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A CASE OF RETAINED CHEST DRAIN: VATS TO THE RESCUE

General Surgery

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ABSTRACT

Intercostal drains (ICDs) are crucial tools in thoracic medicine, both in trauma & elective cases. It is primarily used to manage pleural effusions, pneumothorax, and other thoracic conditions requiring fluid or air removal from the pleural cavity. Fracture of ICD and displacement of fractured segment within the pleural cavity is a rare complication. Here we present A 65-year-old man presented with accidental retention of a part of chest tube in the left hemithorax during removal. The patient underwent surgery using video-assisted thoracoscopic surgery (VATS) for removal of ICD fragment retained in the thoracic cavity. The postoperative course was uneventful. A brief case report and review of literature is presented.

KEYWORDS

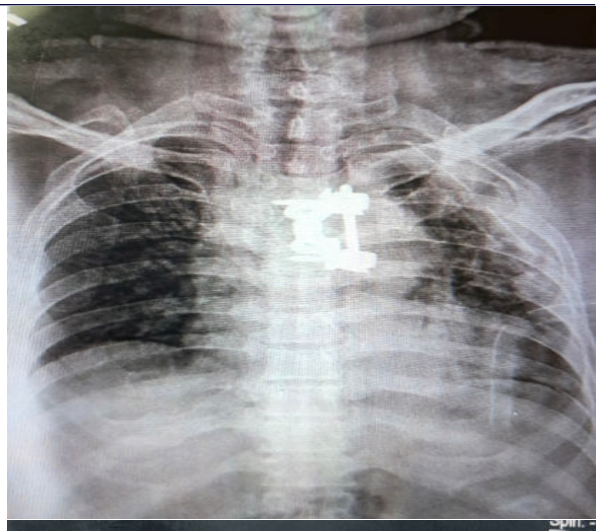
INTRODUCTION:

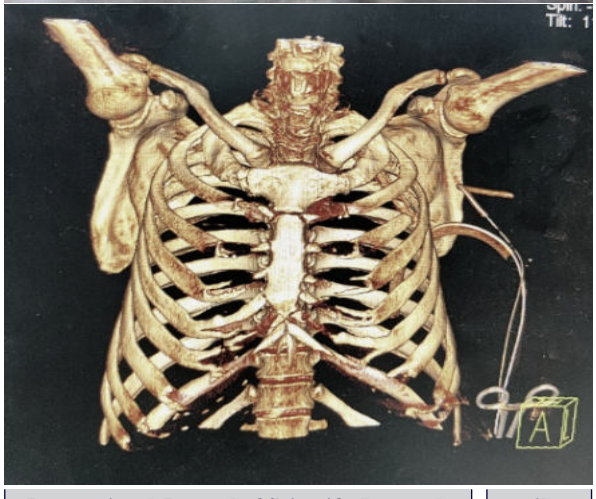
The earliest recorded attempts at pleural drainage can be traced back to Hippocrates in ancient Greece, who used primitive techniques for draining empyema through open incisions. However, these rudimentary methods lacked the sterilization and controlled suction required for safe and effective treatment. [1] In the 19th century, the development of aseptic techniques allowed for safer surgical interventions. In 1876, Dr. Gotthard Bülau, a German physician, introduced the concept of closed chest drainage to treat pleural effusions and empyema. His method involved placing a tube in the pleural cavity and connecting it to a water-seal drainage system to prevent air from entering the chest during respiration. [2] In 1918, Dr. Carlos Monaldi further improved the technique by popularizing the use of closed drainage systems specifically for thoracic surgery and empyema treatment. [3]

A chest drain tube is indicated for insertion through the chest wall to allow for drainage of fluid, blood, air, or pus out of the chest. These chest drains play a crucial role in trauma, surgery, and pulmonary medicine, and researchers are continuously working on enhancing patient outcomes and reducing complications.

Case Report:

A 62-year-old male was brought to the neurosurgery department after reportedly being involved in a road traffic accident resulting in multiple injuries. He sustained injuries to his head, chest, and back and presented with weakness in both legs and reduced breath sounds on the left side. Following assessment, he was found to have left sided hemothorax and burst fracture of D3 and D4 vertebrae with abutment of spinal cord. A left intercostal drainage tube (ICD) was inserted and a gush of blood was seen streaming through the tube. Transaxillary approach D3 D4 corpectomy with D2 to D5 fusion was done by neurosurgery during which two No 32Fr intercostal drainage tubes (ICD) were inserted. Post operatively patient was extubated. On the 4th post operative day, ICD removal was attempted. During the process of removal, difficulty was noted in removal of anterior ICD. Upon removal it was noticed that ICD was fractured and on radiographical evaluation it was noticed that a fractured part of ICD was retained inside the left thoracic cavity. (Fig 1A) Patient was referred to general surgery after computed tomography (CT) scan confirmed the presence of fracture of the tube with broken segment in the apex of left pleural cavity. (Fig 1B and 1C).





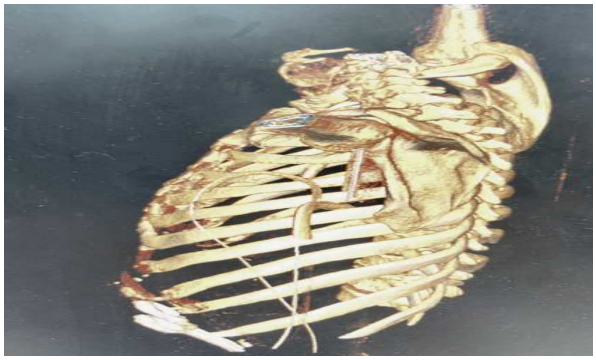


Fig 1A. CXR showing part of chest tube in the left hemithorax
Fig 1b And C. 3D reconstruction showing broken piece of chest tube lodged in the pleural cavity besides 1 more ICD in place.

Video assisted Thoracoscopic surgery (VATS) was planned for this patient. Patient and relatives were explained need for removal and counselled regarding the procedure preoperatively.

The patient was placed in a right lateral position for the procedure. Single lung ventilation was initiated. The site of previously removed chest tube was utilized as the entry point for the thoracoscope. Upon examining the pleural cavity, adhesions were observed, prompting the insertion of a 10mm port one intercostal space below anteriorly.

The thoracoscope was then inserted through this newly created port, while the previous one was used as the working port. Further examination of the pleural cavity revealed the broken part of the chest tube surrounded by adhesions with the pleura and lung. After blunt adhesiolysis, it revealed suture entrapment through a fenestration of the ICD, causing it to fracture. (Fig 2A)

The suture was then cut using scissors, and the ICD fragment was removed through the working port. (Fig 2B) The lung was slowly re-expanded to check for any air leaks due to a potential spontaneous broncho-pleural fistula that might have formed during adhesiolysis. A chest tube was inserted through the second port and fixed.

The total operative time was 35 minutes. Post-operative recovery was uneventful. The chest tube was removed after 4 days, and the patient was discharged on post-operative day 6.

Fig 2A. Intra operative photograph showing the fractured ICD segment with entrapped suture through fenestration.
Fig 2B. Removed segment of fractured ICD.

DISCUSSION:

Although uncommon, dealing with intrathoracic foreign objects, whether in the bronchial tree, chest wall, or pleural space, presents significant challenges. Approaches for removing foreign bodies traditionally have been limited to open techniques, bronchoscopy or endoscopic removal. [4] The timing of diagnosis and the potential for complications are emphasized in guidelines for removing foreign bodies. Complications of retained intrapleural foreign bodies may include pneumonia, lung abscess, pulmonary gangrene, and empyema. [5] A comparable occurrence was documented in a 27 year old male with right pneumothorax involving the accidental retention of a portion of a chest tube in the right hemithorax. This was attributed to mishandling during insertion at the fenestration site, where a VATS approach was utilized for extraction. [6]

Chest tubes nowadays are manufactured using transparent plastics such as polyvinyl chloride (PVC) and flexible silicone, which are gentle on internal structures and resistant to breakage. However, the tube is vulnerable at the fenestrations due to incomplete circumference, making it prone to trauma and breakage when handled or manipulated roughly at this point. Therefore, we advise being meticulous when suturing to prevent entrapment and refraining from handling the area around the fenestrations to reduce the risk of ICD fracture.

In cases where VATS approach is chosen for removing foreign bodies, it is crucial to first locate the foreign body using computed tomography (CT) imaging and three-dimensional (3D) reconstruction. [4] Preoperatively, it is important to conduct a diagnostic assessment to determine the best surgical approach. In present case, the 3D reconstruction of the CT scan played a significant role in spatially organizing the surgery and identifying anatomical landmarks.

VATS has emerged as the preferred approach for thoracic surgeries, gradually replacing open thoracotomies in many centers worldwide due to its numerous clinical advantages. One of the most significant benefits of VATS is its safety profile, particularly in older patients, offering reduced perioperative morbidity and mortality compared to traditional open procedures. VATS also provides superior pain control, leading to faster recovery and shorter hospital stays. Despite the initial higher cost associated with VATS procedures, the overall cost-effectiveness for the hospital system is enhanced due to shorter hospital stays and reduced rates of complications, making it an economically viable option.

CONCLUSION:

The current case demonstrates that accidental suture entrapment poses a risk of ICD fracture because the device is vulnerable at the fenestration sites due to inadequate circumference. VATS provides a safe and successful approach for removal of intrathoracic foreign objects from different thoracic sites, leading to positive clinical results in both elective and emergency cases with the advantage of less trauma, minimal bleeding, magnified vision and decreased morbidity. VATS with preoperative computed tomography allowed for localization of the foreign body and removal with minimal morbidity.

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