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ORIGINAL ARTICLE

# Postoperative Lung Torsion With Retained Viability: The Presentation and Surgical Indications

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**Background** We review our experience with postoperative lung torsion with retained viability.

**Methods** A total of 2165 patients underwent pulmonary resection (lobectomy or segmentectomy) at our institution between 1 January, 1986, and 31 March, 2017. Eight (0.3%, six males and two females: median age, 68 years) had lung torsion with retained viability.

**Results** The right upper lobe was resected in seven patients, while the left upper segment was resected in one patient. The lung torsion with retained viability was the right middle lobe in seven patients and the left lingular segment in one patient. A bronchoscopic examination was performed in four patients to diagnose the pulmonary torsion; however, it demonstrated no specific findings. Subsequently, computed tomography (CT) was performed in all the patients, and lung torsion was diagnosed in all the patients based on the CT findings. None of the patients showed any symptoms when lung torsion was diagnosed in them. The diagnosis of pulmonary torsion was made at a median of four days (range, 1–22 days) after the initial surgery. Six patients underwent detorsion of the affected lung, while one patient had a lobectomy, and one patient received conservative management. The lungs of all patients in which detorsion was performed adequately re-expanded. Frequent pneumonia in the viable torsed lung was diagnosed as a cause of death in the one patient who received conservative management.

**Conclusion** The timely decision to follow a surgical approach for lung torsion with retained viability can lead to a satisfactory outcome.

**Keywords** Lung torsion • Viability • Surgical indication

## Background

Lung torsion after pulmonary resection is a very rare complication of thoracic surgery. Previous reports have largely focussed on torsional lung with non-viability [1,2]. As such, the natural history of torsional lung with retained viability is unclear [3]. The aim of the present report was to assess the clinical presentation of this event and suggest surgical

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indications in patients experiencing lung torsion with retained viability following pulmonary resection.

## Patients and Methods

A total of 2165 patients underwent pulmonary resection (lobectomy or segmentectomy) at National Hospital Organization, Okinawa National Hospital, between 1 January, 1986, and 31 March, 2017. Nine (0.4%) of these patients had remaining lung torsion postoperatively. Eight (0.3%, six males and two females: median age, 68 years) had lung torsion with retained viability. We retrospectively reviewed and analysed the demographics, perioperative events, and follow-up of these patients.

## Results

We examined eight patients (six males and two females, median age 68 years [range, 47–75 years]). The right upper lobe was resected in seven patients, while the left upper segment was resected in one patient. All patients had a complete fissure between the remaining lungs. All the patients underwent chest radiography immediately after the initial surgery, which revealed complete expansion on the operated side. Routine chest radiograph findings on postoperative day 1 demonstrated atelectasis and volume loss on the operated side in five patients and consolidation in two patients.

None of the patients had a fever or oxygen desaturation, and their white blood cell counts were within normal ranges when they were diagnosed with lung torsion. Computed tomography (CT) scans performed in all the patients to diagnose the lung torsion revealed inappropriate displacement of the involved lung in six patients (Figure 1A), and collapse and atelectasis of the involved lung in two patients. A bronchoscopic examination performed in five patients revealed nonspecific findings. The remaining lung torsion was diagnosed a median of four days (range, 1–22 days) after the initial surgery. One patient refused reoperation. All of the other patients underwent re-exploration within 24 h after the diagnosis of the remaining lung torsion.

The findings at reoperation included right middle lobe torsion twisted approximately 90° counter-clockwise in two patients, 120° counter-clockwise in three patients, and 150° counter-clockwise in one patient, and left lingual segment torsion twisted approximately 90° clockwise in one patient. The torsed lung had shifted from its original position to the superior side in all cases. The torsed lungs of all patients showed mild congestion, and no torsed lungs showed a necrotic appearance (Figure 1B, 1 C and 1 D). The surgical treatment of the remaining lung torsion in the present patients included detorsion and fixation between the involved lung and the other lung by sutures in six patients, and a middle lobectomy in one patient who underwent reoperation at postoperative 22 days due to failed re-expansion after detorsion. A pathologic examination of the resected middle lobe showed the invasion of alveolar macrophages and the visceral pleura of the fibrosis covering the whole middle lobe. There were no intraoperative complications in any patients. The postoperative complications were empyaema in two patients and prolonged air leakage in two patients. One of the patients with prolonged air leakage underwent multiple reoperation for surgical repair due to air leakage following laceration of the pulmonary parenchyma at the suture point for fixation. No perioperative mortality was observed in any of the patients. The lungs of all patients

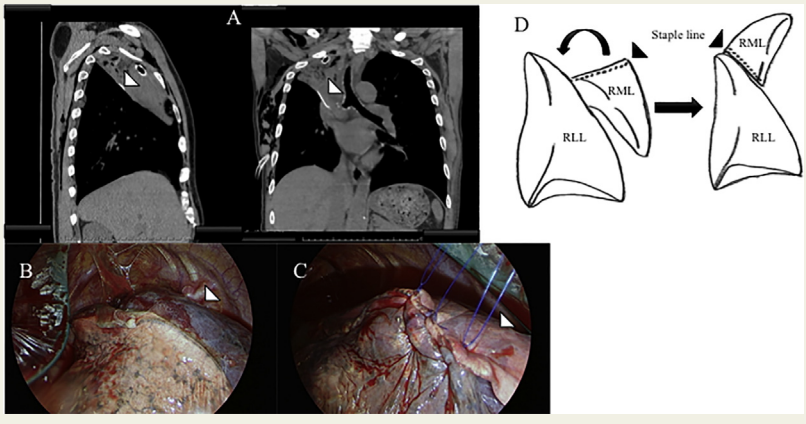


**Figure 1** (A) Sagittal and coronal sections of computed tomography reconstructions for the diagnosis of middle lobe torsion reveal the inappropriate direction of the staple line (arrow heads) of the middle lobe. (B) The right middle lobe was twisted approximately 150° counter-clockwise (arrowhead). (C) The surface colour and compliance of the middle lobe improved after detorsion (arrowhead). We performed detorsion and fixation between the middle lobe and the lower lobe by sutures. (D) Scheme of right middle lobe torsion.
Abbreviations: RLL = right lower lobe; RML = right middle lobe.

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