Intracavitary fibrinolysis directly under vision during medical thoracoscopy: a case report

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Abstract

Medical thoracoscopy is a minimally invasive single-port endoscopic technique that allows for direct visualization of the pleural surface as well as diagnostic and therapeutic procedures. When fibrous adhesions are extensive, its utility is limited. In patients with malignant pleural effusion and loculated effusion, fibrinolytics have been used through chest drainage to break down septations to relieve breathlessness and to improve pleurodesis success We described the use of intrapleural fibrinolytics during a medical thoracoscopy to break the septations and perform pleural biopsies in a patient with multiloculated pleural effusion. To the best of our knowledge, no studies on this subject have been published in the literature, only case reports. We believe that direct instillation of fibrinolytics during medical thoracoscopy is safe and has the potential to increase both the therapeutic and diagnostic capacity of medical thoracoscopy and fibrinolysis.

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Introduction

Multiloculated pleural effusion or trapped lungs often occur in patients with malignant pleural effusions. In these patients, on the one hand increased procoagulant activity and on the other hand decreased fibrinolytic activity contribute to the deposition of fibrin in the pleural space [1]. These conditions limit the possibility of viewing during medical thoracoscopy, often making it difficult to perform pleural biopsies. We report a case of pleural carcinosis from squamous cell lung carcinoma with severe multiloculated pleural effusion directly using intrapleural urokinase during medical thoracoscopy.

Case Report

A 71-year-old man was referred to our Department to investigate a right pleural effusion. Before the hospitalization, the patient underwent thoracentesis and bronchoscopy with samples both negative for malignancy and infections. The chest X-ray showed an extensive pleural effusion on the right, predominantly affecting the middle and lower lung fields, compression atelectasis of the right lower lobe (Figure 1A). We performed a chest CT-scan showing in the lower rights lobe a poorly circumscribed central hypodense/necrotic nodulation of a maximum size of about 5 cm (Figure 1B) and an extended pleural effusion on the right side (Figure 1C). Extensive, partly nodular, solid thickening of the pleura on the right-side (Figure 1D). We decided to perform a medical thoracoscopy (MT). Before the procedure, we appreciated on ultrasound an organized pleural effusion with loculations and diffuse pleural thickening. With a thoracoscope inserted through the trocar into the thoracic cavity, we observed a remarkable intrapleural fibrin deposition, and we were unable to view adequately the pleural space (Figure 2A). The pleural thickenings were of different dimensions, some of which had vascularization. Initially, we attempted to breakdown mechanically and remove the fibrin networks by moving the distal end of the thoracoscope using biopsy forceps.

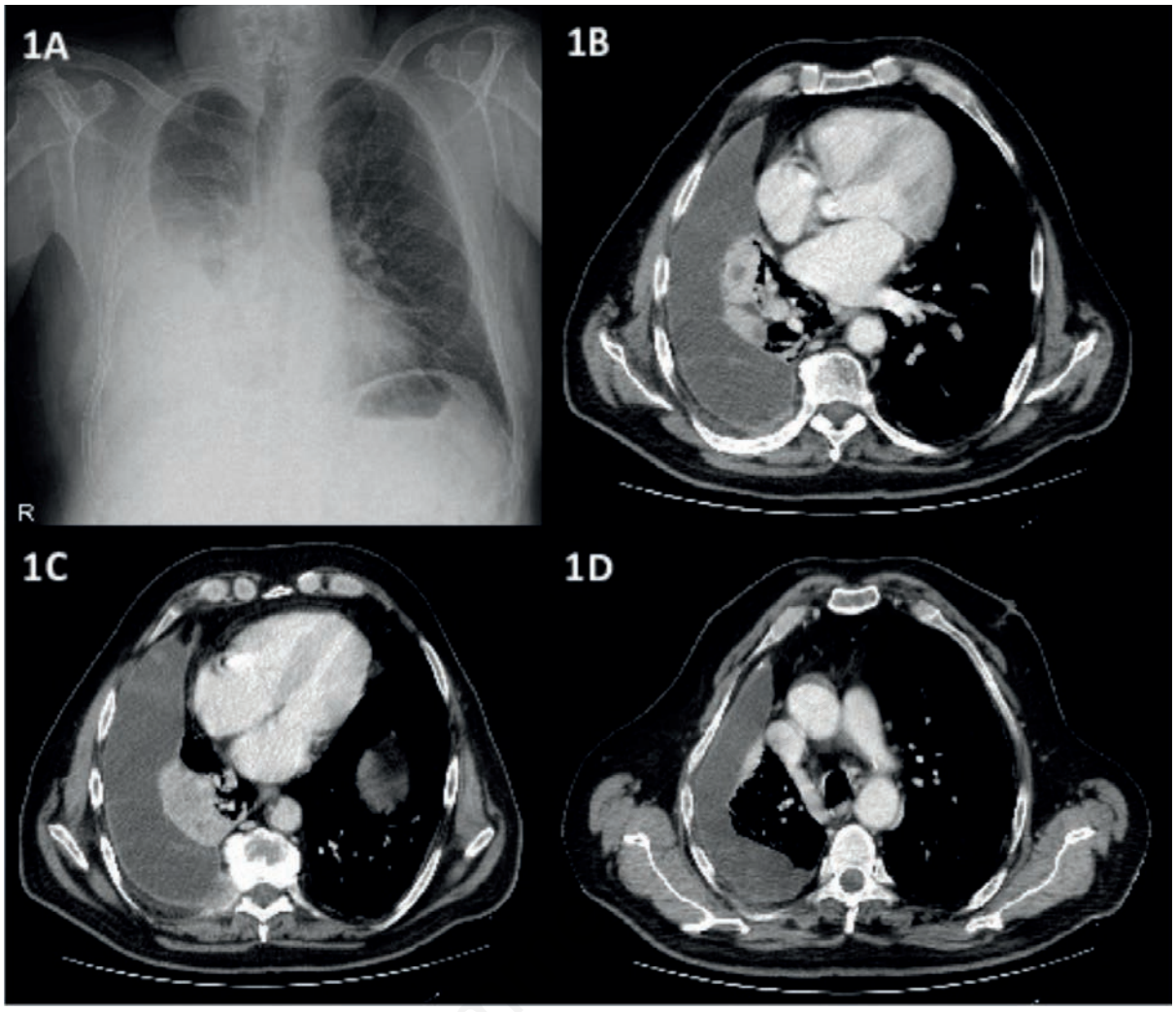

Figure 1. Pleural effusion on chest X-ray (A) and on thorax CT (B-D).

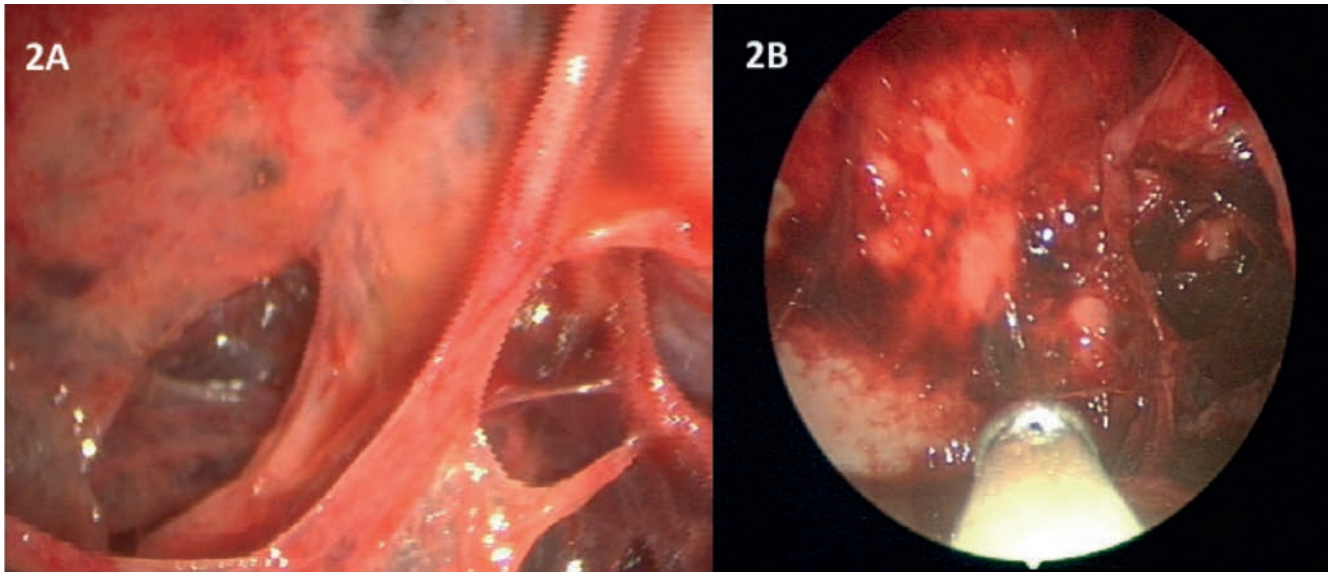

Figure 2. A) Pleural cavity before instillation of urokinase. B) Exposed parietal pleura after urokinase instillation.

Despite the destruction of some septa, a few vascularized ones remained that we did not attempt to rupture due to the risk of bleeding, and the pleural cavity remained very small, preventing the maneuver from being completed properly.

Therefore, it would not have been possible to perform adequate pleural biopsies. Therefore, we attempted to instill urokinase into the pleural space to improve endothoracic vision. We reconstituted a dose of 100,000 IU urokinase in 50 mL of 0.9% saline solution. The solution was instilled into the pleural cavity using a syringe connected to the MADgic® (Teleflex Medical, Morrisville, NC, USA), an atomization device that is normally used to instill local anesthetics on the laryngo-tracheal mucosa (Figure 3A). In the process, the MADgic® was passed together with the thoracoscope through the trocar (Figure 3B), making it possible to see in real time where the solution was directed. In the meanwhile, we have checked the action of the urokinase under vision. After about 10 min, we observed that the network of septa had significantly decreased and that some portions of the parietal pleura were visible (Figure 2B). No adverse effects had occurred, no bleeding was observed. We then easily identified where to take pleural biopsies, which were taken at different points in the parietal pleura. After the biopsy, we completed the MT without any complications. The histological diagnosis was pleural localization of squamous lung cell carcinoma.

In the following days, two more fibrinolysis procedures were performed through the drainage tube, the lung gradually expanded, and the X-ray improved.

Discussion

MT is a minimally invasive single-port endoscopic technique that can directly visualize the pleural surface and permits both diagnostic and therapeutic procedures. Its usefulness, however, is limited when fibrous adhesions are extensive [1]. In this regard, the British Thoracic Society guidelines consider massive pleural adhesions a contraindication to performing MT [2].

Intrapleural administration of fibrinolytic agents, such as streptokinase and tissue plasminogen activator (tPA), has been widely used to lyse fibrin primarily in cases of pleural infection (complicated pleural effusion or empyema). It has been shown that the use of intrapleural fibrinolytics increases the volume of drained pleural fluid, decreases hospital length of stay, and improves radiographic outcome [3]. In patients with malignant pleural effusion who developed a loculated effusion, fibrinolytics have been used to break down the septations, with the ultimate scope of relieving breathlessness and improving pleurodesis success. Thoracic ultrasound performed before and after administration of pleural fibrinolytic demonstrates the dissolution of septations. All the reports and trials reported in the literature described pleural fibrinolysis through an indwelling pleural catheter [4]. The risk of pleural hemorrhage is a particular concern in malignant pleural effusion, where pleural tumor stimulates the development of new blood vessels, which can be friable and prone to bleeding. Of the various studies carried out on the use of fibrinolytics in malignant

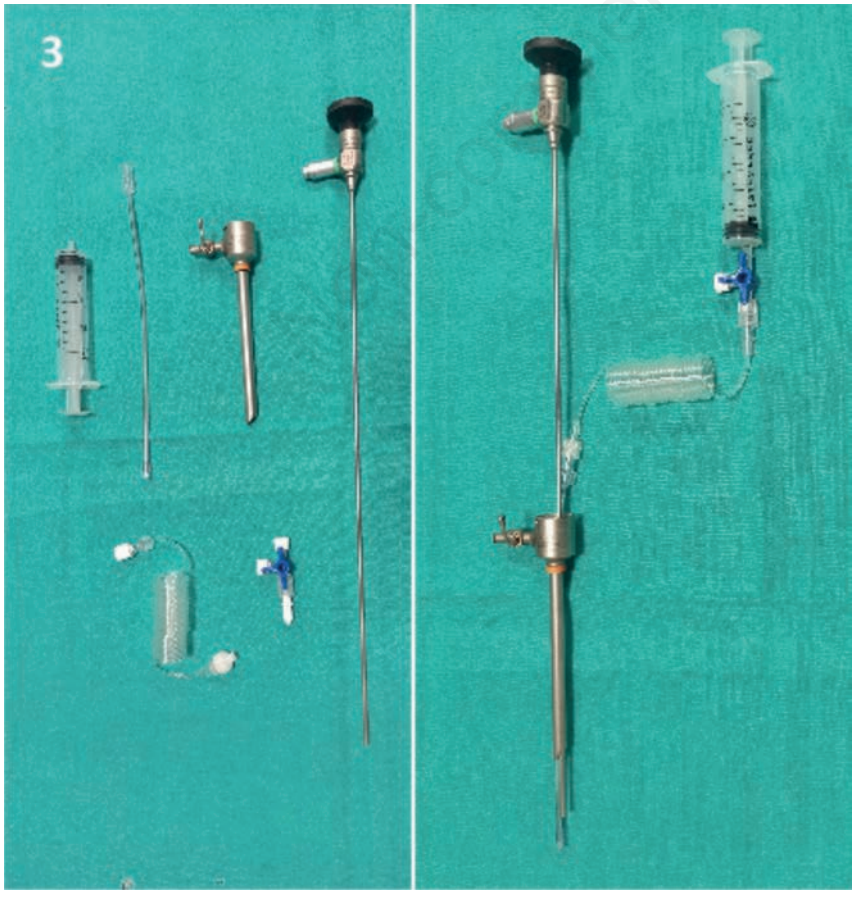

Figure 3. Syringe connected to the MADgic® to instill urokinase through the thoracoscope.

pleural effusions, non-fatal bleeding was described in only two patients by Thomas *et al.* [5].

To our knowledge in literature there are no trials describing intracavitary fibrinolysis during MT. The application of intrapleural urokinase directly through a medical thoracoscope for loculated pleural effusions, however, has been reported in two case reports by Therashita *et al*. In the first case the authors described intrapleural urokinase instillation through the biopsy port of a semirigid thoracoscope. It improved the intrathoracic field of view to the extent that they were able to perform parietal pleural biopsies and obtain the successful diagnosis of malignant pleural mesothelioma [6]. In the second case, they used intrapleural urokinase instillation under MT for the diagnosis of an infective (*Mycobacterium tuberculosis*) multiloculated pleural effusions [7]. In our case, we instilled the urokinase through the rigid thoracoscope directly under vision, concentrating the jet of the drug in the affected areas, avoiding septa that might appear highly vascularized to minimize the risk of bleeding.

Conclusions

Our case shows that the direct instillation of intrapleural urokinase during thoracoscopy can give the possibility of expanding the therapeutic capacity of the MT and fibrinolysis and of expanding the diagnostic capacity of MT. In addition, direct vision of the jet of a solution containing the drug may further reduce the risk of bleeding in patients with malignant pleural effusions.

To prove the effectiveness and safety of this method, further studies are needed, also to standardize this procedure.

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