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Case Report

Broken chest tube: a rare complication treated by video-assisted thoracic surgery

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ABSTRACT

Intercostal chest drain (ICD) or chest tube is a simple device used very frequently in medical, surgical and critical care specialties to drain air, blood or pus from the pleural cavity. Fracture of ICD and displacement of fractured segment within the pleural cavity is a rare complication. Minimal invasive approaches via video-assisted thoracic surgery (VATS) have been demonstrated predominantly in traumatic thoracic foreign body removal cases in a primary surgical setting. Here we present a case of a broken chest tube in the pleural cavity removed using VATS. A brief case report, review of literature and prevention of this complication is described.

Keywords: Video assisted thoracoscopic surgery, Fractured chest drain

INTRODUCTION

The concept of chest drainage was first advocated by Hippocrates when he described the treatment of empyema by means of incision, cautery, and insertion of metal tubes.[1] Tube thoracotomy was first demonstrated by Hewett in 1867.[2] Since then this procedure has been used in a lot of medical surgical and critical care specialties.

ICD can be introduced either by blunt dissection technique or trocar technique. Complications of ICD has been classified into technical and infective. Technical causes include malposition dislodgement blockage, injuries to surrounding structures, residual collections and infective complications include fasciitis, and cellulitis. However, fracture of ICD within the pleural cavity is rare. Approaches for removing foreign bodies traditionally have been limited to open techniques, bronchoscopy or endoscopic removal. Present case reviews causes of breakage of ICD tube while insertion and demonstrates retrieval of broken part of ICD by Video assisted thoracoscopic surgery (VATS) which has not been described earlier in literature.

CASE REPORT

A 27 years old male was admitted in the chest medicine department with complaints of cough with expectoration and sharp chest pain localized to the right side which increased on coughing and on deep inspiration. Clinically air entry was reduced on right side. X-ray chest revealed right pneumothorax. In view of breathlessness with clinical picture of pneumothorax, a chest tube was inserted in the right pleural cavity. A post procedure radiograph showed a fracture of the chest tube with displacement of the broken piece of tube in the posterior recess (Figure 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 posterior recess of right pleural cavity (Figure 1B and 1C) three days after ICD insertion. Patient was

explained the procedure and counselled preoperatively to allay anxiety.

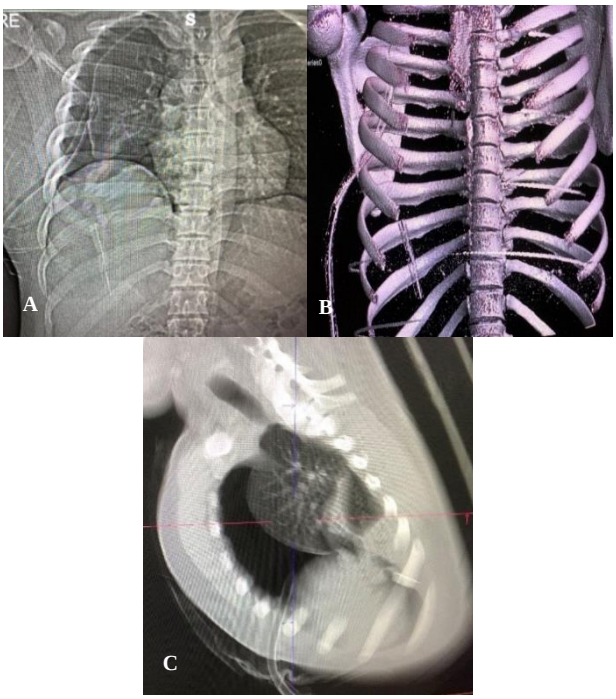

Figure 1: (A) Post procedure X-ray after ICD insertion showing the broken piece below. (B) 3D reconstruction showing broken piece of chest tube lodged in the pleural cavity. (C) Lateral view showing the broken piece lodged in the posterior diaphragmatic recess.

VATS was planned for this case. Patient was positioned in left lateral position. Single lung ventilation was done. The chest tube was removed & its opening was used for camera port. On inspection of the pleural cavity, adhesions were seen hence two more ports of 5 mm each were inserted and adhesiolysis was done to see the posterior recess. Further inspection of the pleural cavity revealed the broken part of chest tube which was held and removed through one of the ports (Figure 2A). Multiple washes were given and the chest cavity was irrigated with normal saline. The lung was slowly expanded to see for any air leak due to any spontaneous broncho-pleural fistula that could have been formed during adhesiolysis. A chest tube was inserted through a port and fixed.

The total operative time was 40 minutes. The chest tube removed was matched with the broken segment and it was found that the chest tube had broken at the site of fenestration (Figure 2B). Post-operative recovery was uneventful. The chest tube was removed after 4 days, and the patient was discharged on post-operative day 6.

DISCUSSION

The majority of thoracic foreign bodies are related to inhalation or ingestion, especially in the pediatric population. Post-traumatic and iatrogenic foreign bodies have been reported. Approaches for removing foreign bodies traditionally have been limited to open techniques, bronchoscopy or endoscopic removal.[3] Guidelines for removal of foreign bodies stress timing of diagnosis and potential for complications. Complications include pneumonitis, pericarditis, foreign body reaction, pain, arrhythmia, and significant patient anxiety. The exact incidence of such complication is not known, but a similar incidence in adults has been reported[4] where VATS was done to remove a retained pleurocath in a 62 year old male.

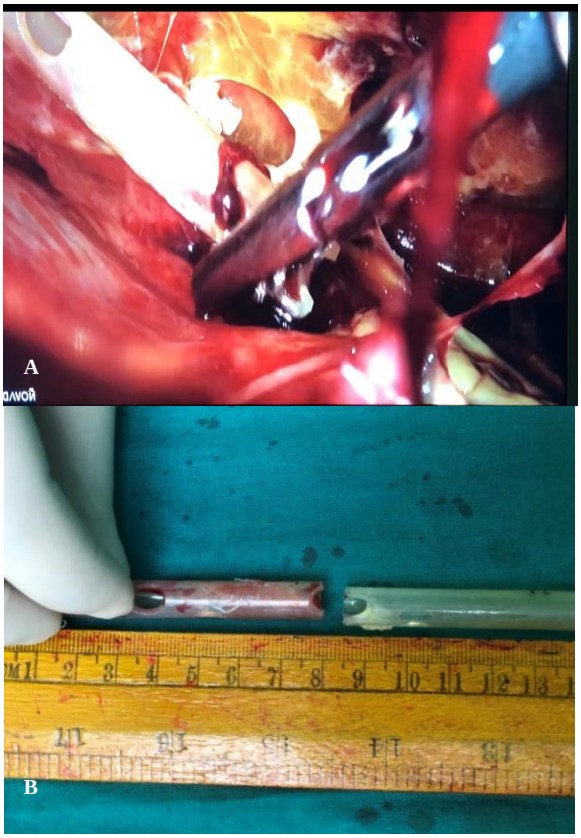

Figure 2: (A) Intra-op photograph showing the broken piece being removed from the cavity. Notice the adhesions and the pus flakes present. (B) Showing chest tube broken at the fenestration.

Modern chest tubes are made from clear plastics like polyvinyl chloride (PVC) and soft silicone, which are relatively soft and gentle on the internal structures and do not break easily. However, at the fenestrations, the tube is weak because the circumference is not complete and is susceptible to trauma and breakage if roughly handled or manipulated at this point. This was seen in present case Figure 2 (B).

Many health care personnel have a habit of holding these tubes with artery forceps through these fenestrations while inserting it into the pleural cavity which can result in breakage of the tube inside. We recommend that the

tube should not be held within the artery forceps at the site of fenestration.

If VATS approach is decided for such cases of foreign body removal, prior localization of the foreign body is important via computed tomography (CT) imaging and three-dimensional (3D) reconstruction.[3] The pre-operative diagnostic workup is essential to plan the optimal surgical approach. The 3D reconstruction of the CT-scan helped significantly in present case to spatially plan the operation and to determine the anatomical landmarks.

Even after workup, since most VATS are done in lateral position, one must be prepared to put additional ports as the foreign body can be dislodged further. VATS has the advantages of minimal access and magnified visualization which plays a vital role in such cases. It is of special value if the foreign body is smaller and finding it may be difficult to the naked eye. It provides excellent visualization so localization and management of such complication is easier and precise. There is no rib spreading required in vats which is the main source of increased postoperative pain and analgesia requirement in open thoracotomies. VATS helps to minimize this morbidity.

CONCLUSION

Present case shows that since the chest tube is not a complete tube at the fenestrations, it is weaker at these points, and so holding them through the fenestrations further weakens them and increases the risk of breakage. Hence, during insertion, chest tube should not be held completely within the artery forceps at the site of fenestration. VATS is an ideal approach for retrieving foreign body like broken piece of ICD as seen in present case. it has the advantage of less trauma, minimal bleeding, magnified vision and decreased morbidity.

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