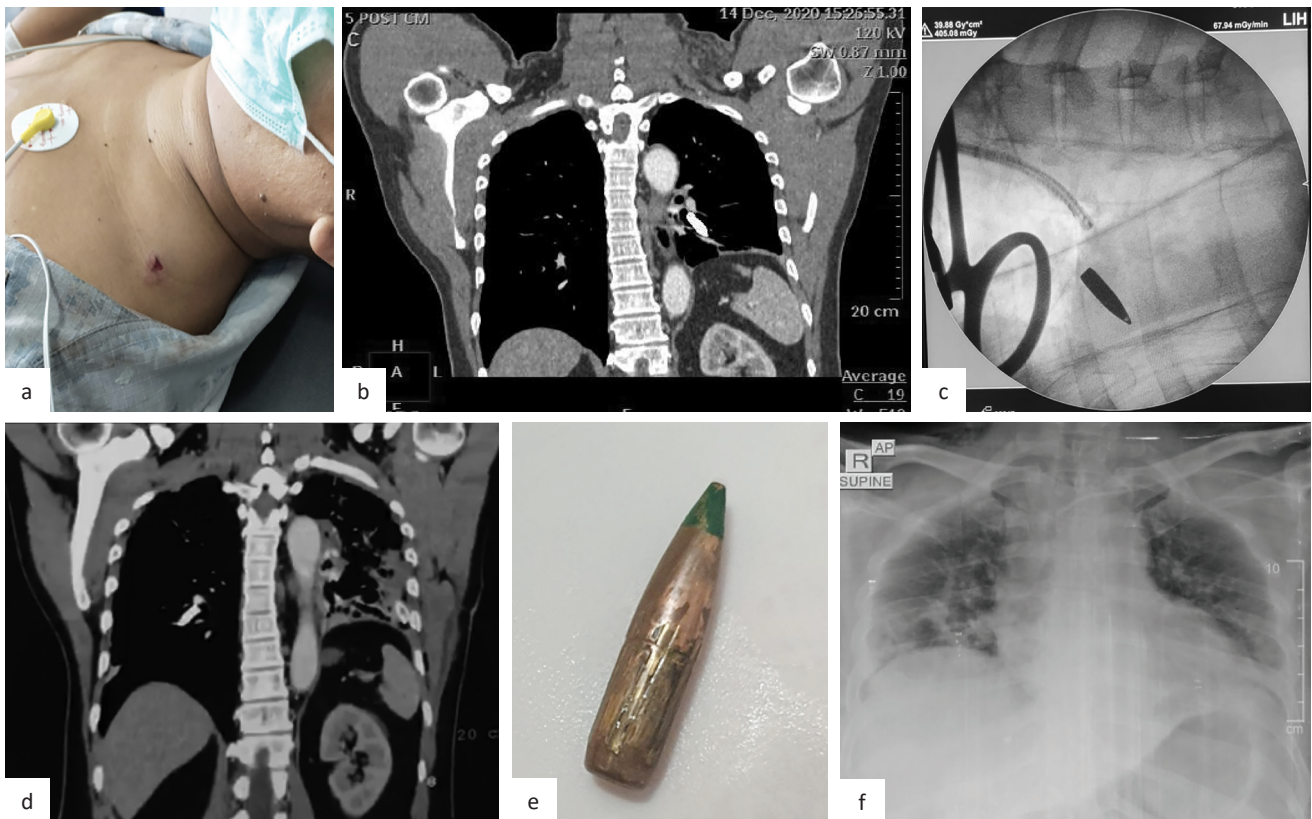


Figure 1. Clinical and imaging pictures of the ballistic wound migration case. (a) Entry side of the ballistic wound; (b) foreign body inside the left lower bronchus; (c) fluoroscopy showing the foreign body had migrated to the right bronchus; (d) computed tomography (CT) scan showing the foreign body in the right bronchus; (e) the ballistic projectile; (f) final X-ray thorax of the patient

the scapula should face the 6th rib when properly positioned. During the procedure, there was no visible injury in the lung, mediastinal tissue, or thoracic wall. The inferior lobe of the lung was identified, but no foreign body was palpated. Intraoperative fluoroscopy showed that it had migrated to the contralateral chest cavity (Figure 1c). Moreover, we decided to end the surgery and set up a new strategy to evacuate the foreign body.

Then, the second chest X-ray showed that the foreign body was in the right thoracic cavity. The second thorax CT scan showed that it had migrated to the right lower bronchus (Figure 1d). He underwent the second surgery immediately using a double-lumen endobronchial tube as a new strategy to prevent foreign-body migration. A right anterolateral thoracotomy was performed using the C-arm to reconfirm the position of the foreign body. Careful positioning and meticulous tissue handling were performed to prevent further movement of the foreign body. Finally, the foreign body was palpated in the intermediate bronchus. It was massaged from the right lower lobe of the bronchus to the right lower lobe of the lung. A suture of the fistula was then performed, and surgery was finished when no air leakage was confirmed. The foreign body (Figure 1e) was then submitted to the authorities for identification and analysis.

The patient was moved to the intensive care unit for 4 days before being transferred to the ward. He was given antibiotics and analgesics. He had no major complaints in the postoperative period, and the pain scale was on a visual analog scale of 1–2. The chest tube in his left and right chest was removed on the 4th day. He was discharged afterward in a stable condition, and the X-ray evaluation showed no sequelae (Figure 1f). He came to the outpatient clinic on day-7, -14, and a month after discharge with a good postoperative wound and no complaints.

DISCUSSION

The severity of penetrating chest injuries caused by a ballistic projectile is not only determined by the bullet's properties and orientation but also by the impacted tissue.⁵ Small-caliber pistol wounds generate less primary tissue loss than hunting or military weapons.^{6,7} In this case, the patient did not experience any symptoms of the first stage of foreign

body aspiration as he immediately fell unconscious, and only a ballistic wound was found. There are three stages of symptoms in foreign body aspiration, i.e.: initial, asymptomatic, and complication.¹ Coughing, choking, or gagging are the most common events in the first stage. The second stage may lead to misdiagnosis since it is asymptomatic. In the third stage, infection or inflammation response may occur.¹ Therefore, in this case, the foreign body might penetrate the trachea from the left side and lodge into the smaller bronchus.

The classic triad of symptoms in the bronchial foreign body are wheezing, coughing, and decreased air entry to the obstructed side, but these only develop in 31–47% of cases.² The early clinical presentation is ambiguous, and it generally remains unnoticed until tracheobronchial fistula, mediastinitis, or empyema happens. It is also critical to keep the airway secure.⁸ Various strategies can be used to remove a foreign body in the respiratory tract, including endoscopic or open approaches, each with its advantages and drawbacks. Rigid bronchoscopy is preferred because it facilitates rapid removal and provides excellent airway control.⁹ We performed an open approach because the foreign body was in the distal part of the bronchus, and we had limited facilities.

The cough reflex, along with the mucous and the smooth properties of the rattle projectile, may make the object easily dislodged, especially if the lateral thoracotomy was done without an endobronchial tube to block the contralateral bronchial. A careful procedure and serial imaging are required to anticipate this. The procedure should be discussed and prepared to achieve the best result. A trauma team consisting of multidisciplinary experts, such as a surgeon, anesthesiologist, radiologist, and nursing team, is required to manage such complex and uncommon cases.¹⁰ An emergency thoracotomy should be done if there are massive bleeding, bronchial injury, esophageal injury, pericardial tamponade, diaphragmatic injury, great vessel injuries, and acute deterioration of the patient's condition.¹¹

Preoperative preparations are intended to prevent further migration of the foreign body by doing proper positioning and giving sufficient analgesics. Moreover, accurate diagnostic imaging can help the surgeon to predict the foreign body's location and choose the best surgical approach.

Performing serial X-rays is also vital to provide the latest foreign body's location. Intraoperative fluoroscopy may also be beneficial.

Due to the lack of preparation and to avoid prolonged surgery, this patient did not undergo one-stage surgery, although the subsequent surgery possessed greater risks, such as infection. A double-lumen endobronchial tube was not used in the first surgery, although it is preferred to avoid lung collapse, thus giving a better visual and preventing foreign body mitigation during positioning and tissue manipulation. Moreover, there were limited facilities in the operating room, so re-diagnostic imaging needed to be performed elsewhere. There was also no bronchoscopy. Postoperative management was also crucial to collaborating with an anesthesiologist to manage postoperative pain.

The limitations in treating this patient were the inability to perform preoperative bronchoscopy and serial X-rays to confirm the object's location before the first surgery, as well as using a non-double lumen endobronchial tube in the first surgery. Moreover, this case is expected to be a lesson for a similar case in the future.

In conclusion, well-prepared strategies in both preoperative and intraoperative surgery are needed to evacuate this foreign body. Adequate analgesics, serial X-rays, and a double-lumen endobronchial tube play a major role in preventing migration and improper location of the foreign body in the bronchus.

Conflict of Interest

The authors affirm no conflict of interest in this study.

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