Spontaneous middle-lobe torsion

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Middle-lobe torsion is a well documented but rare entity that typically occurs following surgery, characteristically after right-upper lobectomy. It has also been described in the setting of pleural effusion, trauma, and neoplasm. We present a case of spontaneous middle-lobe torsion, occurring in the absence of the above risk factors, with emphasis on radiographic and CT findings.

Case report
A 28-year-old man with mild-to-intermittent asthma presented to the Emergency Department with a 7-day history of progressive shortness of breath and wheezing. Associated symptoms included subjective fevers, chills, and cough productive of yellow sputum. He also described pleuritic chest pain and fatigue. His only routine medication was an Albuterol MDI that he used up to 15 times per day during his recent illness. Tobacco use was limited to socially on the weekends.

Physical examination on admission revealed hypoxemia on room air, temperature of 102.1°F, tachycardia, and tachypnea. The patient also exhibited diminished breath sounds with a prolonged expiratory phase. Laboratory evaluation showed respiratory alkalosis with hypoxemia, in addition to leukocytosis with neutrophilia. The patient was treated with intravenous corticosteroids, antibiotics, and inhaled bronchodilators, with mild symptom improvement.

PA and lateral chest radiographs showed left-upper-lobe atelectasis manifesting with a luftsichel sign (Fig. 1). Additionally, there was an ill-defined right-upper-lobe opacity with airspace opacities surrounding the right-upper-lobe bronchus on the lateral radiograph. Because of the radio-
graphic abnormalities, the patient underwent unenhanced chest CT, which showed complete right-middle-lobe collapse (Fig. 2). In addition, the middle lobe was abnormally positioned between the posterior segment of the right upper lobe and superior segment of the right lower lobe. The course of the middle-lobe bronchi was outlined with multiplanar reformatted images that documented abrupt tapering of the airway lumens and confirmed middle-lobe torsion (Fig. 3).

Complete collapse of the left upper lobe was also demonstrated. There was no evidence of any central obstructing lesion.

When fiberoptic bronchoscopy was subsequently performed, the bronchoscope could not pass through the orifice of the right middle lobe bronchus, as the orifice of the superior segmental right-lower-lobe bronchus was narrowed from extrinsic compression. A large endobronchial mucus plug was removed from the left upper lobe.

To avoid complications of prolonged middle-lobe torsion, the patient was taken to surgery. Preoperative spirometry showed an FEV1 of 1.22 L, FVC of 2.01 (L), and a FEV1/FVC of 61. Right-sided thoracoscopy confirmed torsion of the middle lobe. Extensive adhesions to the posterior apical chest wall were present, suggesting a chronic infectious process. The lobe was viable, and it was de-torsed and fixated. Intraoperative bronchoscopy and followup contrast-enhanced chest CT confirmed patency of the right-middle-lobe bronchus. There was no evidence of pulmonary infarct. The patient had an uneventful recovery and was discharged to home in good condition.

Discussion

Lung torsion is a rare occurrence, with a reported incidence of 0.089-0.4% (1). It has been described in three main clinical settings: postoperative, post-traumatic, and spontaneous occurrences due to an underlying pneumonic process (2). Overall, most cases of lobar torsion occur in the postoperative setting of pulmonary lobectomy, typically involving middle-lobe torsion following right-upper lobectomy (70%) (3). The involved lung may twist anywhere from 90 to 360 degrees, but generally rotates 180 degrees (2). Spontaneous torsion may be caused by pneumothorax, pleural effusion/empyema, and neoplasm (4, 5). Felson described several other factors contributing to lung torsion, including an atelectatic or consolidated lobe, a long lobar pedicle, incomplete fissures, and absence of the inferior pulmonary ligament (2). In this particular case, contributing factors likely included chronic infection leading to middle-lobe consolidation with multiple pleural adhesions.

The prospective diagnosis of lung torsion is often not suspected clinically. In the postoperative setting, symptoms may be very nonspecific but can include rapid-onset dyspnea, hypoxia, fever, cough, and hemoptysis (6).
Chest radiographic abnormalities may suggest the possibility of torsion. Findings are often nonspecific but consist of lobar collapse, hilar displacement inappropriate for the atelectatic lobe, altered course of the pulmonary vasculature, rapid lobar opacification ipsilateral to the surgery, and bronchial cutoff (2, 6). The airspace opacity has been attributed to both atelectasis and venous congestion (4). Radiographic analysis was particularly challenging in our case due to the distracting finding of concurrent left-upper-lobe collapse, which exhibited a luftsichel sign.

Lung torsion is often confirmed with computed tomography (CT) (2, 7), which shows to better advantage the altered anatomic location of the torsed lung. Additional unenhanced chest CT findings include focal bronchial tapering, hilar distortion, and both consolidation and hyperinflation (8). Smooth interlobular septal thickening has also been described, presumably related to obstruction of pulmonary venous return. The middle-lobe bronchi in this case tapered proximally but were patent distally, which proved helpful in following their course and establishing the anatomic location of the middle lobe. Multiplanar reformatted images, maximum and minimum intensity projections (MIPs and MinIPs), and 3D renderings may provide additional information. CTA has been reported to be particularly useful, due to its ability to follow the course of the affected pulmonary vessels. It may also indicate decreased or absent blood flow to the torsed lung (9). Contrast was not administered in our case, which limited evaluation of the vascular supply.

Conventional angiography has also been described for diagnosis (10) but may be of limited value in the setting of vascular occlusion, due to greater-than-90-degree torsion.

Lung torsion is a rare entity, even more so in the absence of recent surgery or trauma. However, as illustrated by this case, it is a diagnosis that can be confidently made with careful chest CT interpretation. Upon diagnosis, urgent surgical intervention is recommended to reduce the torsion and to resect any compromised lung tissue, due to the high morbidity and mortality (1) associated with unrecognized cases.

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