

## Two Successful Cases in the Treatment of Post-operative Bronchial Stump Fistulae

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**We report on two successful cases of managing lung resections that had been complicated by bronchial stump fistulae.**

**In the first case, an endobronchial blocker tube was used to intubate the patient, in order to control inflammation in the event of aspiration pneumonia. This treatment improved the general condition, so we were able to perform a second operation to close the fistula safely. This attachment is very useful in serious cases, allowing intervention before a second operation.**

**In the second case, a bronchial fistula recurred following a second operation, which then healed without surgical treatment. A minimal fistula may heal spontaneously when it is wrapped with an appropriate, vascularized, pedicle flap in advance, and adequate drainage is provided. (Ann Thorac Cardiovasc Surg 2005; 11: 194–7)**

**Key words:** bronchial fistula, endobronchial blocker tube, surgical treatment, interventional therapy

### Introduction

Despite recent advances in surgical techniques, successful management of post-operative broncho-pleural fistula has been a major challenge for thoracic surgeons, and remains so even today. Interventional treatment is often required before a second operation, to close a fistula in unwell patients. Intervention is intended to control infection. We present a case where an endobronchial blocker tube was used as an intubation tube, in order to control inflammation prior to a second operation. This device is considered ideal for patients too unwell to even undergo a fenestration. The goal of the bronchial fistula treatment is to close the fistula completely. Once the lesion is sterilized adequately, the stump should be wrapped with an appropriate material to reinforce it. We are not always able to close it though, which unfortunately means further surgical intervention is required. There are, however, some fistulae that do not need multiple-surgery. We also

report a case in which a stump fistula, following a second operation, healed spontaneously.

### Case Report

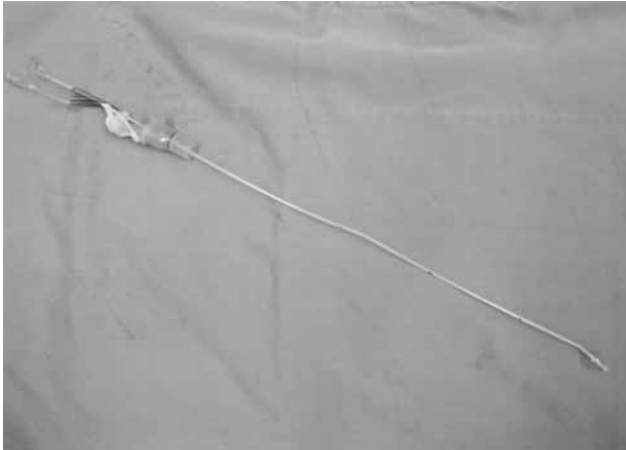
#### Case 1

A 64-year-old male patient with lung cancer was admitted for surgery. He had been in good health. Physical examination and routine laboratory data was not remarkable. The chest CT showed a 1×1×1 cm nodule in the right lower lobe. The bronchofiberscopy biopsy indicated adenocarcinoma. We performed a right lower lobectomy and lymph nodes dissection (ND2a). On day seven after the operation, the patient had a fever. The chest CT showed pneumonia. The stump fistula could not be detected by bronchofiberscopy. On day 14, dehiscence of the stump developed. Surgical treatment to achieve closure was considered, but his physical condition was too poor (due to aspiration pneumonia) to undergo the operation. The fistula was also too large, and too leaky, to be managed by a respirator. We intubated, kept an endobronchial blocker tube in place and inflated a balloon (Fig. 1) at the fistula, to prevent further aspiration and leakage (Fig. 2). After keeping the blocker, air leakage and fluid aspiration were hardly observed. This result allowed us to manage his respiratory condition appropriately, and to dissipate inflammation. We occasionally checked and

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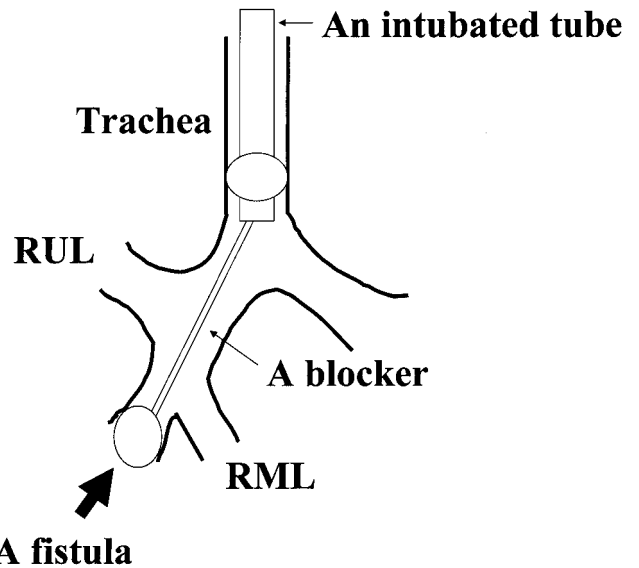


**Fig. 1.** An endobronchial blocker tube (Coopdech, Osaka, Japan).

adjusted the position of the blocker. This was performed very easily and safely by bronchofiberscopy. After his condition improved, we performed a right middle lobe lobectomy, amputating and reclosing the stump five days after intubation. The post-operative course was complicated by Acute Respiratory Distress Syndrome (ARDS) on day three. Respiratory management and medication overcame this episode. As a result, a tracheostomy was performed on day 15 after the second operation. Bronchofiberscopy revealed a complete closure of the stump on day 60.

### Case 2

A 60-year-old patient was admitted on Aug 19, 2003 for an operation on a metastatic lung tumor. In 1998, this patient had had a left hemicolectomy for colonic carcinoma. A right lower lobe lobectomy was performed through a standard posterolateral thoracotomy on Aug 22, 2003. As air leakage was serious on day one, he was returned to theatre to close a torn pleura in the suture line. Although no leakage was observed after the re-operation, empyema presented on day seven. A stump fistula could not be found by bronchofiberscopy. A drainage tube was put in place immediately. Once inflammation had dissipated, however, dehiscence of the stump occurred (on day 47). Our attempt to close bronchoscopically, using fibrin sealant, failed, so the operation was performed on day 61. We reopened the previous posterolateral incision and prepared a latissimus dorsi muscle flap, which was dissected over the existing dissection line to obtain sufficient flap-volume. The stump fistula was amputated and re-closed. The muscle flap revealed sufficient blood sup-

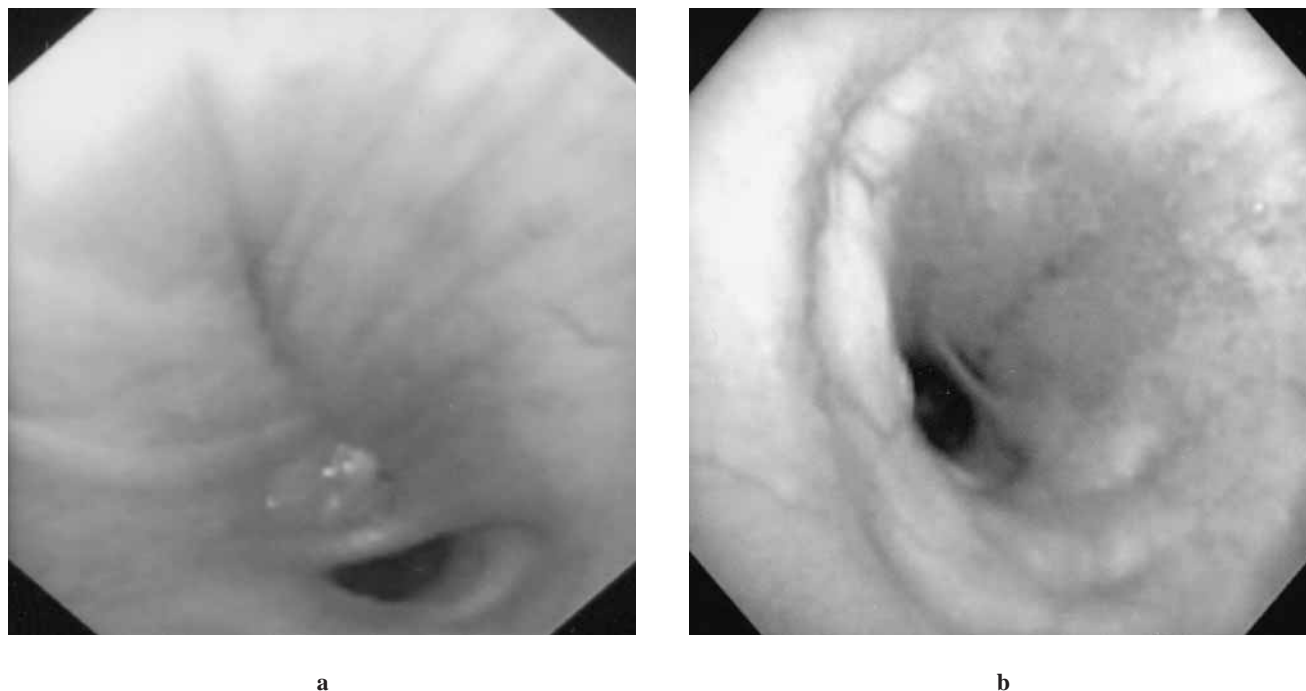


**Fig. 2.** An endobronchial blocker tube balloon was kept at the left lower branch stump to prevent aspiration and to be managed under a respirator. RUL; right upper lobe, RML; right middle lobe.

ply, and no apparent atrophic change macroscopically even at the previous dissection line, so a new stump was wrapped with this muscle flap. Seven days after this operation, the patient became feverish again, and a small abscess was detected around the stump (on the chest CT scan). Bronchofiberscopy showed minor granulation at the stump (Fig. 3a). The drainage tube was kept in, and washed twice daily (with 20% povidone yode). Bacteriological swabs of the drainage fluid tested sterile 34 days after the last operation; the tube was removed and the patient was then discharged. Bronchofiberscopy on day 90 revealed neither leakage nor granulation at the stump (Fig. 3b).

### Discussion

Proper management of postoperative bronchopleural fistula is wholly dependant on the status of the patient. Basically, it is agreed that immediate drainage, and if possible, direct closure of the fistula should be performed. However, when the patient is too poorly and direct closure cannot be performed immediately, it is necessary to intervene and drain. Although draining may be a first option, it could prove insufficient to control the inflammation completely. Fenestration may be effective and useful to sterilize infected lesions, but in serious cases such as ours, even a general anesthetic is not adminis-



**Fig. 3.** Bronchofiberscope showed just a small granulation on day 7 (a) and good adaptation with no granulation on day 90 (b) at the stump after closure and wrapping of the fistula.

trable. An alternative procedure has to be considered. Athanassiadi et al.,<sup>1)</sup> and Van Schil et al.,<sup>2)</sup> suggest the efficacy of endoscopic embolization at the lesion, using fibrin sealant solely; Y. Watanabe et al.,<sup>3)</sup> suggest using silicone; S. Watanabe et al.,<sup>4)</sup> prefer vascular embolization coils with cyanoacrylate glue. These procedures may be suitable for minimal fistulae. The two separate Watanabe groups<sup>3,4)</sup> reported post-resection failure on large fistulae. An endobronchial blocker tube for the intubation tube at the fistula was successful in our first case.

An endobronchial blocker tube is usually used for single-lung ventilation in thoracic surgery. This adaptor proved much better than the conventional double lumen tube (which only allows ventilation in the healthy side). In our Case 1, the adaptor was easier to keep at the correct site. We also could confirm and adjust the position easily by bronchofiberscopy. Moreover, it prevented aspiration and, crucially, secured other bronchial branches for ventilation. Such ventilation was made available from both the diseased side (with fistula) and the healthy (fistula-free) side. Case 1 showed this to be a beneficial course of treatment.

Once infection is controlled, closure and reinforcement of the fistula should be considered. A pedicled flap, (intercostal, latissimus dorsi muscle, or greater omentum)

is often used.<sup>5)</sup> The greater omentum is a very effective material, because it is rich in lymphocytes, macrophages and monocytes; these control local infection and improve disrupted microcirculation.<sup>6)</sup> However, there are fewer options in the event of failure. The pedicled muscle flap does supply neovascularity, and provides mechanical support of the bronchial anastomosis,<sup>5)</sup> just as effectively as an omental flap. A muscle flap can also be easily obtained at thoracotomy and, unlike an omental flap, does not necessitate laparotomy. In Case 2, we used a pedicled latissimus dorsi muscle flap that had already been divided at the initial operation. Kadokura et al.<sup>7)</sup> reported a successful case of post lobectomy empyema treated by plompage with a pedicled latissimus dorsi muscle flap divided previously and confirmed good circulation of the flap by postoperative angiography. In our case, since a long and large flap was required, we used a latissimus dorsi muscle flap divided in the first operation. It would have been better to prepare a “new” flap, which had no previous dissection line. Nomori et al.<sup>8)</sup> recommended a pectoralis major and minor, Kitami et al.<sup>9)</sup> used a latissimus dorsi muscle dissected under the existing dividing line instead of using a previously divided pedicled muscle flap. However, a volume of the flap is required to ensure no dead space in the empyemic cavity. In addition, pedicled flaps other

than the latissimus dorsi muscle, such as pectoralis major, minor or serratus anterior sometimes have inadequate length and volume to wrap a fistula and to fill the cavity. In cases where the post-standard thoracotomy, using a muscle flap previously dissected could be an option to consider, as long as the divided muscle has no serious damage. Although we did not perform angiography, we recommend pre-operatively confirming blood supply for a muscle which is to be divided.

It is debatable whether an operation or conservative therapy is better in cases where the fistula is small and the patient's general condition is stable. Since an operation for a stump fistula is usually invasive, an effective non-operative therapy would be less detrimental. It is relatively difficult to determine precise criteria for a non-operative therapy because fistulae cases vary individually. Some authors report that minimal fistula heal spontaneously (without operative procedures), when an effective reinforcement is provided,<sup>10,11</sup> as in our second case study. These successful non-operative cases indicate that the criteria for success are:

- 1) a small fistula,
- 2) use of a vascularized flap to reinforce the stump,
- 3) adequate drainage to sterilize the lesion.

We reported two successful courses of management for post-operative bronchial stump fistulae. The endobronchial blocker tube we used was very useful to close a fistula temporarily. When the fistula is small, spontaneous healing may occur if appropriate reinforcement and effective drainage are provided.

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