

Pulmonary Torsion Following Right Upper Lobectomy

Shinji Kanemitsu, MD, Keizo Tanaka, MD, Hitoshi Suzuki, MD,
Toshiya Tokui, MD, and Toshihiko Kinoshita, MD

We report on a case of postoperative lobar torsion in a 51-year-old woman following right upper lobectomy. A right middle lobar torsion was diagnosed by postoperative observation with chest X-ray and bronchofiberscopy. An emergency rethoracotomy was performed and a middle lobectomy was carried out. The postoperative course was uneventful and the patient was discharged on the 17th day after rethoracotomy. Careful postoperative observation with chest radiography and bronchofiberscopy is important for the precise diagnosis of a lobar torsion. In a case of lobar torsion following lobectomy, rethoracotomy should be immediately carried out. (Ann Thorac Cardiovasc Surg 2006; 12: 417–9)

Key words: pulmonary torsion, lung cancer, complication, lobectomy

Introduction

Torsion of the remaining lobe after lobectomy is an uncommon but life-threatening complication in thoracic surgery, which if undetected results in hemorrhagic infarction and fatal gangrene. Thus it is a life-threatening condition that requires urgent management. We experienced a case of pulmonary torsion following lobectomy that required removal of the affected lobe. We described the clinical features of our case and our methods for management of this severe postoperative complication.

Case Report

A 51-year-old woman had an abnormal shadow mass in the upper lung field of her right lung and was admitted to our hospital for further examination. She weighed 52 kg and had pain in her right upper chest. A pulmonary function test showed somewhat poor data as follows: vital capacity 2,480 ml (96.9%), respiratory volume per sec-

ond 1,940 ml (76.4%). Chest computed tomography (CT) revealed a mass at the right upper lobe extending to the posterior chest wall between the third and fourth ribs. Malignant epithelial cells, indicative of adenocarcinoma, were demonstrated by CT-guided needle biopsy. The right upper bronchus was stapled using a Reticulator™ 30-4.8 (Tyco Healthcare, MA, USA). She was diagnosed as having primary lung cancer in the right upper lobe, T3N0M0, stage IIB. A right upper lobectomy was performed with an en-block resection of the involved chest wall (second, third and fourth ribs) and systemic lymph node dissection. The hilar dissection was performed first, and the second, third and fourth ribs were divided at the costovertebral angle. At the end of the operation the remaining lobe expanded well and the thoracic wall was closed in the usual manner. Chest radiograph on the fifth postoperative day showed an opacification in the right apical area (Fig. 1). Breath sound was diminished in the right upper lung. Her condition deteriorated, with vital measurements of sinus tachycardia (120 beat/min) and tachypnea (30 breaths/min). She became highly febrile with white blood count and C-reactive protein (CRP) rising to 23,700/mm³ and 15.9 mg/dl respectively. Blood gas analysis showed PO₂, 131 mmHg, PCO₂, 47.2 mmHg, and pH 7.372 on 100% oxygenation. Bronchofiberscopy demonstrated twisting and obstruction of the right middle lobe bronchus (Fig. 2).

From Department of Thoracic and Cardiovascular Surgery, Anjo Kosei Hospital, Anjo, Japan

Received January 27, 2006; accepted for publication April 22, 2006.

Address reprint requests to Shinji Kanemitsu, MD: Department of Thoracic and Cardiovascular Surgery, Anjo Kosei Hospital, 28 Higashihirookute, Anjo-cho, Anjo, Aichi 446-8602, Japan.



Fig. 1. Postoperative chest radiograph shows a large homogeneous wedge-shaped opacification in the right apical area. An apparent oblique fissure courses medially to a point below the right hilum.

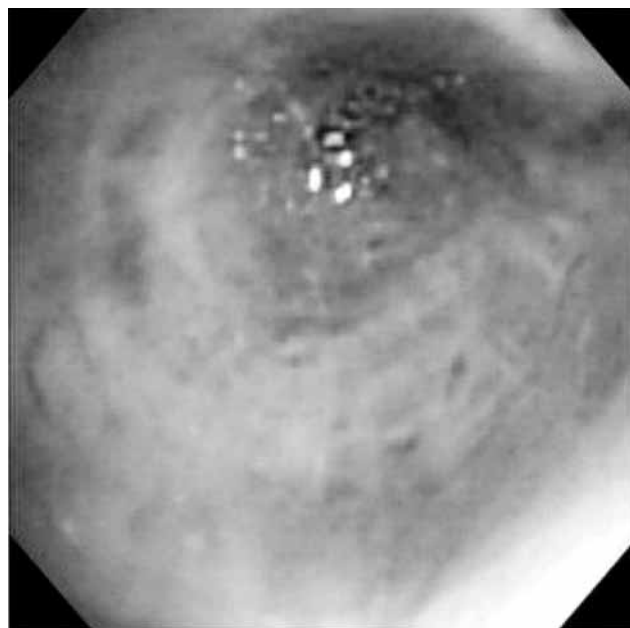


Fig. 2. Postoperative bronchoscopy demonstrates that the twisting and obstruction of the right middle lobe bronchus is caused by middle lobe torsion.

Torsion can cause bronchial obstruction, which while the bronchoscope can enter with pressure the torsion can recur when the bronchoscope is withdrawn. Torsion of the right middle lobe was highly suspected in this case and an emergency rethoracotomy was performed. The middle lobe was hard with a reddish surface, and was compressed upward to an apex and twisted about 180 degrees around its pedicle at the hilum. The lung parenchyma was very fragile. We carefully maneuvered a pulmonary vein to prevent isolation of thrombus, and carried out a middle lobectomy (Fig. 3A). Pathologic examination revealed hemorrhagic infarction throughout the pulmonary parenchyma (Fig. 3B). The patient's postoperative course was uneventful and she was discharged on the 17th day after rethoracotomy.

Discussion

Torsion of the entire lung or of a pulmonary lobe has been described spontaneously, after trauma and postoperatively following thoracotomy with or without lung resection. Pulmonary lobar torsion is a rare complication after lobectomy; though its true incidence is difficult to determine, it has been reported as 0.089–0.3%.^{1–3)} Wong and Goldstraw reported that 30% of thoracic surgeons had

seen one or more cases of pulmonary torsion, and most of these instances involved middle lobe torsion after right upper lobectomy. Thirty-five percent of thoracic surgeons are reported to not routinely fix the middle lobe to the remaining lobe after upper or lower lobectomy.⁴⁾ In this case, we did not undertake such a fixation for the following two reasons: the middle and lower lobes expanded well at the inspiratory phase during the operation, and we planned to lessen the upper dead space after upper lobectomy. However, it seems reasonable after a right upper lobectomy that if the oblique fissure is completed, it minimizes the likelihood of pulmonary torsion, which can occur following right upper lobectomy when the middle lobe twists on its narrow pedicle in a clockwise fashion.

Some rotation and kinking of the middle lobe bronchus with atelectasis is a common postoperative phenomenon after the removal of the right upper lobe. Pulmonary lobar torsion represents a difficult diagnostic dilemma in the early postoperative period after a lobectomy. Physical findings include fever, tachycardia, sudden cessation of a previous air leak, and loss of breath sounds over the affected lung field. The main diagnostic symptom almost always is homogeneous consolidation in the X-ray image. Since late reoperation for postoperative lobar torsion sometimes results in poor prognosis, careful

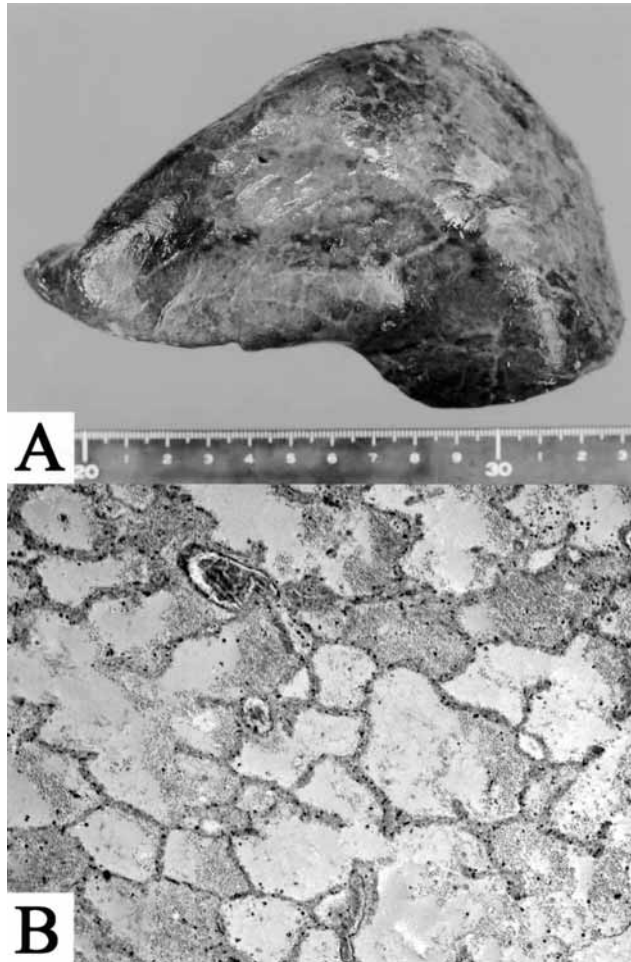


Fig. 3.

- A:** Macroscopic findings show the resected right middle lobe is consolidated and hemorrhagic.
- B:** Pathological findings of the resected middle lobe show hemorrhagic infarction throughout the pulmonary parenchyma. (HE stain: ×40)

observation with bronchofiberscopy as well as chest radiography is necessary for an accurate diagnosis. In this case, bronchofiberscopic examination was useful for our diagnosis of advanced torsion; therefore, we did not examine by CT.

A combination of factors can lead to the possibility of pulmonary torsion. Felson⁵⁾ noted the mechanisms of torsion. Underlying circumstances that favor the development of pulmonary torsion include: (a) an airless lobe, (b) a long, free, lobar pedicle, (c) the absence of a parenchymal bridge between contiguous lobes, (d) pneumothorax or pleural effusion, and (e) transection of the inferior

pulmonary ligament. In the case reported herein, while the cause was uncertain, we believe that complete separation of the middle and lower lobes might have played a role.

Treatment should not be conservative for torsion; exploratory thoracotomy must be performed without delay. Hendriks and colleagues⁶⁾ reported cerebral infarction after completion pneumonectomy for pulmonary torsion; therefore, attention must be given to isolation of thrombus from a pulmonary vein. Schamaun⁷⁾ surveyed the literature and reported that simple detorsion had been carried out in seven patients, two of whom died. If torsion persists for more than a few hours, it is no longer justified to preserve the involved pulmonary area at rethoracotomy; we believe that it is important to resect an affected congestive lobe and not to detorsion.

We suggest that lobar torsion after lobectomy has a low incidence and early recognition is based on a high index of suspicion, followed by aggressive diagnostic evaluation. To prevent torsion, the position of the remaining lobes should be noted, and should be fixed together if they are unusually mobile. Rethoracotomy should be carried out without any delay to reduce the morbidity and mortality associated with lobar torsion following pulmonary resection.

References

1. Cable DG, Deschamps C, Allen MS, et al. Lobar torsion after pulmonary resection: presentation and outcome. *J Thorac Cardiovasc Surg* 2001; **122**: 1091–3.
2. Keagy BA, Lores ME, Starek PJ, Murray GF, Lucas CL, Wilcox BR. Elective pulmonary lobectomy: factors associated with morbidity and operative mortality. *Ann Thorac Surg* 1985; **40**: 349–52.
3. Larsson S, Lepore V, Dernevik L, Nilsson F, Selin K. Torsion of a lung lobe: diagnosis and treatment. *Thorac Cardiovasc Surg* 1988; **36**: 281–3.
4. Wong PS, Goldstraw P. Pulmonary torsion: a questionnaire survey and a survey of the literature. *Ann Thorac Surg* 1992; **54**: 286–8.
5. Felson B. Lung torsion: radiographic findings in nine cases. *Radiology* 1987; **162**: 631–8.
6. Hendriks J, Van Schil P, De Backer W, Hauben E, Vanmaele R, Van Marck E. Massive cerebral infarction after completion pneumonectomy for pulmonary torsion. *Thorax* 1994; **49**: 1274–5.
7. Schamaun M. Postoperative pulmonary torsion: report of a case and survey of the literature including spontaneous and posttraumatic torsion. *Thorac Cardiovasc Surg* 1994; **42**: 116–21.