Effective Management of Persistent Pneumothorax Using a Thopaz® Digital Drainage System Combined with an Endobronchial Watanabe Spigot

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Abstract

A 72-year-old man with salivary gland cancer and multiple pulmonary metastases suffering from intractable pneumothorax was transferred to our institution; he was inoperable because of a low pulmonary function. A chest tube had been placed more than a month prior to this admission. A digital drainage system was used for 24-h monitoring of air leaks (Thopaz®). Using the Thopaz® system, we performed endoscopic bronchial occlusion using an endobronchial Watanabe spigot (EWS) to reduce air leaks. Finally, the air leaks ceased, and the chest tube was removed five days after EWS placement. We herein report a case of persistent pneumothorax that was successfully treated by endoscopic bronchial EWS placement with the aid of a Thopaz® system.

Key words: Thopaz®, digital drainage system, pneumothorax, air leak, endobronchial Watanabe spigot (EWS)

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Introduction

Bronchopleural and alveolar pleural fistulas with persistent air leaks decrease the quality of life and increase the mortality risk for affected patients. When all other conventional treatments have failed, endoscopic approaches may be the only available option in patients with low pulmonary function (1). An endoscopic approach using bronchial occlusion with an endobronchial Watanabe spigot (EWS) (Novatech, La Ciotat, France) has been reported to be effective and safe in reducing air leaks (2, 3). Additionally, digital drainage systems have been used to quantify air leaks in real time, and appear to be safe and easy to integrate into clinical care. The early removal of chest drains has been associated with the more frequent use of digital drainage systems than conventional systems (4). Therefore, the quantitative measurement of air leaks in real time may be useful for clinical decision-making regarding chest-drain removal. We herein report a case of persistent pneumothorax in a patient with multiple pulmonary metastases that was successfully managed with a Thopaz® digital drainage system and an EWS.

Case Report

A 72-year-old man with salivary gland cancer and multiple pulmonary metastases suffering from intractable pneumothorax was transferred to our institution. A chest radiograph taken on admission showed a pneumothorax in the right lung (Fig. 1A). The patient was considered to be inoperable because of low pulmonary function. A chest tube had already been in place for more than a month prior to his admission to our hospital. For 24-h monitoring of air leaks, we used a digital drainage system (Thopaz®, Medela, Baar, Switzerland) (Fig. 2A). Fig. 2B shows representative record-
Figure 1. (A) A chest radiograph taken on admission showed a pneumothorax in the right lung. (B) A chest radiograph after the placement of four endobronchial Watanabe spigots (EWS) showed complete lung re-expansion.

Figure 2. (A) The Thopaz® digital drainage system. The digital display graphics of the air leaks and suction pressure. (B) The patient’s chart showing the air leaks and suction pressure recordings. The red line represents the air leaks (flow in mL/min), and the blue line represents the suction pressure (in cmH₂O).

ings of the air-flow trace and suction pressure. The initial flow was as high as 100 mL/min. Therefore, we performed endoscopic bronchial occlusion to reduce air leaks using an EWS. Balloon tests at the right B1b, B2, and B3 markedly reduced the air leaks. We then occluded the right B1b, B2, B3a, and B3b with a 6-mm EWS. The air leaks were remarkably reduced after bronchial occlusion. Upon confirmation of air-leak cessation two days later, we performed pleurodesis with 2 g of sterile talc through a catheter (Fig. 2B). Finally, when the air leaks completely ceased, the chest tube was removed five days after EWS placement (Fig. 1B). There were no adverse events related to the Thopaz® use. Subsequently, the patient was transferred back to the referring hospital.

Discussion

We herein reported a case where the combined use of a digital drainage system and an EWS was useful for the management of a persistent pneumothorax. The Thopaz®
A chest drainage system is a portable suction unit with a drainage canister that obtains scientific digital flow recordings in real time with an in-built alarm system. The digital display of the Thopaz® system provides objective data in real time, as well as a 24-h historical graph of the air leakage, which allows easy tracking of the progress of treatment. The use of digital technology to provide this data could assist physicians in making definitive decisions regarding the removal of chest drains. The Thopaz® system also has the advantage of being a digital measurement system that does not require drainage clamping and testing prior to its removal (5). Drain removal can be performed when there is minimal flow and the graphs are stable.

Pompili et al. (6) showed the superior performance of the digital device, with a significantly shorter air-leak duration, shorter duration of chest tube placement, and reduced hospital stay among postoperative patients. However, few reports of digital drainage systems are available relating to internal medicine. To the best of our knowledge, this is the first study of the combined use of a digital drainage system and an EWS in a patient with a pneumothorax. Real-time quantitative measurement of air leaks may be useful for determining the effectiveness of EWS placement and balloon testing during bronchoscopic occlusion. As changes in patient position can alter the air leaks, and considering how difficult and cumbersome it is for medical staff to continuously monitor air leaks, the 24-h monitoring that the Thopaz® system provides may be greatly beneficial with respect to determining the presence or absence of air leaks.

As shown in Fig. 2B, the air leaks were reduced after the endoscopic bronchial occlusions. The quantitative measurement of air leaks in real time may be useful not only for clinical decision-making regarding the removal of chest drains, but also for the objective and accurate judgment of the effectiveness of endoscopic bronchial occlusion. It has been reported that chest tubes can be removed when an air leak is less than 20 mL/min as determined by a digital device (5). Endoscopic bronchial EWS occlusion with the aid of a Thopaz® digital drainage system is thus considered to be an effective and safe therapy for patients with a prolonged pulmonary air leak.

The authors state that they have no Conflict of Interest (COI).

References