

Endobronchial valves to occlude bronchopleural fistula and recurrent pneumothorax



Saenghirunvattna S, MD
email : sawang.sa@bgh.co.th

Sawang Saenghirunvattna, MD¹
Rungsima Saenghirunvattna, MD²
Gerard Lalande, MD³

¹ Bangkok Chest and Respiratory Care Center, Bangkok Hospital, Bangkok Hospital Group, Bangkok, Thailand.

² Priest Hospital, Bangkok, Thailand.

³ CEO-Health Medical Service

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OBJECTIVES. We present our experiences using endobronchial valves to effectively manage patients presenting with pneumothorax and bronchopleural fistula.

MATERIALS AND METHODS. Ten patients underwent the procedure. Seven patients had developed pneumothorax with bronchopleural fistula; two patients were intubated with complicated bronchopleural fistula. One patient had recurrent catamenial right pneumothorax.

RESULTS. The procedure was effective in 9 cases (90 percent). The mortality was low, effectiveness was high and achieved in less than 30 minutes.

CONCLUSION. This technique is an effective intervention for prolonged air leakage.

Patients presenting with pneumothorax and bronchopleural fistula are normally difficult to treat. Surgical options may be limited due to patients being elderly, having emphysema, poor lung functions, underlying heart diseases or poor nutritional status.

We present our experiences using endobronchial valves to effectively manage these problems.

Materials and Methods

From January 2005 till June 2012, ten patients underwent the procedure. Seven patients developed pneumothorax, with bronchopleural fistula; two patients were intubated which was complicated with bronchopleural fistula. One patient had suffered from recurrent pneumothorax almost every month since 20 years whenever she menstruated (catamenial pneumothorax). She underwent surgical pleurodesis several times in the United States ten years ago but pneumothorax still recurred.

Identification of the affected bronchi and technique

A balloon catheter was inserted via the working channel of the flexible bronchoscopy, if there was no leakage or decreased air bubble via the chest drain, the lumen was the target site of occlusion. In one case there was more than one lumen leakage, so up to 3 valves were needed to totally occlude the fistula. In cases of small leakage following the occlusion, we used tetracycline to seal the lumen.

The technique to insert the Watanabe valve

There were 3 sizes of valve (Picture 1). How we selected any valve depended on the diameter of the bronchial lumen detected by the balloon occlusion. Then the selected valve was grasped by the forcep catheter through the working channel. The easiest way is to pass through the large endobronchial tube when the leakage site is the lower lobes. The most difficult position is the upper lobe; to get a proper position, the Watanabe valve may have to be cut in half before inserting into the lumen.

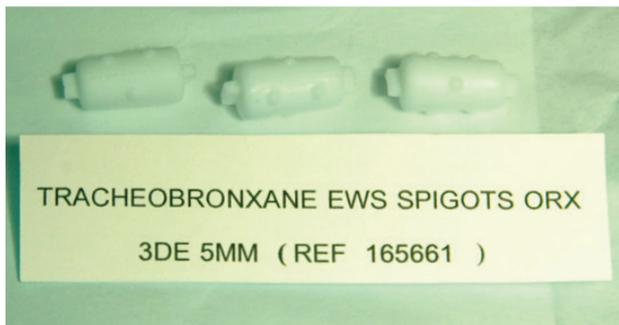


Figure 1: Shows Watanabe valves

Results

There were 7 males and 3 females, from 37 to 89 years of age, with a mean age of 71. Eight patients had emphysema with a history of heavy smoking. There were nine cases of pneumothorax with bronchopleural fistula and one case of recurrent catamenial right pneumothorax.

The duration of the leakage before the valve insertion was between 7 - 15 days. The procedure was effective in 9 cases (90 percent). The average operation time was 25 minutes.

References

1. Gillespie CT, Sterman DH, Cerfolio RJ, et al. Endobronchial valve treatment for prolonged air leaks of the lung. *Annual Thorac Surg* 2011;91:270-3.

One patient on assisted ventilation developed acute respiratory distress syndrome which required high positive end expiratory pressure (PEEP). Despite decreasing the air leak, his pneumothorax could not be completely occluded and the patient expired from underlying sepsis a week later.

Discussion

Patients presenting with pneumothorax and bronchopleural fistula may be poor candidates for surgery due to emphysema, poor lung function with or without respiratory support, heart disease, or poor nutritional status; for such patients, endobronchial valve occlusion may represent an interesting alternative to surgical. In our experience, endobronchial valve occlusion was successfully performed in 9 out of 10 patients. The procedure was performed in a short period of time, and mortality was low, despite the poor underlying health status of the patient population.

The limitations of the technique can be seen when the lesions are located in the upper lobes or when patients are already in respiratory distress. However, newer umbrella valves available nowadays^{1, 2} are easier and faster to insert although also more expensive. Anyway, the latest endobronchial valves provide us more options to give better medical care to our patients.

Conclusion

We present our experience in managing patients with pneumothorax and bronchopleural fistula using endobronchial valves which led to subsequent improvement in 9 out of 10 cases. We show the evidence that this technique is an effective intervention for prolonged air leakage.

2. Sterman DH. A Multicenter pilot study of a bronchial valve for the treatment of severe emphysema. *Respiration* 2010;79:222-33.