


# Chemical pleurodesis using mistletoe extracts via spray catheter during medical thoracoscopy for management of malignant pleural effusion

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## Keywords

Malignant pleural effusion, mistletoe, pleurodesis, pleuroscopy.

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## Abstract

We present three cases of successful chemical pleurodesis with a liquid solution of mistletoe extract using a spray catheter during medical thoracoscopy. The medical thoracoscopy was performed in all presented cases to remove pleural effusion and conduct chemical pleurodesis to manage symptomatic malignant pleural effusion. A spray catheter was used to instil the mistletoe extract evenly into the pleural cavity, and there were no pleurodesis-related complications. Respiratory symptoms caused by pleural effusion improved after pleurodesis, and successful pleurodesis was maintained for more than 3 months after medical thoracoscopy in all three patients.

## Introduction

Chemical pleurodesis with atomizing large-particle talc into the pleural cavity, or so-called talc poudrage, is considered a standard procedure during thoracoscopy for patients with symptomatic malignant pleural effusion (MPE) [1]. However, the availability of large-particle talc varies worldwide. Moreover, no alternative sclerosant is available that can be sprayed evenly into the pleural cavity during thoracoscopy [2].

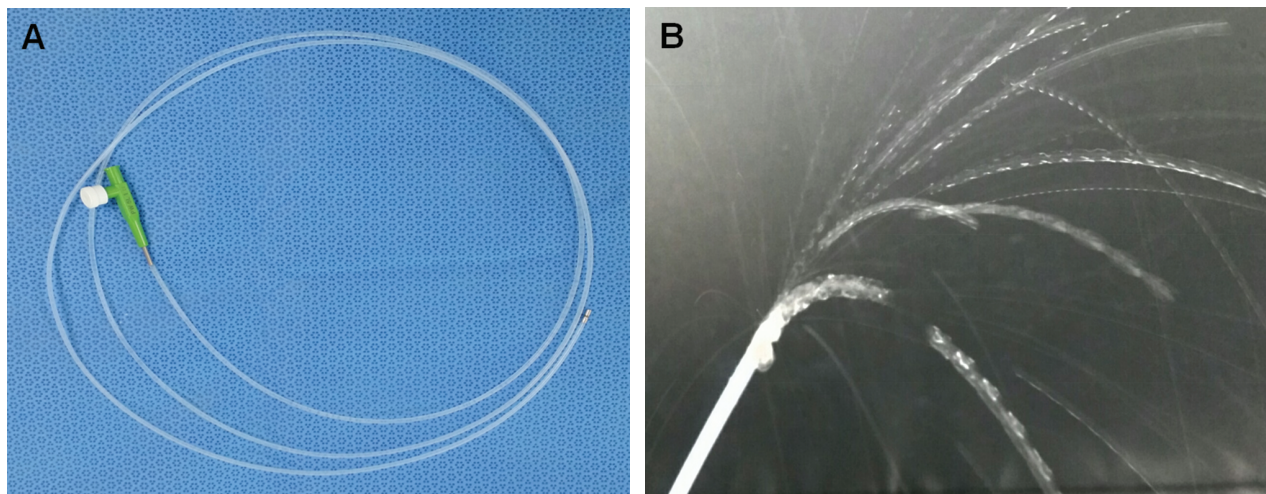
Mistletoe extract is a chemotherapeutic agent and pleurodesis with a liquid solution of mistletoe extract via a chest tube was described as a useful method of pleurodesis [3,4]. A spray catheter is a unique local anaesthetic method for spraying inside the pleural cavity (Fig. 1) [5], and mistletoe extract can be evenly sprayed into the pleural cavity as a sclerosing agent using a spray catheter during thoracoscopy, similar to talc poudrage. Herein, we report three cases of symptomatic MPE that were managed successfully

by novel mistletoe extract pleurodesis using a spray catheter during medical thoracoscopy.

## Case Series

### Case 1

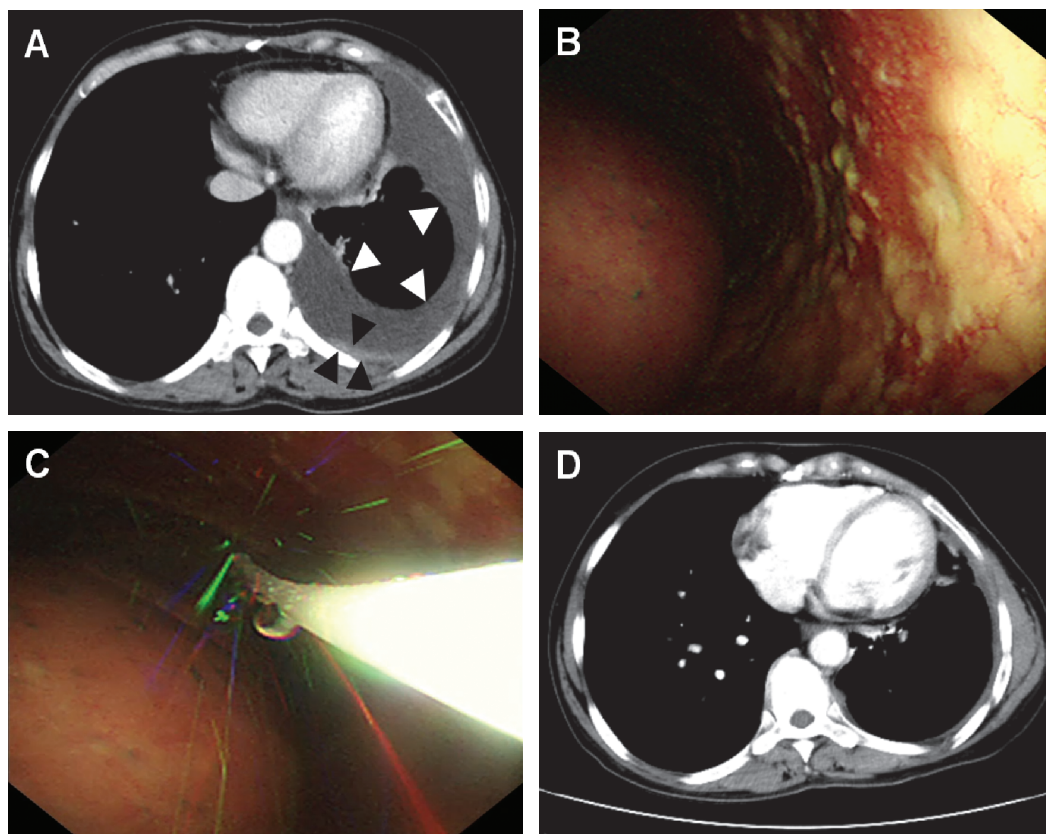
A 55-year-old woman, who was diagnosed with metastatic breast cancer, presented with progressive dyspnoea. A chest computed tomography (CT) scan showed left pleural effusion with focal pleural thickening suspicious of MPE (Fig. 2A). To manage the MPE, medical thoracoscopy (LTF-240 instrument; Olympus, Tokyo, Japan) was performed to remove the effusion and to allow chemical pleurodesis (Fig. 2B). A total of 650 mL of pleural effusion was removed using the suction channel of a semi-rigid pleuroscope. Then, an aqueous solution of mistletoe extract (ABNOVAViscum; Abnoba GmbH, Pforzheim, Germany) was sprayed into the pleural cavity using a spray



**Figure 1.** (A) Spray catheter; (B) spraying the liquid solution using a spray catheter.

catheter for chemical pleurodesis (Fig. 2C). After the medical thoracoscopy with pleurodesis, dyspnoea and performance status improved, and there were no immediate or

delayed procedural-related complications. The patient had been prescribed tamoxifen over the 2 years prior to pleurodesis and was continued on that drug only after



**Figure 2.** (A) Chest computed tomography (CT) scan shows left pleural effusion (white arrowhead) with focal pleural thickening (black arrowhead). (B) Medical thoracoscopy reveals ubiquitous tumour growth over the parietal pleural surface. (C) Liquid mistletoe extract was sprayed into the pleural cavity using a spray catheter. (D) A chest CT scan performed 3 months after the medical thoracoscopy shows no left pleural effusion.

pleurodesis using the mistletoe extract. A CT scan performed 3 months after the medical thoracoscopy verified successful pleurodesis with complete apposition between the visceral and parietal pleura (Fig. 2D).

### Case 2

A 54-year-old woman complained of right pleuritic chest pain for 1 month. The patient had no known disease and had been healthy. A chest CT scan was suspicious of right upper and middle lobe lung cancer with pleural effusion and nodules. Medical thoracoscopy was performed not only for histological diagnosis but also to allow management of the suspected MPE. The bloody effusion was removed during medical thoracoscopy with the aid of gentle suction. Thereafter, forceps biopsies were taken from numerous flat white patches of the parietal pleura, which raised the suspicion of a metastatic tumour. The biopsy materials were subjected to histological examination. A mistletoe extract solution was instilled evenly into the pleural cavity using a spray catheter, and no procedural-related complications developed. The patient was finally diagnosed with stage IV non-small-cell lung cancer (adenocarcinoma) based on the parietal pleura biopsy result. The pleuritic chest pain disappeared after the medical thoracoscopy with pleurodesis, and a CT scan 4 months later found no MPE.

### Case 3

A 79-year-old woman with advanced gastric cancer was referred to the department of pulmonology to manage symptomatic MPE. A chest CT scan and plain radiograph showed newly developed right pleural effusion with passive atelectasis. Malignant cells were evident in the cell block formed from the pleural effusion obtained by thoracentesis. Therefore, thoracoscopy was performed both to remove the MPE and to allow chemical pleurodesis. Thoracoscopy revealed hypervascular polypoid nodules of various sizes, consistent with pleural metastases, and loculated pleural effusion. A large volume of loculated effusion was removed during the thoracoscopy, and the mistletoe extract was atomized into the pleural space using a spray catheter. Respiratory symptoms caused by MPE improved, and no procedural-related complications developed. A follow-up chest radiograph performed 3 months later showed no MPE in the right hemithorax.

### Discussion

Talc remains the most effective sclerosant for pleurodesis; however, the availability of sterile large-particle talc for use

as poudrage during thoracoscopy varies worldwide [2]. Unfortunately, no alternative sclerosing agent has been available that can be evenly sprayed into the pleural cavity during a medical thoracoscopy, until now.

Lee and Colt reported that instilling lidocaine via a spray catheter is effective for pain control before chemical pleurodesis during medical thoracoscopy [5]. Using a spray catheter in the same way, we performed pleurodesis with a mistletoe extract via a spray catheter in three patients with MPE. A complete response, defined as no pleural effusion within 4 weeks of the last pleurodesis [6], was achieved in all three patients.

In South Korea, only bleomycin and mistletoe extract were available as sclerosants when the three patients in the present case series underwent medical thoracoscopy and pleurodesis. Although bleomycin has traditionally been used as a sclerosant during pleurodesis, the mean success rate was only 61% [2]. Several studies in Germany and South Korea used liquid mistletoe extract delivered via a chest tube as a form of chemical pleurodesis [3,4]. Stumpf and Bussing reported that the overall response to mistletoe extract was 72% in 20 patients with MPE [4]. Cho et al. showed that the pleurodesis success rate was high when a mistletoe extract was used (79% of patients attained a complete response and 18% a partial response) [3]. Thus, we selected mistletoe extract as a sclerosant because the cost was reasonable (US\$ 75.79 per dose in South Korea) and the success rate was higher than that of pleurodesis using bleomycin. In addition, mistletoe extract, previously shown to be an effective sclerosant for pleurodesis when delivered via a chest tube, was evenly sprayed into the pleural cavity during thoracoscopy, with the aid of a spray catheter [3]. Even distribution of the sclerosant within the pleural cavity using a spray catheter may aid in successful pleurodesis, particularly in patients who undergo medical thoracoscopy.

Previous studies suggested that instillation of mistletoe extract into the pleural cavity increased the numbers of lymphocytes and reduced the numbers of tumour cells in pleural fluid [4,7]. Although the precise mechanism of mistletoe-mediated pleurodesis remains poorly understood, it may be that such pleurodesis induces not only an inflammatory reaction between the parietal and visceral pleura but also exerts anti-tumour effects on pleural metastases. However, these hypotheses require verification in future, well-designed research.

In conclusion, we used a spray catheter for chemical pleurodesis during medical thoracoscopy. We found that instilling the mistletoe extract using a spray catheter was an effective pleurodesis method and could possibly be performed as an alternative to talc poudrage. Our findings should be verified in a further large-scale trial.

### Disclosure Statements

No conflict of interest declared.

Appropriate written informed consent was obtained for publication of this case series and accompanying images.

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