

CASE REPORT

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Successful removal of an iatrogenic pleural foreign body—pigtail catheter, using a semi-rigid thoracoscope

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Abstract

Tube thoracostomy stands as the conventional treatment for pleural diseases. Nevertheless, pigtail catheters have gained traction due to their smaller size, potentially resulting in reduced complications. Despite the enhanced safety and ease of insertion associated with pigtail catheters, it is crucial to recognize that procedural complications can arise irrespective of the drainage method employed. Complications related to small-bore pigtail catheters encompass the possibilities of dislodgment, kinking, and, though rarely, breakage. Our case serves as a reminder for medical practitioners to select appropriately sized pleural tubes based on the specific pleural condition. In this instance, we present the utilization of a semi-rigid thoracoscope to extract a broken pigtail catheter from the pleural cavity. To the best of our knowledge, this is the first case report of removing a broken pleural catheter using semi-rigid medical thoracoscopy.

Introduction

The intercostal drainage tube (ICDT) insertion is a standard procedure for managing pleural diseases. Morbidity due to large size ICDT has always been a concern. With the advent of pigtail catheters, ICDT insertion is being replaced by pigtail insertion in many patients with pleural effusions and pneumothoraces. Despite the improved safety and ease of insertion with pigtail catheters, it is important to acknowledge that pleural procedural complications might occur with any drainage technique. Reported complications associated with small-bore pigtail catheters include the risk of dislodgement, kinking, and, on rare occasions, breakage. Thoracic surgery may then be needed to remove these iatrogenic pleural foreign bodies. Our case alerts clinicians to pick adequate-sized pleural tubes according to pleural pathology and plan

management accordingly, especially in malignant pleural effusions and empyema, where pigtail pleural catheters may be counterproductive. We here, report the use of a semi-rigid thoracoscope in the extraction of a broken pigtail from the pleural cavity. To the best of our knowledge, this is the first case report of removing a broken pleural catheter using semi-rigid medical thoracoscopy.

Case presentation

A 65-year-old gentleman was referred to us for the removal of a broken piece of pigtail catheter. An 8 F¹ pleural pigtail catheter was placed in the primary center to manage left-sided, moderate, metastatic pleural effusion secondary to renal cell carcinoma. The small-bore pigtail catheter got blocked and was not working despite manipulation and flushing. After a pulmonary consult, the patient was planned for ICDT-guided talc pleurodesis for definitive management of the malignant pleural effusion. Accordingly, pigtail catheter removal was attempted by the interventional radiologist. During removal, its distal end broke down and remained in pleural space and he was referred to us for further

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management. On presentation, the patient had stable vital parameters with left-side ICDT in the midaxillary line at the 4th intercostal space, which was placed after the breakage of the pigtail catheter. The ICDT was functioning with 200–150 ml fluid drainage daily, for the last 3 days. The chest radiograph confirmed the presence of pleural fluid and the iatrogenic foreign body in the left pleural cavity (Fig. 1). Thoracic ultrasound localized the broken pigtail in the posterior pleural recess. After obtaining written informed consent, semi-rigid thoracoscopy was done under general anesthesia (propofol infusion). A 7-mm semi-rigid thoracoscope (Olympus LTF-160) was introduced on the left side through the same ICDT wound. A small amount of free-flowing effusion was observed within the pleural space. The diaphragmatic and mediastinal regions of the pleural space were easy to access and appeared normal upon examination. However, the examination of the lateral and posterior costal pleural spaces proved challenging due to the presence of numerous fibrinous exudates and septa. By breaking these septa using a scope and biopsy forceps, a limited space was created, allowing for the careful navigation of the scope to examine this space. The broken pleural catheter was identified as lodged within the posterior pleural recess, surrounded by numerous adhesions. The broken pigtail was grasped and subsequently extracted using biopsy forceps, along with the thoracoscope and thoracoscopic trocar, as a unified unit. In Fig. 2, a segment measuring 25 cm of the removed broken catheter is shown. Following this, the thoracoscope was reintroduced, and talc poudrage was done to induce pleurodesis. Subsequently, a new 24-French chest tube was inserted and secured using silk 2.0 sutures, followed by a sterile dressing. Notably, no complications were observed during or after the procedure, and the patient remained stable. Post-procedure, the patient was discharged the next day.

Discussion

Tube thoracostomy is the standard treatment of pleural effusions. However, because of their smaller size, the pigtail catheters came into practice with potentially less morbidity. Dislodgement, lumen obstruction, subcutaneous emphysema, iatrogenic pneumothorax, and parenchyma necrosis are common to rare complications of a pleural pigtail catheter [1]. Other rare complications, such as subclavian artery laceration, air embolism, breakdown of one end, and penetration of the heart and lungs, have been reported [2, 3]. Pleural pigtail catheter drainage is reported with lesser complication than ICDT and with the same therapeutic efficiency [4]. A safe, easy, tolerable, and effective use of a pleural pigtail catheter is also studied in patients with malignant pleural effusion [5]. A proper pigtail fixation, flushing, and daily assessment of the pigtail are recommended as they tend to kink and displace because of their smaller lumen size. Patients with MPE usually require different treatment modalities based on symptoms and expandability of the lung; a standard guideline and multidisciplinary team-based approach should be followed in managing malignant pleural effusion (MPE) cases. An intercostal drainage tube, indwelling pleural catheters, and thoracoscopic or ICDT-guided pleurodesis are recommended for MPE cases [6]. Pigtail placement is not recommended in MPE cases because of the risk of dislodgement and infection. Even if a short-term pigtail catheter is planned, it should be decided by a team of experts, including pulmonologists, medical oncologists, and intervention radiologists. An indwelling pleural catheter (IPC) is a recommended drainage tube in MPE cases. The IPC is made of silicone and is a 65-cm long and 15.5 Fr in diameter. The distal end of the catheter has several side holes and is placed within the pleural cavity. The initial subcutaneous course of the catheter reduces the risk of subsequent infection and the leakage of pleural fluid [7]. If a pigtail is inserted instead of ICDT and IPC, at least 14–16 F lumen size should be

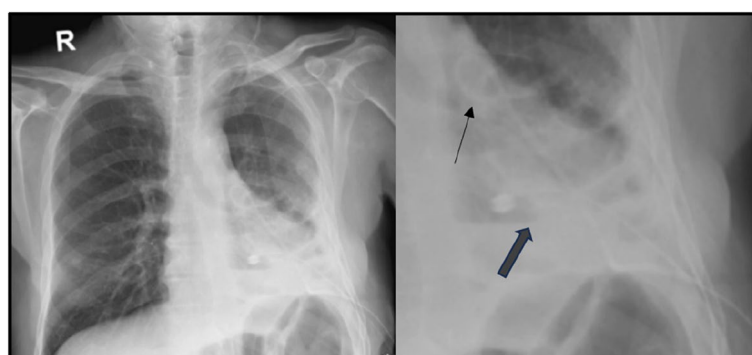


Fig. 1 Chest X-ray showing left-sided pleural effusion and retained broken intrapleural catheter and intercostal drainage tube (ICDT). In a closer view, the pigtail is marked with a thin arrow, while the ICDT is marked with a thick arrow

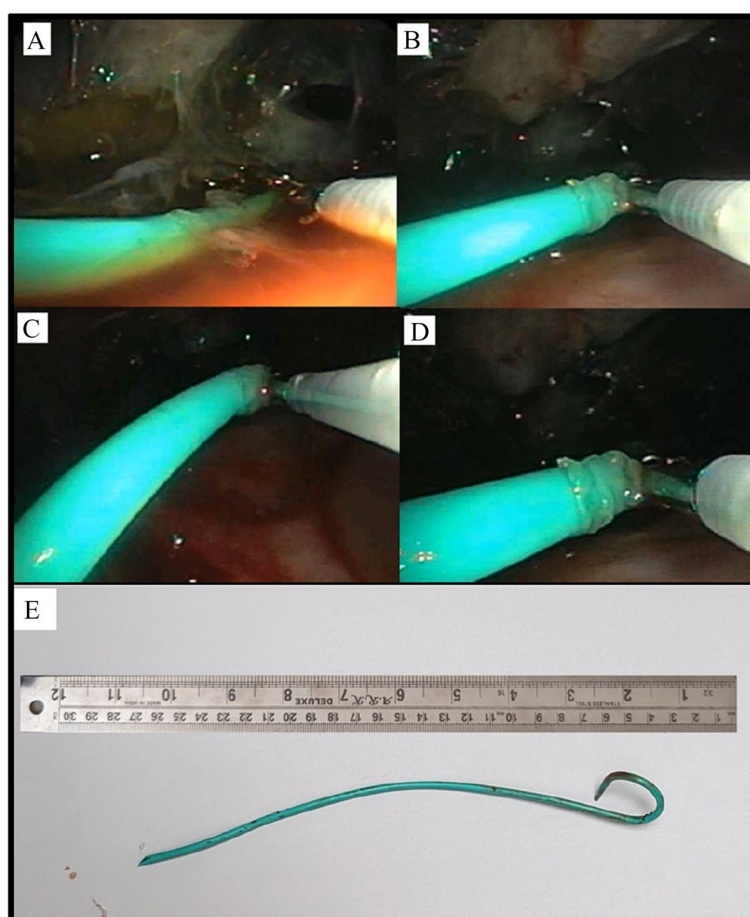


Fig. 2 Thoracoscopic image: pleural pigtail embedded in posterior-lateral costal pleural space. Panels **A–D** show stepwise pigtail catheter retrieval via biopsy forceps. **E** Retrieved broken pigtail with a ruler

considered to prevent lumen size-related complications. Inserting a small pigtail catheter was an important reason for the breakage of the pigtail. Rarely, an ICDT or pleural pigtail catheter may break into pleural space during insertion or removal [8, 9]. Both surgical and thoracoscopic procedures have been used to remove foreign elements. Weissberg et al. reported the extraction of foreign bodies in 21 patients; among these, two patients had ICDTs; one had a chest tube segment, and another had a Penrose drain. They performed thoracotomy, rigid thoracoscopy, video-thoracoscopic surgery, and simple incision for retrieval [2]. A case of rigid thoracoscopic pigtail catheter retrieval has been reported [10]. Medical thoracoscopy is a good modality for many diagnostic and therapeutic procedures that involve parietal pleura and pleural space. Foreign body removal procedure can be attempted with a semi-rigid thoracoscope which is now available at many pulmonology units and is routinely performed by pulmonologists. Complicated, sharp, and

non-retrievable pleural foreign bodies may be referred to thoracic surgeons. In our case, we could remove the pleural pigtail catheter and perform talc pleurodesis in the same setting.

Conclusions

A pigtail catheter smaller than 12F should ideally not be used in complicated and large-volume pleural effusions. A standard guideline and multidisciplinary team-based approach should be followed in managing malignant pleural effusion (MPE) cases. Medical thoracoscopy can be safely performed to remove retained intrapleural foreign bodies.

Abbreviations

ICDT	Intercostal drainage tube
MPE	Malignant pleural effusion
IPC	Indwelling pleural catheter

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Authors' contributions

PB was involved in the concept/design of the study, manuscript preparation and final approval, and integrity of the work. SP was involved in writing the case, integrity of the work, and final approval. AK was involved in the acquisition and interpretation of the data and final approval. SA was involved in manuscript preparation, image editing, and final approval.

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