



## Case Report

## Thickened parietal pleural covering in intractable pneumothorax: A case report



Hiroki Matsumiya<sup>a,\*</sup>, Masataka Mori<sup>a</sup>, Masatoshi Kanayama<sup>a</sup>, Akihiro Taira<sup>a</sup>,  
Shinji Shinohara<sup>a</sup>, Masaru Takenaka<sup>a</sup>, Koji Kuroda<sup>a</sup>, Yoshinobu Ichiki<sup>b</sup>, Fumihiro Tanaka<sup>a</sup>

<sup>a</sup> Second Department of Surgery, School of Medicine, University of Occupational and Environmental Health, Kitakyushu, Japan

<sup>b</sup> Department of General Thoracic Surgery, National Saitama Hospital, Wako, Saitama, Japan

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## ABSTRACT

**Introduction and importance:** Choosing the optimal surgical approach for intractable pneumothorax can be challenging for surgeons.

**Case presentation:** A case describing the management of intractable pneumothorax has been presented.

**Clinical discussion:** Resection is not suitable in a stiff lung from repeated pleurodesis, and multiple air leakage points would make it more intricate. The ideal alternative is the use of another material to cover the entire lesion.

**Conclusion:** A thickened parietal pleura covering is an effective surgical approach for intractable pneumothorax.

## 1. Introduction and importance

The optimal choice of surgical treatment for intractable pneumothorax is complex. If air leaks are present, making resection unsuitable, and pleurodesis [1], fibrin glue injection [2], covering with artificial material [3], bronchial occlusion using Endobronchial Watanabe Spigot (silicone spigot, EWS®, Novatech, LaCiotat, France) [4], and the use of other bronchial valves must be considered. Treatment failure using these approaches necessitates the consideration of an autologous material for covering [5]. Herein, we report a case where covering with a thickened parietal pleura effectively controlled intractable pneumothorax. To the best of our knowledge, this is the first report describing the use of an autologous material covering for persistent air leaks. We believe that this method is effective for intractable pneumothorax where covering with broad autologous tissues is required. The SCARE 2020 criteria were followed in reporting this case [6].

## 2. Presentation of case

A 75-year-old man was referred to our department for the treatment of intractable pneumothorax. The condition had lasted for 2-months despite the placement of a thoracic tube, three courses of pleurodesis with OK-432 (Picibanil, Chugai: Pharmaceutical Co. Ltd, Tokyo, Japan), bronchial occlusion with EWS, and two surgical procedures (covering

with a polyglycolic acid sheet using fibrin glue and an attachment of intercostal muscle flap) at another hospital, previously. The patient was a past smoker with BI1000 and was administered with steroids for the management of organizing pneumonia at the age of 64 years. At the time of presentation, the patient had a non-contributory family history, no ongoing medications, no history of alcohol consumption, allergies or discontinuation of medication. He had a long history of treatment for pneumothorax, which had left him emotionally distressed. No other significant physical findings were detected. At our hospital, a chest radiograph revealed a large pneumothorax (Fig. 1A). Pleurodesis was performed three times after inserting a chest tube, resulting in a narrowed air space (Fig. 1B). However, the air leakage persisted, necessitating surgical intervention. The patient was placed in the left lateral decubitus position under general anesthesia. A lateral incision was made extending from the fourth intercostal space to the second rib and down to the eighth rib. Extrapleural dissection of the thickened parietal pleura was performed bluntly with fingers to cover the air space (Fig. 2). Seratus anterior was placed in the extrapleural space to eliminate it. Two chest tubes were also placed in the collapsed thoracic cavity and extrapleural space (Fig. 1C). The postoperative course was uneventful. After drain removal, the pleural space was completely obliterated, and fluid was observed in the extrapleural space (Fig. 1D). Thereafter, the fluid in the extrapleural space was gradually absorbed, and satisfactory expansion of the left lung was observed (Fig. 1E). The patient was

\* Corresponding author. Second Department of Surgery, School of Medicine, University of Occupational and Environmental Health, Yahatanishi, Kitakyushu, 807, Japan.

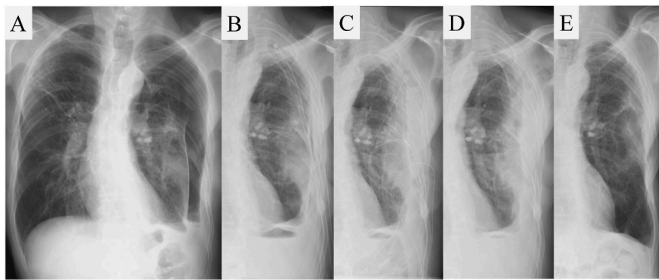
E-mail address: [matsumiyahiroki@med.uoeh-u.ac.jp](mailto:matsumiyahiroki@med.uoeh-u.ac.jp) (H. Matsumiya).

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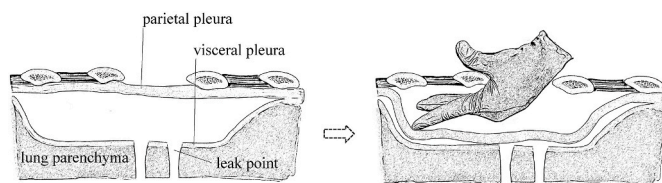
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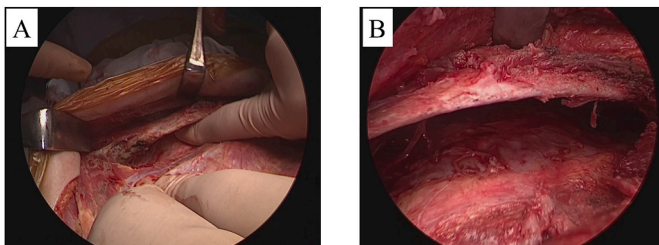
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**Fig. 1.** Chest radiographic findings over time. (A) Immediately after hospitalization, a large left pneumothorax was visible. (B) After three pleurodeses courses, the intrathoracic air space narrowed. (C) Post-surgery, the air space was completely eliminated. (D) After the drain removal, the pleural space was completely obliterated, and fluid was observed in the extrapleural space. (E) At seven months post-surgery, pleural effusion in the extrapleural space completely disappeared, with satisfactory expansion of the left lung.



**Fig. 2.** Illustration of the surgical procedure. A thickened parietal pleura was present just below the ribs and intercostal muscles. Air leakage was observed at multiple points. The parietal pleura was dissected bluntly with fingers, constituting the autologous material used to cover the whole visceral pleura.



**Fig. 3.** Intraoperative view. (A) Blunt dissection with fingers was started at the lower edge of the fourth rib. (B) Extrapleural dissection separated the parietal pleura from the ribs and intercostal muscles.

discharged on postoperative day 17. No recurrence was observed three years after surgery (see Fig. 3).

### 3. Clinical discussion

Covering with a thickened parietal pleura, we controlled persistent air leakage which was resistant to chest tube placement, pleurodesis, bronchial occlusion with EWS, and treatment with polyglycolic acid sheets using fibrin glue and the attachment of an intercostal muscle. Kawachi et al. previously reported a method of pleural tenting to prevent the recurrence of pneumothorax [7]. While pleural tenting utilizes the normal thin parietal pleura, the covering presented in this case utilizes thickened parietal pleura to occlude the air leakage point. Thickened pleura are considered more resistant to leakage from the fistula than thin pleura. In this case, the surgical findings of the previous surgeon suggested that the lung was stiff with the presence of multiple air leakage points on the left lower lobe. The need to cover these points with an autologous material informed our selection of the thickened parietal pleura. The parietal pleura was thickened due to repeated pleurodesis or chronic inflammation, making it a good fit as an

autologous material to cover the entire visceral pleura.

### 4. Conclusion

A thickened parietal pleura covering is suitable for patients with a stiff lung and persistent air leakage at multiple points. This may be an effective surgical alternative for intractable pneumothorax.

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### Ethical approval

The Ethics Committee of the University of Occupational and Environmental Health Japan approved this study. (21–065)

### Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

### Author contribution

Hiroki Matsumiya; Writing the paper, Study design, follow up of the patient. Masataka Mori, Masatoshi Kanayama, Akihiro Taira, Shinji Shinohara, Masaru Takenaka, Koji Kuroda, Yoshinobu Ichiki; follow up of the patient. Fumihiro Tanaka; Study design, Supervision. All authors read and approved the final manuscript.

### Registration of research studies

Not applicable.

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### Provenance and peer review

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### Declaration of competing interest

The authors declare no conflict of interest associated with this manuscript.

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### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2022.103792>.

### References

- [1] G.H. Almassi, G.B. Haasler, Chemical pleurodesis in the presence of persistent air leak, *Ann. Thorac. Surg.* 47 (1989) 786–787, [https://doi.org/10.1016/0003-4975\(89\)90150-1](https://doi.org/10.1016/0003-4975(89)90150-1).
- [2] Y. Yasuda, A. Mori, H. Kato, S. Fujino, S. Asakura, Intrathoracic fibrin glue for postoperative pleuropulmonary fistula, *Ann. Thorac. Surg.* 51 (1991) 242–244, [https://doi.org/10.1016/0003-4975\(91\)90794-q](https://doi.org/10.1016/0003-4975(91)90794-q).

- [3] S. Lee, S.Y. Park, M.K. Bae, J.G. Lee, D.J. Kim, K.Y. Chung, C.Y. Lee, Efficacy of polyglycolic acid sheet after thoroscopic bullectomy for spontaneous pneumothorax, *Ann. Thorac. Surg.* 95 (2013) 1919–1923, <https://doi.org/10.1016/j.athoracsur.2013.03.011>.
- [4] Y. Watanabe, K. Matsuo, A. Tamaoki, R. Komoto, S. Hiraki, Bronchial occlusion with endobronchial Watanabe spigot, *J. Bronchol.* 10 (2003) 264267, <https://doi.org/10.2169/internalmedicine>.
- [5] D.C. Hammond, J. Fisher, N.B. Meland, Intrathoracic free flaps, *Plast. Reconstr. Surg.* 91 (1993) 1259–1264.
- [6] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, For the SCARE group, the SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* 84 (2020) 226–230, <https://doi.org/10.1016/j.ijvs.2020.10.034>, doi:.
- [7] R. Kawachi, R. Matsuwaki, K. Tachibana, S. Karita, Y. Nakazato, R. Tanaka, Y. Nagashima, H. Takei, H. Kondo, Thoracoscopic modified pleural tent for spontaneous pneumothorax, *Interact. Cardiovasc. Thorac. Surg.* 23 (2016) 190–194, <https://doi.org/10.1093/icvts/ivw182>.