

## Ultraflex Expandable Stents for the Management of Air Leaks

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**Postoperative empyema and aspergillosis were diagnosed in a 66-year-old man. Since non-operative therapy was not effective, we performed surgery. On the 8th postoperative day, a covered Ultraflex expandable stent (Boston Scientific, Galway, Ireland) was implanted to make a one-way airway for blocking a major air leak from a bronchopleural fistula causing respiratory distress. His general condition improved gradually, and he was discharged 30 days after stenting. In conclusion, we used a covered Ultraflex expandable stent to make an airway to block an air leak. This may be a new application for this stent. (Ann Thorac Cardiovasc Surg 2006; 12: 50–2)**

**Key words:** bronchus, fistula, stents

### Introduction

Currently, airway stenting is applied in many tracheo-bronchial diseases.<sup>1,2)</sup> We attempted to block an air leak from a bronchopleural fistula due to postoperative empyema using airway stenting with a covered Ultraflex expandable stent.

### Case

In September 2000, a 66-year-old man who had undergone left upper lobectomy and thoracoplasty (partial resection of the fourth and fifth ribs) for tuberculosis 40 years previously was admitted to our hospital with cough, abundant sputum and slight fever. Postoperative empyema and aspergillosis were diagnosed, and we performed tube thoracotomy for drainage and administration of appropriate antibiotics (Fig. 1A). However, these therapies

were not effective, surgery was performed on April 9 2001. A left posterolateral thoracotomy was made. The thoracic cavity findings were of a intrapulmonary abscess cavity accompanied by a major air leak, severe pleural adhesion between the bronchus and the aorta and pulmonary artery. Because compression pneumonectomy could not be conducted we performed curettage, irrigation of the intrathoracic space, and additional thoracoplasty (resections from second to tenth ribs) to reduce the dead space. Finally, a drainage tube was inserted in the outer subcutaneous region. After the operation, he required mechanical ventilation support with one-side tracheal intubation to the right bronchus, and the tube was removed on postoperative day 2. However, he had respiratory distress with major air leak from the cavity and severe subcutaneous emphysema on the same day (Fig. 1B).

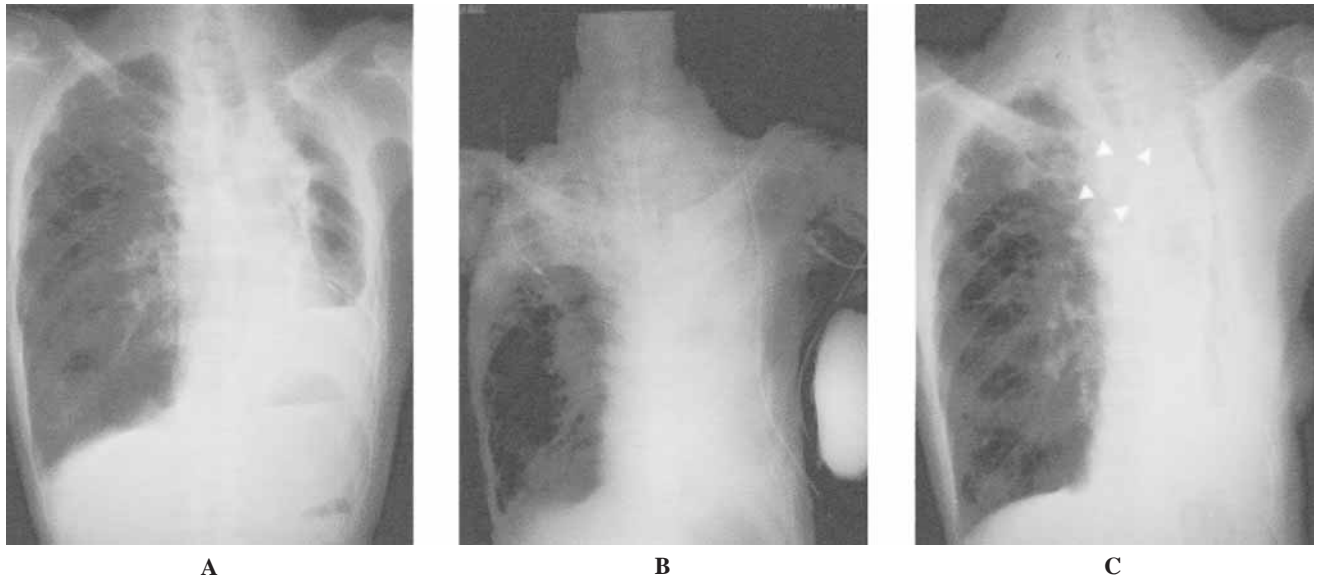
### Stenting

To create a one-way airway to the right lung to block a major air leak, airway stenting was performed on April 17 2001. Under general anesthesia, a covered Ultraflex expandable metallic stent, 10 cm in length and with a 7 cm cover, (Boston Scientific, Galway, Ireland) was implanted using a flexible bronchoscope (BF) under X-ray monitoring from the trachea to the right main bronchus (Figs. 2A, B and D).

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**Fig. 1.** Chest X-ray.

**A:** Before surgery: left pleural effusion was represented and a thoracic catheter was inserted.

**B:** Postoperative day 2: subcutaneous emphysema was showed.

**C:** After the stenting day 30: the inserted stent can be seen (arrowheads), and the subcutaneous emphysema improved.

### Course

After the stenting, the air leak held immediately, the subcutaneous emphysema gradually improved and the drainage tube was removed at the third day after stenting. At 30 days after stenting, he was discharged with no dead space or infection (Fig. 1C). In November 2003, the stent was removed because of granuloma formation and excessive bronchial secretion (Fig. 2C). Thereafter, he has retained a good quality of life with no need for oxygen therapy.

### Discussion

Originally, the major indications for airway stenting were malignant or benign tracheobronchial strictures.<sup>1,2)</sup> We used covered Ultraflex expandable stents for the special purpose of palliative creation of an airway to block a major air leak due to widespread empyema with a bronchopleural fistula. This is apparently the first report demonstrating that the covered Ultraflex expandable stent could be used in this way.

The advantage of covered Ultraflex expandable stents include: (1) high flexibility alleviating curvature;<sup>3)</sup> (2) good sealing to block air leaks;<sup>3)</sup> (3) easy insertion and minimal invasiveness.<sup>2)</sup> Hence, we used this stent for this case.

There is a report suggesting that the current generation of self-expanding metal stents should be avoided in

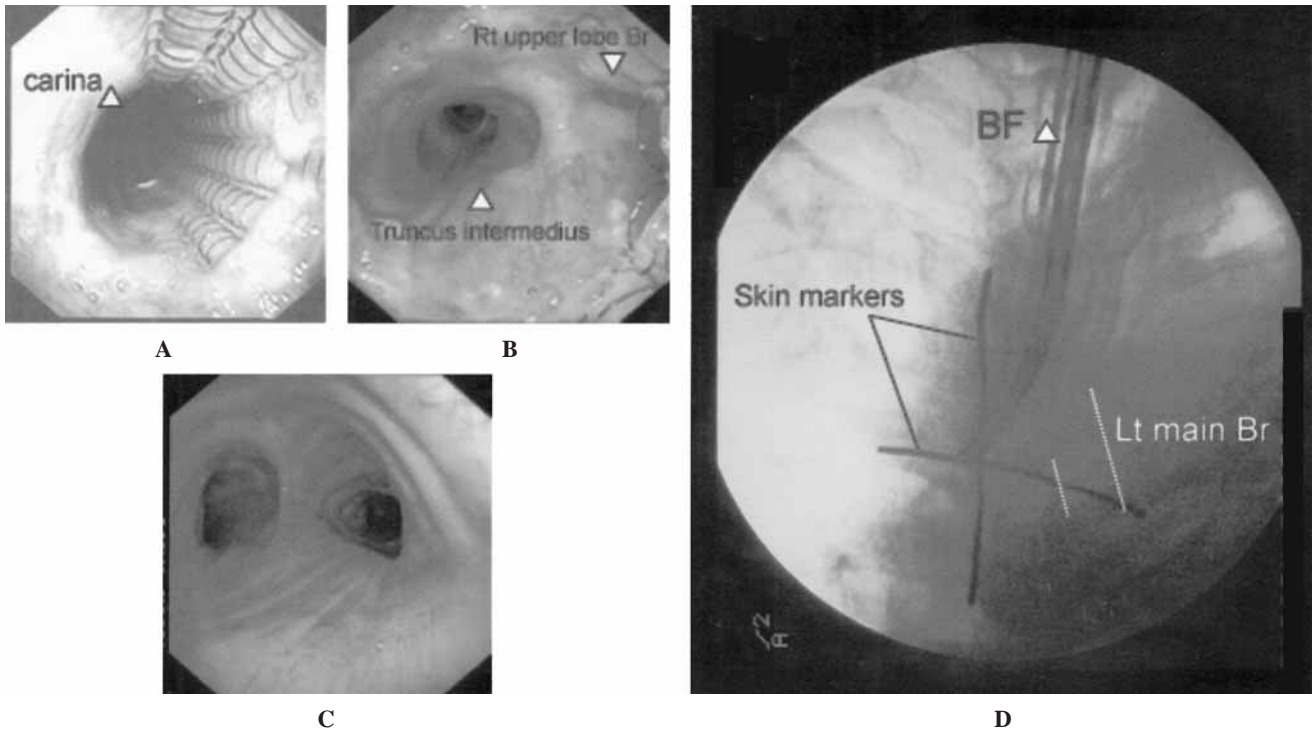
benign disease and that silicone stents should be used because of the difficulty of extraction and the complication of stenosis and granulation with metal stents.<sup>4)</sup> However, we considered that in this case the silicone stent (Dumon stent) would not be appropriate because (1) it does not have flexibility and expandable response, (2) it was an emergency and there was insufficient time to fit the stent to the carina of this patient.

In similar cases, metallic coils and glue have been used for endobronchial occlusion or closure of a bronchopleural fistula.<sup>5,6)</sup> A potential candidates for such an approach would be poor risk patients for surgery who have developed small bronchopleural fistulae<sup>5)</sup> (less than 5 mm in size). Although the bronchopleural fistula was identified with a bronchoscope, the entirety of this bronchus in the left lung was related to the fistula. Bronchial embolization probably was not feasible.

In conclusion, a Ultraflex expandable stent successfully managed an air leak caused by widespread empyema with a bronchopleural fistula. This method may be a new application for this stent.

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**Fig. 2.** Stenting procedure.

Covered ultraflex expandable stent was fully deployed in the right main bronchus (A) without obstruction of the upper lobe bronchus or truncus intermedius at the distal position (B). Two years later, the stent was removed (C). X-ray monitoring during stenting (D). The stent was advanced through a flexible bronchoscope (BF) in right main bronchus.

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