

Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Effective treatment of empyema with bronchopleural fistula after esophagectomy by endobronchial embolization using endobronchial Watanabe Spigots

Shinsuke Uchida^a, Hiroyasu Igaki^{a,*}, Takehiro Izumo^b, Yuji Tachimori^a^a Department of Esophageal Surgery, National Cancer Center Hospital, Tokyo, Japan^b Department of Endoscopy, Respiratory Endoscopy Division, National Cancer Center Hospital, Tokyo, Japan

ARTICLE INFO

Article history:

Received 2 October 2016

Received in revised form

15 November 2016

Accepted 16 November 2016

Available online 24 January 2017

Keywords:

Empyema

Bronchopleural fistula

Esophagectomy

Endobronchial embolization

Endobronchial watanabe spigot

ABSTRACT

INTRODUCTION: Empyema and bronchopleural fistula are well known complications after thoracic surgery. We report a case of refractory air leakage of bronchopleural fistula in a patient with empyema that was successfully treated by endobronchial embolization using Endobronchial Watanabe Spigots (EWSs).

PRESENTATION OF CASE: A 71-year-old man underwent esophagectomy for primary esophageal cancer. A right empyema with bronchopleural fistula (BPF) developed four months after surgery. Right thoracic drainage tube was inserted. Although the empyema was treated by drainage and anti-biotics therapy, the air leakage was apparent. The chest computed tomography (CT) scan revealed that the bronchopleural fistula existed in the segment 6 and 10. Endobronchial embolization was performed to the responsible bronchus using EWSs. After the EWSs of middle and large sizes were inserted into the B⁶c and B¹⁰b + c, the air leakage was stopped. The thoracic tube of drainage was removed after endobronchial embolization. Complications due to the EWSs insertion were not observed, and the patient was discharged.

DISCUSSION: The management of BPF has evolved over the years. Surgical approach is frequently needed to control the BPF, though endobronchial embolization is effective in closing the BPF in some patients. In our case, EWSs of middle and large size were useful to control air leakage. We safely retried the 2nd endobronchial embolization using the EWS. The patient had no complication after insertion of the EWS again.

CONCLUSION: Endobronchial embolization using EWSs was an effective treatment of an empyema with bronchopleural fistula after esophagectomy.

© 2016 Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Empyema is one of the most serious complications after esophagectomy [1]. Furthermore, the treatment of empyema with bronchopleural fistula (BPF) is often difficult [2]. We reported a case of refractory air leakage of bronchopleural fistula in a patient with empyema that was successfully treated by endobronchial embolization using endobronchial Watanabe spigots (EWSs).

2. Clinical summary

A 71-year-old man with advanced esophageal cancer, clinical stage was cT3N1M0 stage IIIA was referred to our hospital. He underwent esophagectomy with video assisted thoracic surgery

accompanied by reconstruction of the stomach through the posterior sternum after induction chemotherapy. The postoperative course was uneventful and he was discharged from our hospital at 14th postoperative day. There were no anastomotic complications after esophagectomy, checked by videofluorography and endoscopy. However, the patient had fever, fatigue, and cough four months after surgery. A right lung abscess of the segment 6 was revealed by chest computed tomography (CT) (Fig. 1A). The CT showed no abscess around the anastomosis. Anti-biotics of oral intake was not effective and the patient developed the right empyema, and he was admitted to our hospital. When we inserted a drainage tube into his right thoracic space, air leakage was observed. Although, the empyema was controlled by the drainage and intra venous anti-biotics therapy, air leakage continued. The thin-section chest CT showed that the BPF existed in the segment 6 and 10 (Fig. 1B). Endobronchial embolization was performed to the responsible bronchus using EWSs (Novatech, Cedex, France). The EWSs were inserted through an endotracheal tube under local anesthesia with moderate sedation to allow sponta-

* Corresponding author at: Department of Esophageal Surgery, National Cancer Center Hospital, 1-1 Tsukiji 5-chome, Chuo-ku, Tokyo, 104-0045, Japan.
E-mail address: hiigaki@ncc.go.jp (H. Igaki).

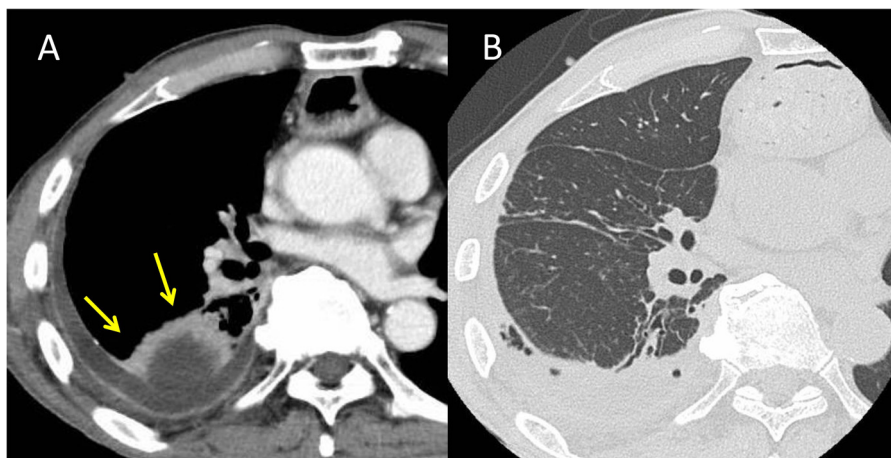


Fig. 1. (A) Chest contrast-enhanced computed tomography shows lung abscess in the right lower lobe. (B) Chest computed tomography on admission shows that the bronchopleural fistula.

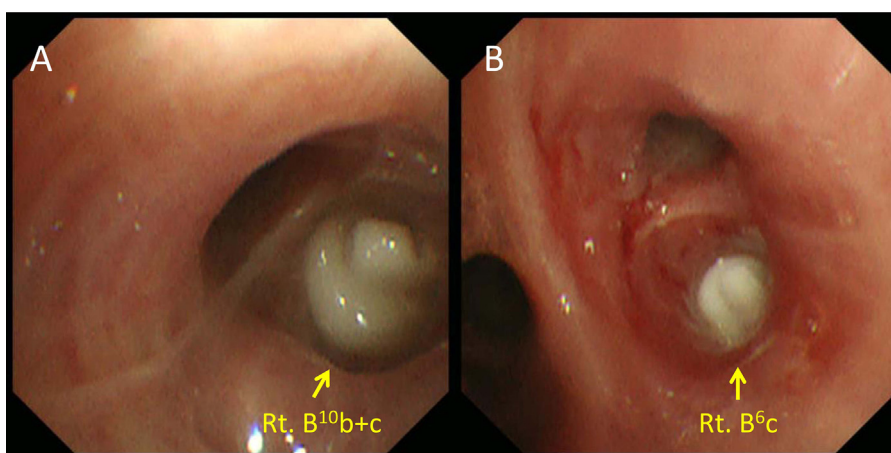


Fig. 2. (A) An EWS (large) was inserted into the right B^{10b+c} bronchus. (B) An EWS (middle) was inserted into the right B^{6c} bronchus.

neous breathing. Vital signs and oxygen saturation were monitored during endobronchial embolization. One EWS of middle size (EWS-M) was inserted tightly into the B^{6c} and the other EWS of large size (EWS-L) into the B^{10b+c} (Fig. 2A). After the EWSs insertion, the patient began to recover from anesthesia, and the air leakage was eliminated. The patient coughed up the EWS in the B^{6c} two days after first endobronchial embolization. We retried the endobronchial embolization using the EWS-M into the B^{6c} (Fig. 2B). As a result, the air leakage completely disappeared. The thoracic tube of drainage was removed two days after 2nd endobronchial embolization. Complications due to the EWSs insertion were not observed, and the patient was discharged from our hospital 6 days after the 2nd bronchial embolization. The patient was followed six months later, empyema was not occurred and the patient was in good general condition and no recurrence of cancer.

3. Discussion

Empyema and BPF are well known complications following thoracic surgery [1]. Furthermore, the treatment is often difficult due to the poor general conditions of the patient [2]. Especially, the patients who underwent esophagectomy often had low serum albumin. Low serum albumin is associated with postoperative complications, so that the clinician should consider the finding of low serum albumin in these patients, together with disease and surgical factors to provide optimal care for these patients [3]. Previous study

reported that postoperative complications rates of empyema and BPF were 2.3% and 0.3% after esophagectomy [1]. Lung abscess is commonly caused by aspiration pneumonia in patients with poor condition. In our case, the patient had vocal cord palsy and low level of serum albumin. Aspiration, which caused lung abscess, frequently occurred after esophagectomy. The lung abscess slightly ruptured and spread to thoracic cavity, which caused empyema. Additionally, the patient was diagnosed to have a fistula of the peripheral bronchus at S⁶ and S¹⁰ by the thin-section CT findings.

The management of BPF has evolved over the years. Surgical approach is frequently needed to control the BPF, though endobronchial embolization is effective in closing the BPF in some patients [2,4]. Though endobronchial embolization using gauze, a polyvinyl sponge, fibrin glue, one way valve was reported, still there have been controversies as to the methods [4]. EWS was developed by Watanabe et al. and reported the effectiveness in reducing air leakage by endobronchial occlusion to the bronchus [5]. EWS was made of silicone and specially constructed. EWS are available in three sizes based on diameters of 5 mm (small), 6 mm (middle), and 7 mm (large). EWS-M should be used mainly at the level of the sub-segmental bronchus [5]. The most complication associated with endobronchial embolization using an EWS is migration [4]. In our case, EWSs of middle and large size were useful to control air leakage. We safely retried the 2nd endobronchial embolization using the EWS because the patients coughed up the EWS. The patient had no complication after insertion the EWS again. There

have been no reports as to the long-term follow-up after EWS insertion. Further studies are required to reveal the long-term safety of the placement of an EWS.

In this case, we emphasized the value of Endobronchial Watanabe Spigot (EWS) use in bronchial embolization. Embolization with EWS is one of the first line options in conservative management of BPF after esophagectomy. Furthermore, we safely retried the 2nd endobronchial embolization using the EWS.

Certainly, there are some reports about endobronchial embolization for postoperative bronchopleural fistula (BPF) after pulmonary resection. However, there are a few reports after esophagectomy. Some patients have aspiration pneumonia after esophagectomy because of the recurrent nerve palsy or lack of cough reflex. In this case, the aspiration pneumonia occur the lung abscess. The lung abscess ruptured and spread to thoracic cavity, which caused empyema. So esophageal surgeon need to know the conservative treatment using EWS. Even though the patient had empyema with BPF, endobronchial embolization using EWSs was an effective treatment to control the refractory air leakage from BPF.

Conflict of interest statement

There are no conflicts of interest to declare.

Funding

This study was supported by the National Cancer Center Hospital.

Ethical approval

IRB approval not required per institutional policy for case report.

Consent

Informed consent was obtained from the patient for publication of this case report, including the accompanying, deidentified images.

Author contribution

Uchida S.-study design, collection of data, analysis, writing.

Igaki H.-study design, collection of data, supervision.

Izumo T.-collection of data, supervision.

Tachimori Y-supervision.

The authors thank Takaaki Tsuchida and Yuji Matsumoto for technical advice for using EWSs. Kazuo Koyanagi and Fumihiko Kato contributed to clinical and radiological evaluations and productive discussions.

Guarantor

Hiroyasu Igaki.

Acknowledgments

The authors thank Takaaki Tsuchida and Yuji Matsumoto for technical advice for using EWSs. Kazuo Koyanagi and Fumihiko Kato contributed to clinical and radiological evaluations and productive discussions.

References

- [1] S. Sihag, A.S. Kosinski, H.A. Gaissert, C.D. Wright, P.H. Schipper, Minimally invasive versus open esophagectomy for esophageal cancer: a comparison of early surgical outcomes from the society of thoracic surgeons national database, *Ann. Thorac. Surg.* 101 (2016) 1281–1289.
- [2] T. Osaki, H. Matsuura, Thoracic empyema and lung abscess resulting from gastropulmonary fistula as a complication of esophagectomy, *Ann. Thorac. Cardiovasc. Surg.* 14 (2008) 172–174.
- [3] S.L. Goh, R.P. De Silva, K. Dhital, R.M. Gett, Is low serum albumin associated with postoperative complications in patients undergoing oesophagectomy for oesophageal malignancies? *Interact. Cardiovasc. Thorac. Surg.* 20 (2015) 107–113.
- [4] S. Sasada, K. Tamura, Y.S. Chang, N. Okamoto, Y. Matsuura, M. Tamiya, et al., Clinical evaluation of endoscopic bronchial occlusion with silicone spigots for the management of persistent pulmonary air leaks, *Intern. Med.* 50 (2011) 1169–1173.
- [5] Y. Watanabe, K. Matsuo, A. Tamaoki, et al., Bronchial occlusion with Endobronchial Watanabe Spigot, *J. Bronchol.* 10 (2003) 264–267.

Open Access

This article is published Open Access at [sciencedirect.com](https://www.sciencedirect.com). It is distributed under the [IJSCR Supplemental terms and conditions](#), which permits unrestricted non commercial use, distribution, and reproduction in any medium, provided the original authors and source are credited.