

Successful recovery of an anastomotic fistula in right sleeve pneumonectomy after excessive radiotherapy



Hiroyuki Ito, MD, Takuya Nagashima, MD, Tetsuya Isaka, MD, and Haruhiko Nakayama, MD, Kanagawa, Japan

From the Department of Thoracic Surgery, Kanagawa Cancer Center, Kanagawa, Japan.

Received for publication Sept 6, 2023; revisions received Sept 27, 2023; accepted for publication Oct 3, 2023; available ahead of print Oct 17, 2023.

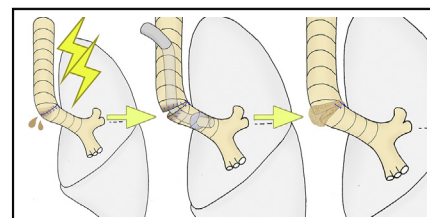
Address for reprints: Hiroyuki Ito, MD, 2-3-2 Nakao, Asahi, Yokohama, Kanagawa 241-8515, Japan (E-mail: JZA01742@nifty.com).

JTCVS Techniques 2024;23:109-12

2666-2507

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<https://doi.org/10.1016/j.xjtc.2023.10.001>



Anastomotic failure after 84.7-Gy radiation managed with deep intubation and nutrition.

CENTRAL MESSAGE

A case of recovery from a lethal complication of right sleeve pneumonectomy after 84.7 Gy of high-dose radiation therapy is discussed.

▶ Video clip is available online.

Lung cancer surgery after high-dose radiation is sometimes performed as salvage surgery.¹⁻³ Fibrotic tissue changes and microvessel elimination may hinder dissection and healing, especially in the case of a bronchoplastic procedure.³ Here, we report a case of recovery from a lethal complication of right sleeve pneumonectomy after 84.7 Gy of high-dose radiation therapy. This report was approved by the Ethics Committee of the Kanagawa Cancer Center (2023EKI-79; August 28, 2023). Written informed consent was obtained from the patient and his family member for the publication of this study data.

CASE REPORT

A 49-year-old man with progressive shortness of breath and dyspnea was referred to our hospital. Six years previously, he had been treated for c-T4N2M0 stage IIIB lung adenocarcinoma with chemotherapy and sequential proton radiotherapy at another facility. Computed tomography (CT) of the chest and 3-dimensional CT showed stenosis around the carina and right main bronchus (Figure 1, A, and Video 1). Bronchoscopy confirmed stenosis of the lower trachea, carina, and right main bronchus, and the bronchus intermedius could not be observed (Figure 1, B). Positron emission CT showed no evidence of recurrence; % forced expiratory volume 1.0, 39.7%, gradually worsening from 46.1% a month previously. A late complication of radiotherapy was suspected, and a previous facility reported that 77 Gy of proton beam (equal to 84.7 Gy of photon beam) had been delivered. The reason for this was unknown (Figure 1, C). Surgical treatment with bronchoplasty was considered too difficult and risky, and airway

stenting was considered first. However, placement of a Y-shaped Dumon stent was impossible because of the deformation of the carina. Long-term survival with an I-shaped stent was not expected due to unavoidable pneumonia. We explained the high risk of surgery and the high possibility of lethal complications. However, the patient preferred high-risk treatment with the possibility of long-term survival.

With the permission of the cancer board, right sleeve pneumonectomy was performed instead of complex bronchoplasty. This creates only one anastomotic site, and airway management is easier if anastomotic failure occurs. To promote healing of the anastomotic site and separate the stump of the main pulmonary artery, omentopexy was performed. Surgery was successfully performed (Video 2), and the postoperative course was good until postoperative day (POD) 12. Excessive fatty sputum expectoration with high-grade fever occurred. Bronchoscopy revealed a break at the anastomotic site (Figure 2, A). Based on the diagnoses of anastomotic failure and empyema, fenestration of the anterior chest wall at the shortest drainage path was performed (Figure 2, B). After surgery, intubation was maintained deeper than the anastomotic site and respiration was maintained without placing the left decubitus position. Bronchoscopy revealed that the broken anastomotic site gradually recovered through gauze drainage 2 to 3 times a day and sufficient tube feeding (Figure 2, C, and Video 3).

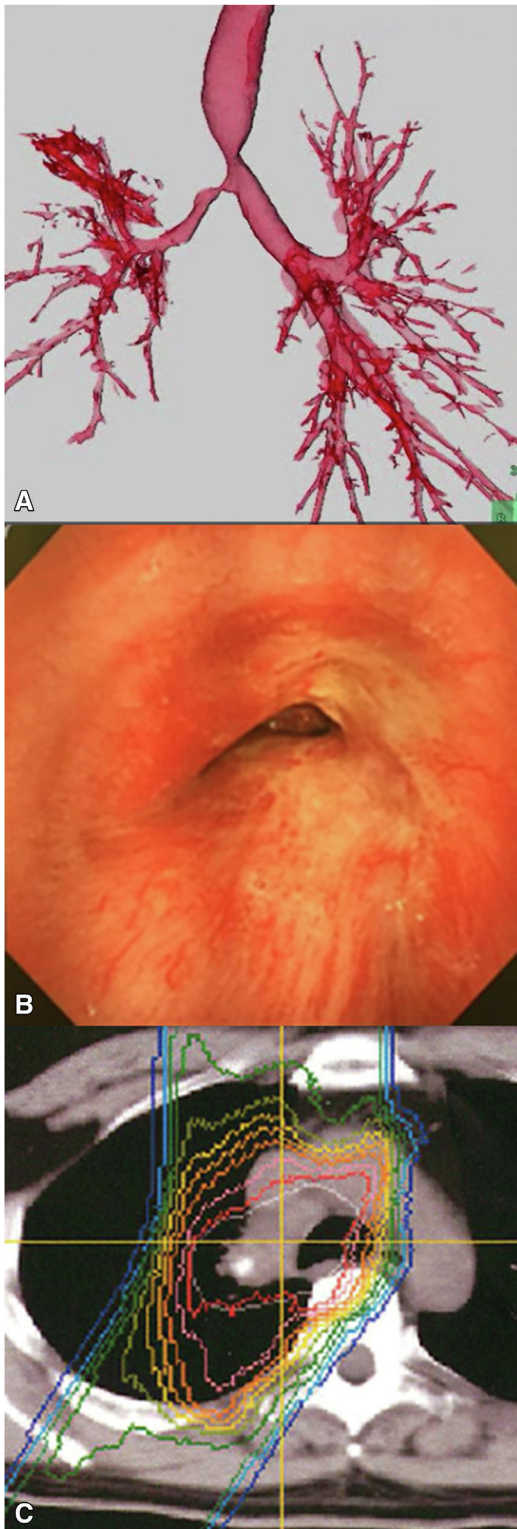
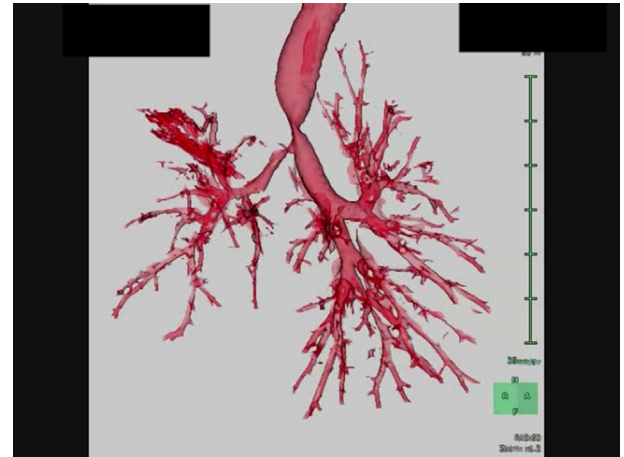


FIGURE 1. A, Three-dimensional computed tomography showing severe stenosis around the lower trachea, carina, and right main bronchus. B, Bronchoscopic findings showing stenosis of the lower trachea, and the damage mainly in the right side. C, Radiotherapy map showing 77 Gy of proton beam had been mainly delivered to the right pulmonary hilum.

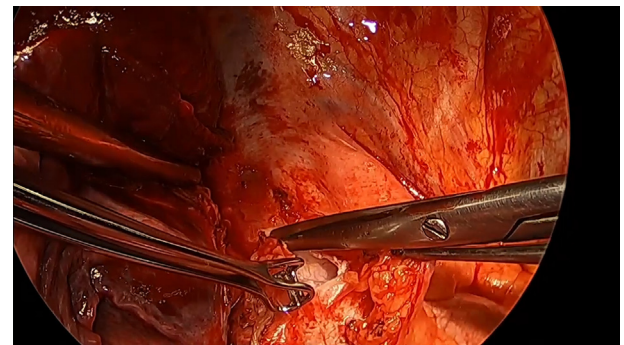


VIDEO 1. Computed tomography of the chest and 3-dimensional computed tomography showing atelectasis of the right upper lobe and stenosis around the lower trachea, carina, and right main bronchus. Video available at: [https://www.jtcvs.org/article/S2666-2507\(23\)00379-6/fulltext](https://www.jtcvs.org/article/S2666-2507(23)00379-6/fulltext).

Air leakage from the anastomotic site was stopped by granulation on POD 46, and the patient was weaned off the respirator from POD 67 and discharged on foot on POD 116. The fenestration closed naturally (Figure 2, D), and the patient continues to work 4 years after surgery.

DISCUSSION

It is well known that radiation therapy causes tissue damage and increases complications, including airway stenosis, particularly at greater doses.⁴ There have been no reports, to our knowledge, of bronchial anastomosis performed after excessive radiation, as in this case, and we understood the



VIDEO 2. Right sleeve pneumonectomy using the posterolateral approach. The hilum was stony and hard, and the tension at the anastomotic site was extremely weakened. The cut length was approximately 3 cm, and no excessive tension was noted during the operation. We released the area around the anterior wall of the left main bronchus but not the upper trachea. Omentopexy was added to increase anastomotic healing and protection. The operative time was 9 hours, 33 minutes, and blood loss was 410 g. Video available at: [https://www.jtcvs.org/article/S2666-2507\(23\)00379-6/fulltext](https://www.jtcvs.org/article/S2666-2507(23)00379-6/fulltext).

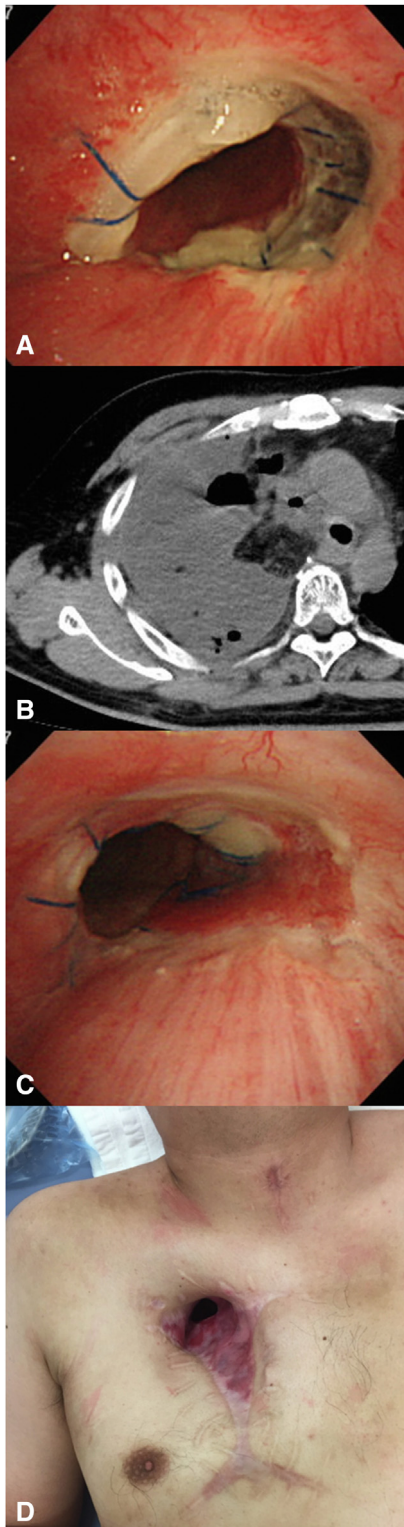


FIGURE 2. A, Bronchoscopic findings at POD 12 showing anastomotic site break, especially on the right side. B, CT showed the shortest drainage path from break site was anterior chest wall. C, On POD 46, the fistula is covered with granulation. D, A year after surgery, fenestration of the anterior chest wall is almost filled, and the patient can take a shower.



VIDEO 3. Bronchoscopy on POD 32 revealing a deteriorated broken anastomotic site; however, it was gradually repaired and covered with granulation. A fistula could not be seen on POD 64. Video available at: [https://www.jtcvs.org/article/S2666-2507\(23\)00379-6/fulltext](https://www.jtcvs.org/article/S2666-2507(23)00379-6/fulltext).

possibility that the healing mechanism would not work well. Anastomotic failure during sleeve pneumonectomy can be fatal. Airway stenting is a reliable and suitable treatment option for central airway stenosis; however, long-term survival cannot be expected due to complications such as pneumonia, dislocation, and bleeding.⁵ Surgery, in this case, was very risky, and anastomotic fistula was an expected and lethal complication; however, there was a possibility of long-term survival if successful. The reasons this patient survived were as follows: pneumonia did not occur; the mediastinum, including the stump of the pulmonary artery, was covered with omentum and isolated from the empyema; and the fenestration provided good drainage from the beginning of the empyema. Granulation from the omentum was good, and the fistula could be covered and filled in a short time. In addition, the patient was relatively young, enteral nutrition was started early to maintain adequate systemic management, and cooperation with intensive care physicians enabled intubation deeper than the anastomotic break site and maintained good respiratory management.

Excessive radiation therapy can damage tissues and delay healing after surgery. This patient recovered completely. Treatment selection in this situation should be extremely cautious, and the decision should be made after a thorough discussion at a multidisciplinary level, taking the patient's preference into account.

Conflict of Interest Statement

The authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

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