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**Torsion of the Middle Lobe after Upper Lobectomy
with Infarction of One Segment of the Lung**

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Abstract

Middle lobe torsion is a rare potentially life-threatening complication after right upper lobectomy. A 70-year old man underwent right upper lobectomy for adenocarcinoma stage IIb. Hemoptysis started on postoperative day 3. Middle lobe torsion was suspected on the basis of chest X-ray, computer tomography and bronchoscopy. A rethoracotomy was performed on postoperative day 4. A partial torsion of the middle lobe was detected in a clockwise direction for 90° with hemorrhagic infarction of the fifth segment of the lung. A middle lobectomy was performed. The postoperative period was uneventful. This is the second case in the literature of infarction of one segment of the middle lobe as a result of partial torsion.

Case presentation

A 70-year old man smokes for 40 years with medical history of cough and shortness of breath during physical exertion presented with 2,5x1,9 cm solid mass a surrounded ground glass opacity 3,0x2,5 cm in the right upper lobe incidentally detected on a computed tomography image of the thorax. He underwent a thoracotomy right upper lobectomy and mediastinal lymph node dissection. He was diagnosed as having adenocarcinoma G1 cT1bN0M0 stage IB. The surgery was performed without complications.

On postoperative day 1 the patient was asymptomatic. The temperature was 36.7° C, SpO2 97%, in the blood test white blood cells 11.85, neutrophils 82%, lymphocytes 10.2%. His a follow-up chest X-ray (CXR) revealed increasing opacities over the right anterior upper zone suggestive of hypoventilation (atelectasis) of the middle lobe (Fig. 1A). Bronchoscopy showed in the lobar bronchi on both sides of the muco-hemorrhagic sputum in moderate amounts.

On postoperative day 3 hemoptysis appeared in the amount of 30 ml per day. There were no signs of infection. The temperature was 36.6° C, SpO2 97%, in the blood test leukocytes 10.9, neutrophils 75.4%, lymphocytes 11.8%. CXR showed signs of middle lobe dyslectasis, and the mediastinum is slightly displaced to the right (Fig.1B). Computer tomography (CT) showed the middle lobe is displaced upwards in the anterior part of the hemithorax, its pneumatization is expressed unevenly, contoured compaction of the medial and lower parts of the lobe is determined as ground-glass opacities and consolidation with an interlobular septal thickening in the middle lobe, contrasting vessels and bronchi are traced, located more in the lateral part of the lobe (Fig.2). The surgical suture is visualized against the background of a compacted parenchyma near the mediastinal pleura, in the basal region there is a local prolapse of the pneumatized lower lobe. Bronchoscopy demonstrated a deformity and a hemorrhagic sputum in the middle lobar bronchus. A torsion of the middle lobe was suspected and an exploratory surgery was indicated. On postoperative day 4 a rethoracotomy was performed. A partial torsion of the middle lobe was revealed in a clockwise direction for 90 degrees. The middle lobe was raised with a hemorrhagic dark reddish surface of the lung parenchyma of the fifth segment which is looking like infarct. Forth segment was good inflated with normal color (Fig. 3). All vessels were normal with no signs of thrombosis. The middle lobe bronchus was open.

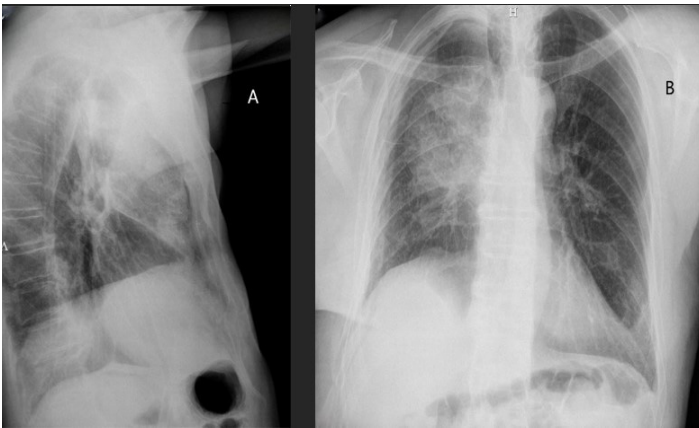


Figure 1: Chest X-Ray on postoperative Day 1 (A - lateral) and Day 3 (B – anteroposterior) shows increased opacification in the right upper and middle lung fields.

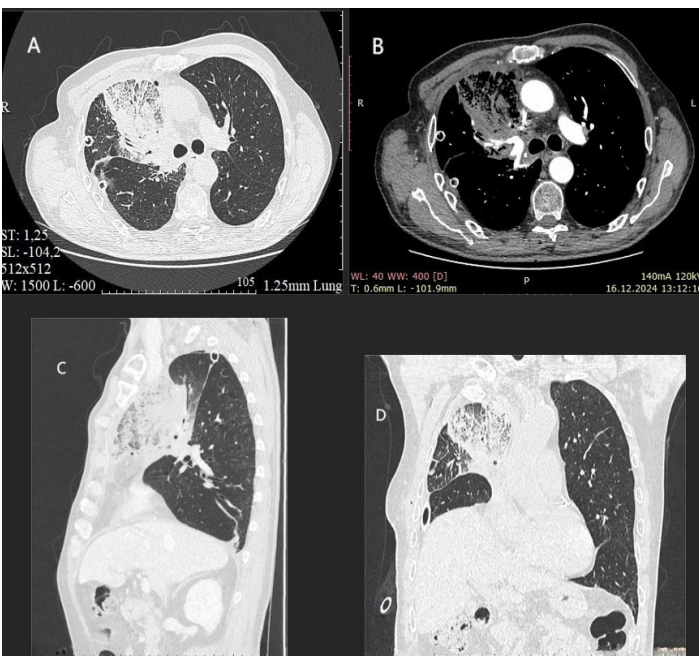


Figure 2: Contrast-enhanced CT on postoperative day 3 following surgery. Axial section with lung window (A), mediastinal window (B), sagittal section (C) and coronal section (D) demonstrates consolidation, ground-glass opacities with an interlobular septal thickening in the middle lobe.

Taking unviable changes in the lobe, a middle lobectomy was performed. The postoperative period was uneventful.

Histopathology: The tissue of the fifth segment of the lung with marked congestion, according to the type of hemorrhagic infarction, the tissue of the fourth segment is intact. The infarction zone has a clear border, dark cherry color on the incision.

Microscopy: In the lung tissue, a site of infarction with infiltration and accumulation of unchanged and hemolysed red blood cells in the alveoli, with partial destruction of interalveolar kinks, with focal pronounced leukocyte infiltration. Microthrombi in the small pulmonary arteries. In the lung tissue outside of hemorrhagic infarction, there

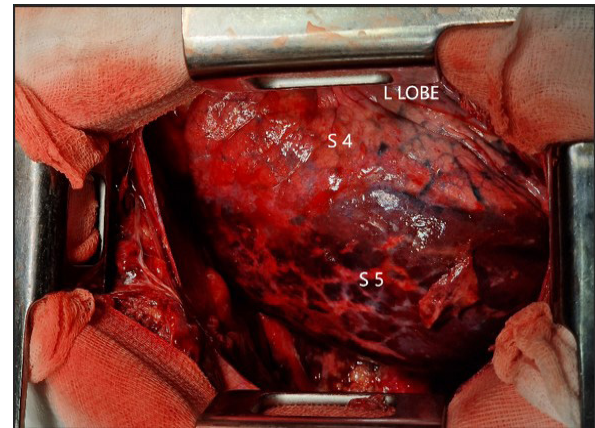


Figure 3: During rethoracotomy intraoperative images demonstrated a hemorrhagic dark reddish surface of the lung parenchyma of the fifth segment (S5) of the middle lobe which is looking like infarct. Forth segment is good inflated with normal color (S 4). L LOBE – lower lobe.

are purulent inflammation like acinar pneumonia.

Discussion

Middle lobe torsion (MLT) is a rare life-threatening complication due to the risk of embolism, stroke, lung gangrene, acute inflammatory reaction with sepsis and multiple organ dysfunction with an incidence of 0,09-0,4% [1,2,3]. MLT is characterized by twisted it clockwise or counterclockwise from 70° to 360° [4,5]. Parenchymal rotation on the bronchovascular pedicle leads to venous occlusion, venous congestion, alveolar hemorrhagic edema, and parenchymal infarction [2,5]. MLT may be asymptomatic up to 21% of cases or characterized by shortness of breath, cough, fever, and hemoptysis [4,6]. Our patient's only symptom was hemoptysis. There was no fever or inflammatory changes in the blood test. A radiographic evidence of torsion on the CXR are usually detected from 1-3 days and are characterized by a opacification of the upper right zone [2]. Chest CT shows patchy consolidation, extensive ground-glass opacity, atelectasis of the middle lobe, obstruction of the middle lobe bronchus [7]. Contrast-enhanced CT can reveals a decrease in blood flow or a break in the vessels of the lobe [1]. Three-dimensional reconstruction by CT may be helpful to confirm the position of the stapler lines on the interlobar sulcus and suggest a vessel malposition [8,9]. Bronchoscopy findings of deformation or obstruction of the middle lobe bronchus suggested torsion [7]. If a torsion of the middle lobe is suspected, an exploratory surgery is necessary [6]. Based on the viability of the lung, it is possible the simple detorsion with pneumopexy. Lobectomy is necessary for ischemic necrosis and gangrene [4,6]. Various methods for preventing torsion have been suggesting by fixing the middle lobe to the lower one with various sutures, an absorbable film with fibrin glue, TachoSil [10,11,12].

Our case report describes a case of partial torsion of the

bronchovascular pedicle of the middle lobe by 90° caused a disorder of perfusion of only one segment of the middle lobe. A similar case of pulmonary congestion of one S4 segment due to compression of V4 caused by deviation of the middle lobe is described by H. Mansumiya et al. [11]. This may explain the partial narrowing of the middle lobar bronchus during bronchoscopy, contrasting vessels and bronchi was traced on CT. MLT was suspected on the basis of unevenly pneumatization, contoured compaction of the medial and lower parts of the lobe, ground-glass opacities and consolidation with an interlobular septal thickening in the middle lobe, the location of the postoperative suture near the mediastinal pleura. In our case, the patient developed a lung infarction by the 4-th postoperative day. All vessels were normal with no signs of thrombosis for rethoracotomy. The cause of ischemia was compression of the veins due to the reversal of the structures of the lobe pedicle. The lung changes were irreversible, so a lobectomy was performed.

Conclusion

Torsion of the middle lobe after upper lobectomy is a rare life-threatening complication. The diagnosis is based on the results of computed tomography and bronchoscopy. If a torsion of the lobe is suspected, an emergency re-operation is required. If the lobe are congestive and nonviable, a lobectomy is necessary.

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Ethics approval and consent to participate .

This study was approved by the Institutional Review Board of Perm State Medical University, Perm, Russia, and informed consent was obtained from patient.

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