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Case Report / Olgu Sunumu

Video-assisted thoracoscopic lobectomy for pulmonary arteriovenous malformation: a case report

Pulmoner arteriyovenöz malformasyon için video yardımlı torakoskopik lobektomi: Olgu sunumu

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ABSTRACT

Pulmonary arteriovenous malformation is a rare pulmonary vascular anomaly caused by abnormal communications between arteries and veins. Although it is a benign disease, it should be treated properly to prevent serious complications and provide improved quality of life for patients. Currently, transcatheter embolization is presented as a standard therapeutic approach for this disease because of its minimally invasive nature and lower morbidity and mortality rates. However, this treatment does not always produce satisfactory results and utilization of surgical treatment is required. In this article, we report a 37-year-old female patient with pulmonary arteriovenous malformation who was treated successfully via video-assisted thoracoscopic lobectomy after embolotherapy.

Keywords: Embolization; lobectomy; pulmonary arteriovenous malformation; thoracic surgery.

ÖZ

Pulmoner arteriyovenöz malformasyon arterler ve venler arasında anormal bağlantıların neden olduğu nadir görülen bir pulmoner vasküler anomalidir. Benign bir hastalık olmasına rağmen, ciddi komplikasyonları önlemek ve hastalara iyileşmiş bir yaşam kalitesi sunmak için uygun şekilde tedavi edilmelidir. Günümüzde, transkateter embolizasyon düşük morbidite ve mortalite oranları ve minimal invaziv yapısı nedeni ile bu hastalık için standart tedavi yaklaşımı olarak sunulmaktadır. Ancak bu tedavi her zaman tatmin edici sonuçlar vermemekte ve cerrahi tedavinin değerlendirilmesi gerekmektedir. Bu yazıda, emboloterapi sonrası video yardımlı torakoskopik lobektomi ile başarılı şekilde tedavi edilen pulmoner arteriyovenöz malformasyonlu 37 yaşında bir kadın hasta sunuldu.

Anahtar sözcükler: Embolizasyon; lobektomi; pulmoner arteriyovenöz malformasyon; göğüs cerrahisi.

Pulmonary arteriovenous malformations (PAVM) are rare pulmonary vascular anomalies caused by abnormal communications between arteries and veins. The presenting symptoms are related with the size of right-to-left shunt and the occurrence of complications such as paradoxical embolism that causes neurological symptoms and hemoptysis. Due to evidence of progressive enlargement over a period of time and high morbidity rate, appropriate treatment should be performed to prevent severe complications.[1] Transcatheter embolization may be considered as the preferred treatment modality due to its less invasive nature and ease of repetition when compared with thoracotomy. The treatment option should be definitive for benign disease. Herein, we presented a female patient with PAVM who was treated successfully via video-assisted thoracoscopic (VATS) lobectomy after embolotherapy. The embolization helped to perform an easier and safer VATS lobectomy.

CASE REPORT

A 37-year-old female patient presented with cyanosis on her lips and fingers and dyspnea which she had for 10 years. No abnormal finding was detected

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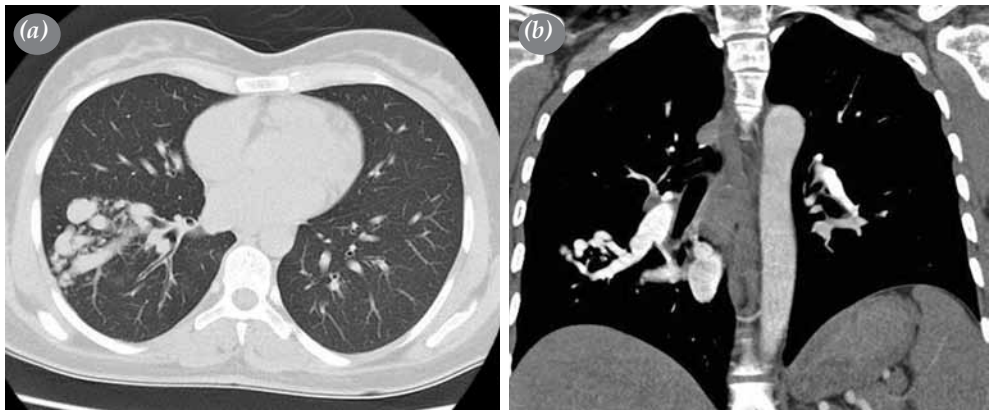

Figure 1. (a) Contrast-enhanced computed tomography shows a massive arteriovenous malformation in right lower lobe. **(b)** Frontal image of chest computed tomography shows an irregular mass covering right lower lobe which has two large feeding arteries.

on physical examination except for cyanosis. The chest X-ray revealed specific findings compatible with PAVM on the right lower zone. In blood gas analysis, oxygen saturation was 82.9%, pH was 7.472, partial pressure of oxygen in arterial blood was 43.1 mmHg, and partial pressure (tension) of carbon dioxide was 27 mmHg. Blood analysis was normal except for secondary erythrocytosis.

Brain computed tomography was normal and there were no lesions compatible with hereditary hemorrhagic telangiectasia. There was a massive arteriovenous malformation (AVM) in the right lower lobe (Figure 1a). It had two large feeding arteries originating from pulmonary artery (Figure 1b). Patient underwent embolization with two Amplatzer duct-occluders (AGA Medical corporation, Golden Valley, MN, USA) for the two feeding arteries (Figure 2a). Embolization was completed successfully (Figure 2b). However, she did not improve probably due to the large size of the two proximal feeding arteries. Her oxygen saturation was approximately 90% by pulse oximetry one month after the transcatheter embolization. Her cyanosis did not resolve. Thus, we proceeded with a VATS lobectomy. We did not have any difficulty when dissecting vessels and placing staplers.

Chest tube was removed on postoperative fourth day and the patient was discharged uneventfully. Her blood gas analysis was normal. Oxygen saturation was 98.8%, pH was 7.456, partial pressure of oxygen in arterial blood was 98.1 mmHg, and partial pressure of carbon dioxide was 29.7 mmHg four months after surgery.

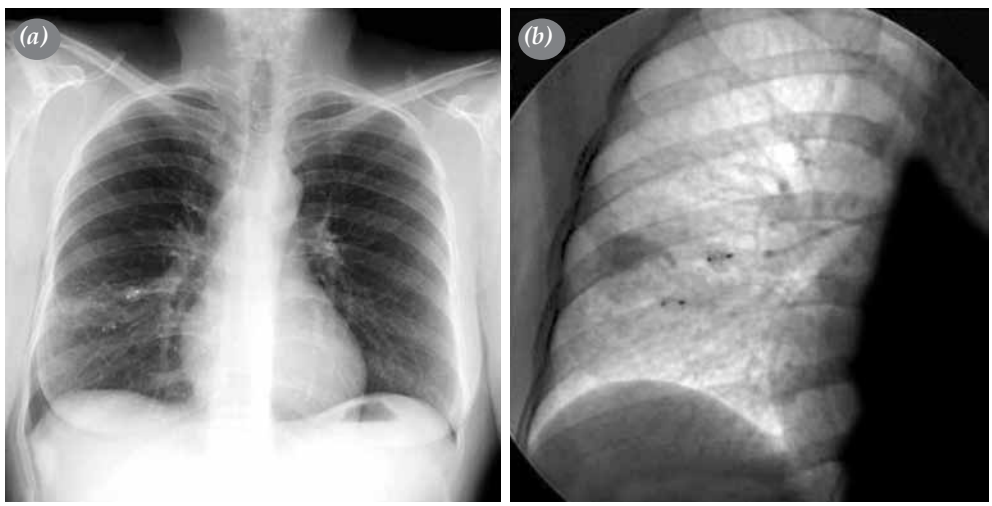

Figure 2. (a) Transcatheter embolization of two large feeding arteries with Amplatzer duct-occluder and **(b)** chest X-ray after procedure.

DISCUSSION

Pulmonary arteriovenous malformation is an abnormal connection between pulmonary arterial and venous vessels. It produces right-to-left shunt which is responsible for symptoms such as cyanosis. When a definitive diagnosis for PAVM is established, it should be treated appropriately since it does not resolve spontaneously and has serious complications. Transcatheter embolization is presented as a first therapeutic option due to its lower morbidity and mortality rates. Its minimally invasive nature is superior when compared with thoracotomy. Major surgeries like thoracotomy should be avoided in patients with benign disease. However, the treatment modality should have curative potential and transcatheter embolization has a 5 to 15% recurrence rate.

All patients with PAVMs with feeding arteries larger than 3 mm in diameter should be treated. Although the first treatment choice is transcatheter embolization, sizes of the feeding arteries are important when deciding how to occlude these arteries. Surgical treatment should be the first choice when treating large, high-flow PAVMs with aneurysmal formation in a central location.[2] Options usually include coils and detachable balloons. However, the success rate of coils for embolization of large feeding arteries is low and may lead to complications such as migration. Therefore, especially for larger feeding arteries which are not appropriate for coil embolization, using Amplatzer duct-occluders is recommended for embolization. Some authors reported this method as a feasible and valuable alternative to surgical lobectomy with a high procedural success rate.[3] Although, we used Amplatzer duct-occluders for our case, symptoms recurred and we decided to perform lobectomy. Surgical treatment includes wedge resection, segmentectomy, lobectomy, and pneumonectomy. The surgical treatment modality depends on the location, size, and dissemination of the AVM. Wedge resection is preferred when the AVM is small and peripheral. Lobectomy may be preferred when the AVM is central or large in diameter or disseminated in the lobe.[4] In our case, the AVM was disseminated in the right lower lobe and there was no targeted area to resect via wedge resection. Therefore, we decided to perform VATS lobectomy which was completed uneventfully.

Surgical treatment of bronchiectasis and pulmonary sequestrations after embolization is less complicated. We thought that this hypothesis is also true for AVM. In our case, we completed the VATS lobectomy after embolization uneventfully. Although embolization of the two feeding arteries did not resolve the symptoms, this intervention helped us to achieve an uncomplicated surgery.

In conclusion, benign diseases of the lung should be treated curatively via a minimally invasive approach with less morbidity rate. Video-assisted thoracoscopic lobectomy may be accepted as a safe and minimally invasive procedure for patients with PAVM especially when performed after transcatheter embolization.

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