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# A new non-invasive diagnostic method for lung lobe torsion: Pulmonary CT angiography

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## ÖZET

**Akciğer lob torsiyonu için yeni bir noninvaziv tanısal metod: Pulmoner BT anjiyografi**

Lobektomi sonrası kalan lobun torsiyonu, tanısı zor, hemorajik infarktüs ve fatal gangrenle sonuçlanabilecek nadir bir durumdur. Bronşektazi nedeniyle orta lob rezeksiyonu sonrası üst lob torsiyonu olan ve noninvaziv pulmoner bilgisayarlı tomografi (BT) anjiyografi ile tanı konulan bir olguyu sunmaktayız. Olguya retorakotomi ile üst lobektomi uygulandı. İki yıllık izlem sonunda hasta asemptomatikti. Bronkoskopinin tanıda değeri yüksek olsa da, BT anjiyografi kesin tanının doğrulanması için efektif noninvaziv bir metottur. Yüksek klinik şüphe, erken tanı ve agresif tedavi sağkalımı artırır.

**Anahtar Kelimeler:** Lob torsiyonu, BT anjiyografi, cerrahi.

## SUMMARY

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*Torsion of the remaining lung lobe after lobectomy is an uncommon event which is difficult to diagnose and may result in hemorrhagic infarction and fatal gangrene. We report a case of right upper lobe torsion after middle lobe resection for bronchiectasis, diagnosed with noninvasive pulmonary computerized tomography (CT) angiography. Rethoracotomy with an upper lobectomy was performed. She was asymptomatic at the two-year follow-up. Although the bronchoscopy has a great value in the diagnosis, CT angiography is an effective noninvasive method for confirming the correct diagnosis. A high index of clinical suspicion, early diagnosis and aggressive management may improve survival.*

**Key Words:** Lobe torsion, CT angiography, surgery.

Torsion of the remaining lung lobe after lobectomy is an uncommon event which is very difficult to diagnose and if undetected, results in hemorrhagic infarction and fatal gangrene (1). There is little information on its natural history. We report a case of right upper lobe torsion after right middle lobe resection for bronchiectasis, which was diagnosed with noninvasive pulmonary computerized tomography (CT) angiography.

#### CASE REPORT

A forty-three-years-old woman was admitted to our institution with hemoptysis. The patient had undergone right middle lobectomy for bronchiectasis two months ago. Breath sounds were markedly diminished over the right upper zone on physical examination. PA chest radiography showed an opacified right hemithorax (Figure 1). Chest CT revealed consolidation conta-



**Figure 1.** PA chest X-ray showed an opacified right hemithorax.

ining numerous air bubbles in the right upper lobe. Right upper lobe torsion was suspected and a three-dimensional (3D) pulmonary CT angiography was planned. Pulmonary CT angiography showed consolidation with low densities suggesting necrosis and infarction in the right upper lobe. Right upper lobe artery, upper lobe bronchus and right superior pulmonary vein were occluded. The middle lobe bronchus was seen as a stump (Figure 2,3).

In the preoperative fiberoptic bronchoscopy, right upper lobe bronchus was observed narrow with hemorrhage at the entrance, while middle lobe bronchus stump was detected intact. Right posterolateral rethoracotomy was performed with the diagnosis of right upper lobe torsion. At surgery, upper lobe was completely consolidated and discolored. After hilar dissection it was seen that the superior pulmonary vein had been ligated during middle lobectomy and the upper lobe was twisted around its pedicle. The torsion was relieved manually and an upper lobectomy was performed. Pathologic examination revealed hemorrhagic infarction throughout the pulmonary parenchyma. During the postoperative period, the patient was treated with antibiotics for wound infection and discharged on day 29. She was asymptomatic at the two-year follow-up.

#### DISCUSSION

Lobar torsion, which is a rotation of the bronchovascular pedicle with resultant airway obstruction and vascular compromise, is a rare event. This unusual accident may sometimes be lethal (2-4). This disorder has been described in 3 different circumstances: as a complication of thoracic surgery, after blunt trauma, and spontaneously. Eppelen and Jacobson made the first desc-

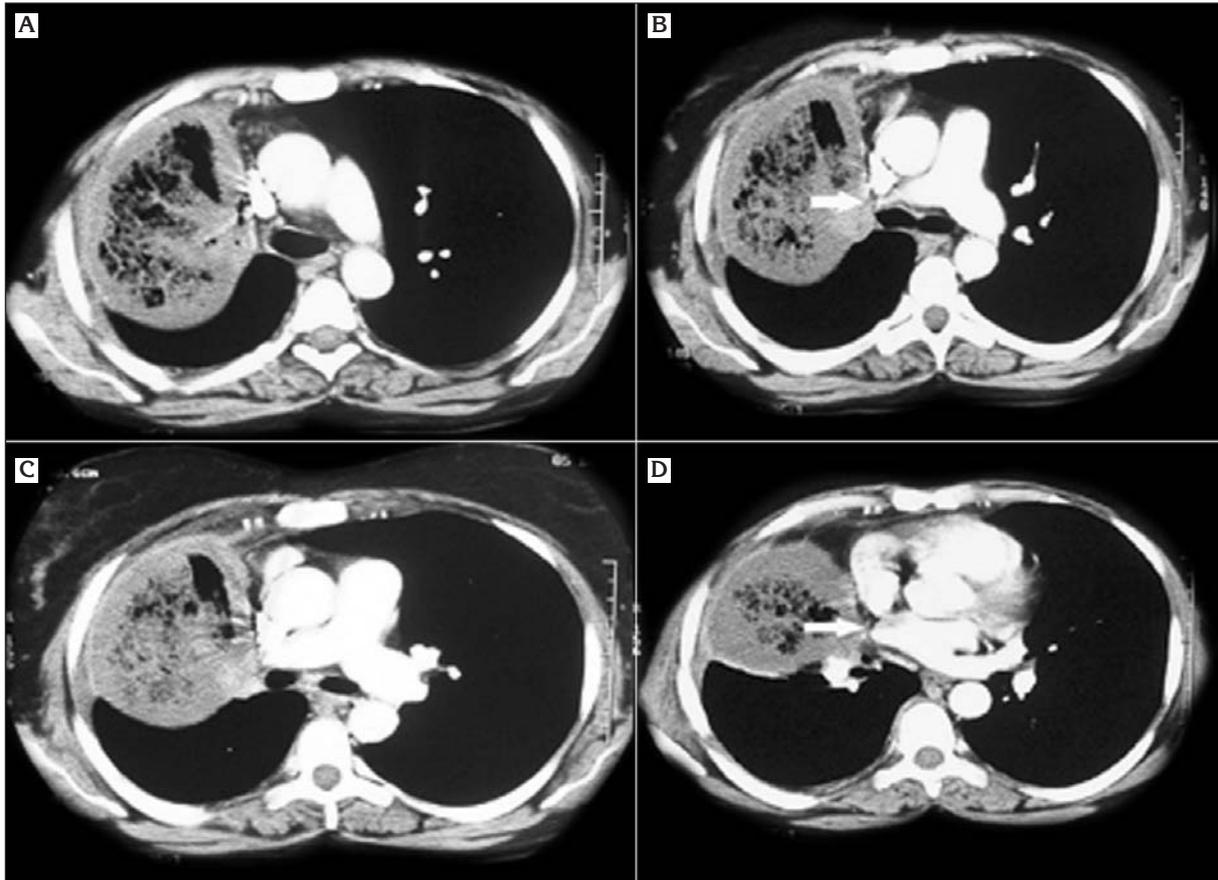


Figure 2. Axial CT angiography images. A: The infarcted right upper lobe is seen as a low density swollen lobe containing gas densities. B: The right upper lobe artery is narrowed (arrow). C: Both the right and left main pulmonary arteries appear normal. D: Axial contrast-enhanced CT section at a more caudal level shows ligated right superior pulmonary vein (arrow).

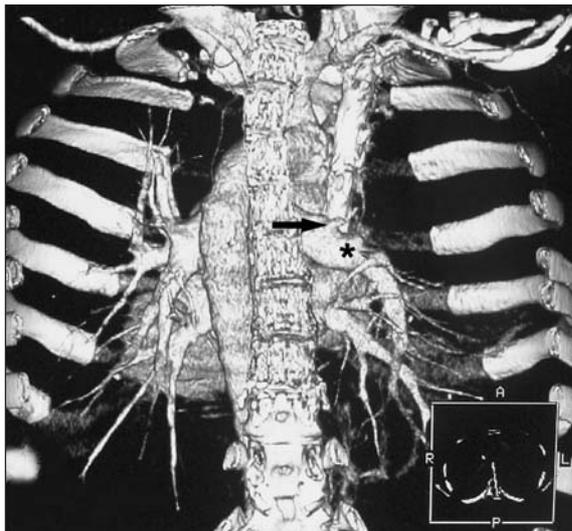


Figure 3. Coronal volume-rendered three-dimensional CT angiography, posterior view, shows occluded right upper lobe artery (arrow). Also note the middle lobe arterial stump (asterisk).

ription of lobar torsion in 1930 (5). Keagy and colleagues noted one case of lobar torsion from 369 lobectomies with an incidence of 0.3% (6). Larsson and colleagues noted four cases from approximately 2000 thoracotomies with an incidence of 0.2% (4). Cable and colleagues noted 7 lobar torsions (0.089%) from 7887 pulmonary resections (7).

Pathophysiology of lobar torsion is controversial. Five predisposing factors are described by Felson as mechanisms in lung torsion: atelectasis or insufficient inflation of a lobe, an extended flap, absence of parenchymal connections between lobes, pneumothorax and/or effusions, and transposition of the pulmonary ligament (8).

Patients with torsion of a lung or lobe present a diagnostic challenge. A definitive diagnosis may sometimes be difficult or impossible. A high in-

dex of suspicion is necessary to diagnose a postoperative lobar torsion. Clinical signs are often attributable to lobar infarction and include chest pain, hemoptysis, air leak, shock and sepsis (9). Radiographic signs include a rapidly progressing consolidated lobe, displacement of hilar structures, bronchial cutoff or distortion, lobar air trapping and primary and secondary signs of lobar collapse. CT may show the interruption in the bronchus at the level of torsion, enabling spatial classification of the lung areas affected (8,10). In our patient, we used pulmonary CT angiography to demonstrate the hilar bronchovascular structures. Pulmonary CT angiography showed occlusion in the right upper and middle lobe bronchi, right upper lobe artery and superior pulmonary vein, as well as an infarcted right upper lobe.

Treatment of the lobar torsion is generally surgical in most of the cases. The necessity of removing the affected lobe is determined by the interval between the onset of the accident and the start of reoperation. The rapidly early diagnosis may provide a correction of the torsion without removing the lobe. Although the bronchoscopy has a great value in the diagnosis, CT angiography is an effective noninvasive method for confirming the correct diagnosis. A high index of clinical suspicion, early diagnosis and aggressive management may improve survival.

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