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World Journal of Surgery and Surgical Case Reports

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Vol: 1 & Iss: 3

Perioperative Management and Optimal Timing of Surgery in Lung Cancer Complicated by Uncontrollable Obstructive Pneumonia due to Transbronchial Biopsy: A Case Report

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Citation: Motono N, Ishikawa M, Iwai S, Iijima Y, Uramoto H. Perioperative Management and Optimal Timing of Surgery in Lung Cancer Complicated by Uncontrollable Obstructive Pneumonia due to Transbronchial Biopsy: A Case Report. *World J Surg Surgical Case Rep*, 2025;1(3):106-109.

Received: 04 December, 2025; **Accepted:** 10 December, 2025; **Published:** 12 December, 2025

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A B S T R A C T

Background: Sleeve lobectomy is indicated for tumors with central localization and extension into the main bronchus or for parabronchial lymph node metastases with bronchial or mucosal infiltration. However, the risk of postoperative complications specifically associated with sleeve lobectomy in lung cancer patients with obstructive pneumonia remains unknown.

Case Report: The 83-year-old man who had a 59-pack-year smoking history was found to have a lesion obstructing the right upper bronchus with complete atelectasis of the right upper lobe on chest computed tomography. In bronchoscopy, the right upper bronchus was obstructed by mass lesion and squamous cell carcinoma was diagnosed by transbronchial biopsy at the deep edge of the mass lesion. Fourteen days after the biopsy, the patient developed obstructive pneumonia and was hospitalized and tazobactam/piperacillin was administered. However, the pneumonia was deemed uncontrollable and urgent radical surgery for lung cancer with obstructive pneumonia was performed on the 5th day of hospitalization. Intraoperative pathological examination revealed lung cancer at the bronchial stump of the right upper lobe and right upper sleeve lobectomy with hilar–mediastinal lymph node dissection was carried out. The patient was discharged without postoperative complications 10 days after surgery. Although adjuvant chemotherapy was not administered because of his advanced age, the patient was alive without recurrence 10 months after surgery. The risk factors for sleeve lobectomy in patients with non-small cell lung cancer who develop obstructive pneumonia have not been elucidated. Accumulating additional cases will be important to clarify these risks in the future.

Keywords: Sleeve lobectomy, Obstructive pneumonia, Bronchoscopy, Non-small cell lung cancer

Abbreviations: APC: Argon Plasma Coagulation; NSCLC: Non-Small Cell Lung Cancer; CT: Computed Tomography; FDG: 18F-Fluoro-2-Deoxy-Glucose; WBC: White Blood Cell; CRP: C-Reactive Protein

1. Introduction

Bronchoscopy is widely used for the diagnosis and treatment of respiratory diseases and is generally considered a safe procedure. Post-bronchoscopy pneumonia is relatively rare, with a reported incidence of 1.4% to 6.3%[1-5]. Risk factors include older age, smoking, bronchial obstruction, necrosis or cavitation, large tumor diameter, lung cancer and central tumor location[1-5]. Although broad-spectrum antimicrobial regimens are usually administered for obstructive pneumonia caused by pulmonary malignancy, the response to therapy is often slow or incomplete because of the obstruction[6]. The post-bronchoscopy pneumonia with lung cancer has been reported as serious condition in itself and risk of delay to treatment for lung cancer[1]. In patients with incomplete responses to antimicrobial therapy, relief of the obstruction is necessary. While surgery is usually the treatment of choice for patients eligible for curative resection, endobronchial treatments such as laser therapy, electrocautery, cryotherapy, Argon Plasma Coagulation (APC) or photodynamic therapy are required for those who are not candidates for surgery[6-8].

Sleeve lobectomy is indicated for tumors with central localization and extension into the main bronchus or for parabronchial lymph node metastases with bronchial or mucosal infiltration. The rate of postoperative complications after sleeve lobectomy reportedly ranges from 16% to 33%[9-13], while postoperative mortality ranges from 0.0% to 4.7%[9,10,12,13]. Reported risk factors for postoperative complications include male sex, comorbidities, current smoking, right-sided resection, longer operation time, squamous cell carcinoma and the presence of lymph node metastasis[10,11]. However, the risk of postoperative complications specifically associated with sleeve lobectomy in lung cancer patients with obstructive pneumonia remains unknown.

We herein report a case involving a patient who underwent urgent sleeve lobectomy for Non-Small Cell Lung Cancer (NSCLC) with uncontrollable obstructive pneumonia following bronchoscopy.

2. Case Presentation

The 83-year-old man who performed an examination of shortness of breath was detected a lesion obstructing the right upper bronchus with atelectasis of the right upper lobe on chest Computed Tomography (CT) and with suspicion of involve to the right hilar lymph node (#12u), following a history of gastric cancer and 59-pack-year smoking history (Figure 1A and 1B). ^{18}F-Fluoro-2-Deoxy-Glucose (FDG) positron emission tomography demonstrated high FDG uptake in the pulmonary lesion (Figure 1C). In bronchoscopy at another institution, the right upper bronchus was obstructed by polypoid mass lesion without suspicion of invasion to the bronchial wall and squamous cell carcinoma was diagnosed by transbronchial biopsy from the tumor protruding into the bronchial lumen. Although the patient was diagnosed with NSCLC, clinical stage IIB[T2aN1(#12u)M0], induction chemotherapy was considered inappropriate because of his advanced age and upfront surgery was planned. However, 14 days after the transbronchial biopsy without administration of prophylactic antibiotics, the patient presented to our hospital with fever. Laboratory tests showed an elevated White Blood Cell (WBC) count and C-Reactive Protein (CRP) level and chest Computed Tomography (CT) demonstrated volume-growth of atelectasis due to complete obstruction of the right upper bronchus without abscess in the right upper lobe (Figure 1D). The patient was admitted on an emergency basis. Despite administration of tazobactam/piperacillin, his high fever persisted and his WBC count and CRP level remained elevated (Figure 2). Enterococcus gallinarum was preoperatively detected in bacterial culture from sputum and the resistance for antimicrobial therapy was suspected. Furthermore, because there was a concern for rapid clinical deterioration due to the persisted high inflammation and a possibility of curative resection by sleeve lobectomy for lung cancer, urgent radical surgery for NSCLC with obstructive pneumonia was performed on the fifth day of hospitalization. After establishing general anesthesia, bronchoscopy confirmed that the right upper bronchus was obstructed by the tumor and intraoperative pathological examination revealed lung cancer at the bronchial stump of the right upper lobe. Consequently, a right upper sleeve lobectomy with hilar–mediastinal lymph node dissection was carried out without intraoperative frozen section analysis at the bronchial anastomosis because sufficient margin was obtained macroscopically. To clarify the blood supply of the bronchial anastomosis, Indocyanine Green (ICG) 5 mg was injected intravenously under fluorescence navigation (1688AIM 4K platform; Stryker, Tokyo, Japan). Operative finding showed clear green staining of the right main bronchus and the truncus intermedius (Figure 3A). Postoperatively, the WBC count and CRP level decreased rapidly and the patient was discharged without complications 10 days after surgery. Histopathological examination confirmed cancer invasion of the right main bronchus, involvement of the hilar lymph nodes (#12u) and widespread obstructive pneumonia in the right upper lobe (Figure 3B and 3C). The pathological stage was IIB [T2aN1(#12u)M0] and the bronchial stump was confirmed to be cancer-free and diagnosed as complete resection. Although adjuvant chemotherapy was not administered because of the patient's advanced age, he was alive without recurrence at the time of this writing (10 months after surgery).

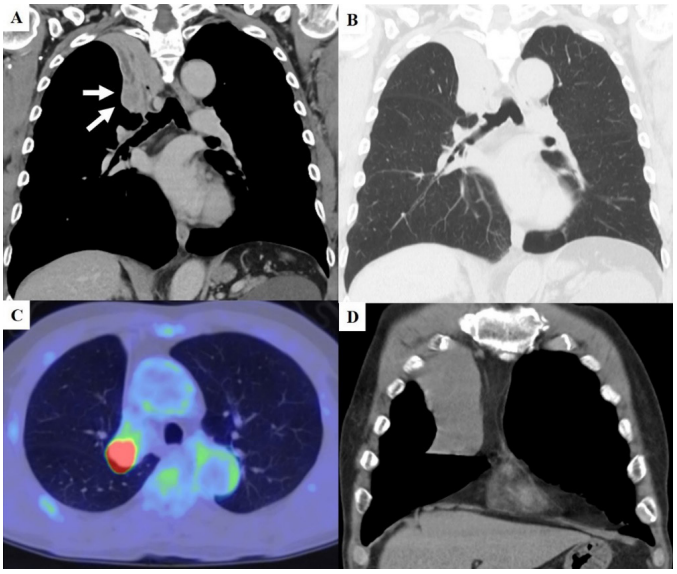

Figure 1: Imaging findings of an 83-year-old man. (A) Mass lesion with suspicion of involve to the right hilar lymph node (#12u) located in the right upper lobe of the lung (arrows). (B) Atelectasis of the right upper lobe. (C) ^{18}F-Fluoro-2-Deoxy-Glucose (FDG) positron emission tomography showing high FDG uptake in the pulmonary lesion. (D) Worsening atelectasis of the right upper lobe.

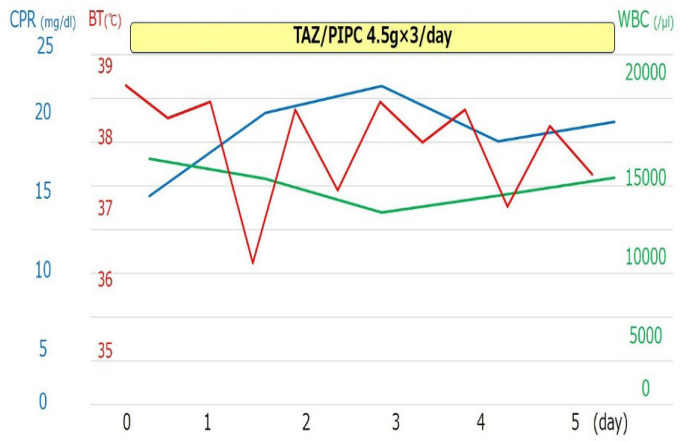

Figure 2: Clinical course after hospitalization. Despite administration of tazobactam/piperacillin, the high fever persisted and the white blood cell count and C-reactive protein level remained elevated.

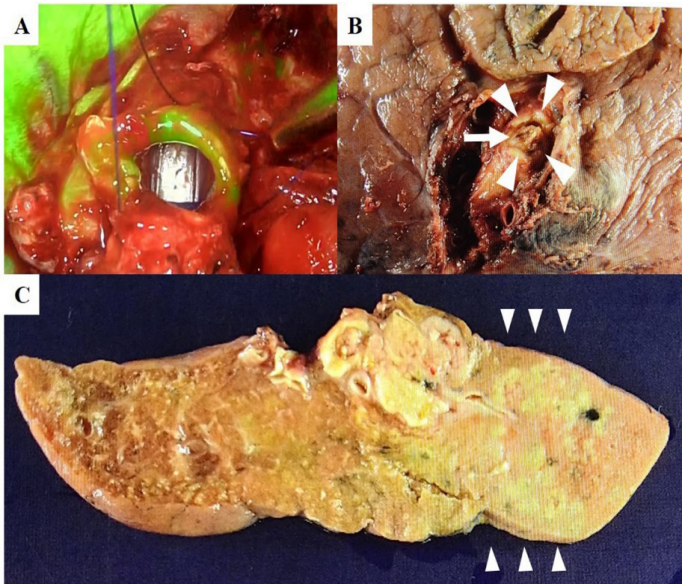

Figure 3: Intraoperative findings and pathological findings of the right upper lobe. (A) Operative finding shows clear green staining of the right main bronchus and the truncus intermedius by indocyanine green. (B) Cancer invasion (arrow) of the right main bronchus (arrowheads). (C) Widespread obstructive pneumonia in the right upper lobe (arrowheads).

3. Discussion

In this case report, we urgently performed a right upper sleeve lobectomy for a patient with NSCLC who developed uncontrollable obstructive pneumonia after bronchoscopy. Although post-bronchoscopy pneumonia is relatively rare, patients who develop it may need to alter or cancel their planned cancer therapy[1]. Reported risk factors include older age, smoking status, bronchial obstruction, necrosis or cavitation, large tumor diameter, lung cancer and central tumor location[1-5]. Many of these factors-older age, smoking status, bronchial obstruction, lung cancer and central tumor location-were present in our patient. Because broad-spectrum antimicrobial therapy produced only an incomplete response, urgent surgery was performed both as a curative resection for lung cancer and as relief for obstructive pneumonia. However, the urgent surgery should be a case-specific decision based on both the respectability of the cancer and concern for clinical deterioration because conservative treatment such as antimicrobial escalation or bronchoscopy drainage could be a valid alternative. Furthermore, this report should not be interpreted as recommending early surgery after only a few days of antibiotic treatment for all cases of post-bronchoscopy pneumonia. Endobronchial treatments such as laser therapy, electrocautery, cryotherapy, APC and photodynamic therapy have been reported as options for patients who cannot undergo surgery[6-8]. These modalities achieve high rates of airway obstruction relief with relatively low complication rates (laser therapy: 77% to 92%, APC: 90%, cryotherapy: 50% to 86%)[6-8]. However, endobronchial therapy is purely palliative, is aimed at symptom improvement and does not provide curative treatment for cancer. Because curative resection by sleeve lobectomy was feasible in this case, endobronchial therapy was not indicated.

Sleeve lobectomy has been indicated for centrally located NSCLC as an alternative to pneumonectomy. Although some reports have shown no significant differences in postoperative complications between sleeve lobectomy and lobectomy[12,13], others have reported a higher postoperative mortality rate after sleeve lobectomy than after lobectomy[12]. Reported risk factors for postoperative complications include male sex, comorbidity, smoking, low respiratory function, right-sided resection, thoracotomy, longer operation time, intraoperative blood transfusion, squamous cell carcinoma and lymph node metastasis[10,11]. In the present case, several of these factors-male sex, smoking history, right-sided resection, squamous cell carcinoma and lymph node metastasis-were applicable, yet no postoperative complications occurred. On the other hand, the morbidity and mortality after curative surgery were reported as high in patients with lung cancer associated with obstructive pneumonia, such as the rate of bronchopleural fistula was 7%, that of pneumonia or empyema was 21% and mortality rate was 10%[14]. In the previous report, intraoperative findings clearly showed both the green staining of the upper bronchus and later a membranous area of the truncus intermedius[15] and as well as the blood supply of the bronchial anastomosis was clarified by ICG in the present case, which may have possibility to contribute to the postoperative good course. If sufficient blood flow cannot be confirmed by ICG, additional procedures such as covering the bronchial anastomosis with pedicled pericardial fat tissue may be necessary. However, the risk factors for sleeve lobectomy in patients with NSCLC who develop obstructive pneumonia have not been elucidated. Accumulating additional cases will be important to clarify these risks in the future.

4. Conclusion

We have reported a case of urgent sleeve lobectomy for NSCLC with uncontrollable obstructive pneumonia after bronchoscopy. The risk of post-bronchoscopy pneumonia for centrally located lung cancer should be recognized and under thorough explanation and informed consent, aggressive surgical intervention for centrally located lung cancer with uncontrollable obstructive pneumonia could be an option because the post-bronchoscopy pneumonia with lung cancer has been reported as serious condition in itself and risk of delay to treatment for lung cancer. However, the risks of sleeve lobectomy for cases complicated by obstructive pneumonia remain unclear, accumulating additional cases will be important to clarify these risks in the future.

5. Acknowledgment

We thank Angela Morben, DVM, ELS, from Edanz (https://jp.edanz.com/ac), for editing a draft of this manuscript.

6. Funding

This work was supported by Grants-in-Aid for Scientific Research of Japan Society for the Promotion of Science (grant no: 23K08326).

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