Left Upper Lobe Torsion Following Lower Lobe Resection*  
Early Recognition of a Rare Complication

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Left upper lobe torsion occurred in a woman during the first 24 hours following left lower lobectomy for bronchogenic carcinoma resection. To our knowledge, this is the first report of left upper lobe torsion. When atypical chest pain or opacification of the remaining lung develops following resectional surgery, torsion of the remaining lung must be suspected. Prompt diagnosis and treatment may prevent the morbidity and mortality associated with pulmonary infarction from torsion. *(Chest 1989; 95:1146-47)*

Pulmonary torsion refers to parenchymal rotation on its bronchovascular pedicle. In the English literature, torsion following pulmonary resection has been described in the right middle lobe,1,4 and in the left lower lobe5-6 following resectional surgery. Because torsion compromises the pulmonary vasculature, prompt recognition and surgical intervention is required to avoid the attendant morbidity and mortality.7 We report a surgically-proven case of left upper lobe torsion following left lower lobe resection for bronchogenic carcinoma.

CASE REPORT

A 51-year-old woman presented with a left lower lobe mass on routine chest roentgenogram (Fig 1). She was asymptomatic and her physical examination was normal. Bronchoscopy was normal. At thoracotomy, the anatomy was normal. Frozen section of the mass revealed adenocarcinoma. Mediastinal lymph nodes were normal. Left lower lobe resection was performed without complication. The left upper lobe re-expanded to fill the chest prior to closure.

On the first postoperative day, the patient complained of left-sided chest pain. She had sinus tachycardia (120 beats per minute), tachypnea (24 breaths per minute), and diminished breath sounds over the left hemithorax. Arterial blood gas analysis on room air showed PaO₂, 72 mm Hg; PaCO₂ 45 mm Hg; and pH 7.47. Chest roentgenogram revealed complete left hemithoracic opacification without tracheal deviation (Fig 2). Aggressive postural drainage, chest physiotherapy, and nasotracheal suctioning did not alter the patient’s clinical status or the roentgenographic appearance. The patient was returned to surgery.

At surgery, the left upper lobe had undergone a 360° counterclockwise torsion about its bronchovascular pedicle. Detorsion resulted in hemorrhage into the endotracheal tube, necessitating immediate cross-clamping of the left pulmonary hilus and completion pneumonectomy. Pathologic examination showed acute hemorrhagic infarction. Postoperatively, the patient developed aspiration pneumonia and ventilatory insufficiency. She was treated with antibiotics, extubated on the tenth postoperative day, and discharged uneventfully.

DISCUSSION

Pulmonary torsion may occur following blunt chest trauma,8-11 nonpulmonary thoracic procedures,12-14 and pulmonary resections.14,15 Post-resectional torsion most commonly occurs after right upper lobectomy when the right middle lobe is not sutured to the right lower lobe. Right lower lobe torsion after right upper lobe resection occurs next most frequently.4 Schuler4 reported that 18 of 31 cases of pulmonary gangrene "resulting from torsion or intraoperative injury" involved the upper lobes. Following pulmo-

FIGURE 1. Presenting chest roentgenogram is normal except for the left lower lobe density.

FIGURE 2. Chest roentgenogram after left lower lobe resection demonstrates left hemithoracic opacification without tracheal deviation.

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nary resection, torsion of the right middle lobe\textsuperscript{1,2} and the left lower lobe\textsuperscript{3,4} has been reported previously. This case demonstrates torsion of the left upper lobe after left lower lobe resection, and to our knowledge, is the first reported surgically-proven postresectional left upper lobe torsion.

Because torsion is usually associated with delayed recovery and is occasionally fatal,\textsuperscript{5} an understanding of prevention, recognition, and management of torsion is important. Torsion is thought to be due to increased mobility of a lobe. Traumatic or surgical disruption of intrathoracic attachments which stabilize the position of the lobe may allow lobar rotation on its bronchovascular pedicle if there is a complete interlobar fissure in the absence of pleural adhesions.\textsuperscript{1,2,5} Torsion obstructs the airway in addition to compromising both the bronchial and pulmonary vasculatures; atelectasis, retained secretions, and infection can complicate the resultant pulmonary infarction.

A high index of suspicion is necessary to diagnose postoperative pulmonary torsion. Chest pain, sometimes confused with incisional tenderness, usually is of sudden onset and is often accompanied by tachycardia, tachypnea, and occasionally by hypotension. Breath sounds over the area are diminished. Pulmonary secretions can be copious and sometimes bloody. An early air leak may cease suddenly as torsion obstructs the airway. Arterial blood gas analysis may demonstrate hypoxemia refractory to oxygen supplementation,\textsuperscript{6} but as in our case, hypoxemia may not be profound because both ventilation and perfusion are impaired by torsion. Early chest roentgenograms may show prominent reticular markings with lung volume larger than expected from compensatory expansion alone; this is thought due to edema from venous obstruction. Subsequent films demonstrating consolidation and volume loss associated with infarction may suggest acute atelectasis.\textsuperscript{6} Bronchoscopy is indicated to exclude endobronchial obstruction by retained secretions. Engorgement of bronchial mucosal vessels from venous obstruction suggests torsion. Torsion may cause bronchial obstruction which admits the bronchoscope with pressure but recurs when the bronchoscope is withdrawn.\textsuperscript{1} Although pulmonary angiography might be helpful,\textsuperscript{16} the associated delay in definitive treatment can complicate recovery\textsuperscript{16} or be fatal.\textsuperscript{3}

Immediate exploratory thoracotomy and detorsion is required to salvage the involved lobe.\textsuperscript{1,3,4,6,8} This is most important in patients whose preoperative pulmonary function demonstrates inability to tolerate a pneumonectomy. However, if already infarcted, removal of the affected lung is required to avoid infectious complications and reduce mortality.\textsuperscript{2,5,15} At re-exploration, a double lumen endotracheal tube can prevent contamination of uninfected lung by secretions from the involved lung.

Lung torsion following resectional surgery has been described previously in the right middle lobe\textsuperscript{1,2} and left lower lobe.\textsuperscript{3,4} We describe left upper lobe torsion after lower lobe resection. Postresectional pulmonary torsion can occur in any lobe with increased mobility associated with a complete fissure in the absence of pleural adhesions. A high index of clinical suspicion will lead to the prompt surgical intervention required to reduce the morbidity and mortality associated with postresectional pulmonary torsion.

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REFERENCES


The Etiology of Tumor Plop in a Patient with Huge Right Atrial Myxoma

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In a patient with a large atrial myxoma, the phonocardiographic timing of the tumor plop has been correlated with the two-dimensional echocardiographic motion pattern of the cardiac mass. The tumor plop occurred at the time when the mass stopped its diastolic forward motion into the

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