BRIEF COMMUNICATIONS

BILOBECTOMY FOR MASSIVE HEMOPTYSIS AFTER BILATERAL LUNG TRANSPLANTATION

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A bronchovascular fistula is a rare but life-threatening complication after lung transplantation. We report a case of massive hemoptysis after bilateral lung transplantation successfully treated by a lower bilobectomy.

Clinical summary. A 27-year-old man underwent bilateral lung transplantation for cystic fibrosis on December 6, 1998. The total ischemic time was 300 minutes for the left lung allograft and 390 minutes for the right lung allograft. Eight hours after the operation, a rethoracotomy was necessary for significant diffuse bleeding from the thoracic wall. Thereafter, the patient's clinical condition remained stable and extubation was performed on postoperative day 1. Microbiological examinations of the donor bronchus revealed *Pneumococcus*, *Staphylococcus aureus*, and hemolytic *Streptococcus*. The initial antibiotic regimen consisted of ceftazidime, flucloxacillin (INN: flucloxacillin), amikacin, and itraconazole. Within the first 2 weeks bilateral perihilar and basal infiltrates were demonstrated by chest x-ray films. Early laboratory tests confirmed infection (C-reactive protein, 200 mg/dL). After specific antibiotic treatment, radiologic and laboratory parameters returned to within normal limits.

One day before the planned discharge from the hospital (postoperative day 32), a massive hemoptysis developed, with an estimated blood loss of 750 mL, and the patient was returned to the intensive care unit. While the clinical condition of the patient stabilized, the initial bronchoscopic examination revealed blood in the right bronchial system but no further bleeding source. On the chest radiogram, basal infiltrates of the right lung were detected (Fig 1). Because of a hematocrit value below 0.25, the patient was given 2 units of blood. A follow-up bronchoscopic study on the next day showed necrotic areas with clots in the intermediate bronchus close to the orifice of the middle lobe bronchus. During this examination a massive bronchial hemorrhage developed. The patient underwent emergency intubation, after which the right main stem bronchus was blocked by an endobronchial blocker. The patient was immediately transferred to the operating room. After a thoracotomy, a hematoma within the middle lobe was

Fig 1. Chest x-ray film of the patient immediately after admission to the intensive care unit showing pulmonary infiltrates in the right lung.

detected. During the simultaneous intraoperative bronchoscopic examination, massive bleeding from the intermediate pulmonary artery into the bronchus was localized. Consequently, the main pulmonary artery was clamped and a lower bilobectomy performed.

The pathologic examination of the resected lobes showed marked intra-alveolar and intrabronchial hemorrhage accompanied by extensive pleuritis and minimal signs of acute rejection (grade A1a). The microbiological examinations of the bronchoalveolar lavage revealed *Pseudomonas* and "nonfermenter" species.

The postoperative course was uneventful, and the patient was discharged 13 days after the reintervention. A bronchoscopic examination 2 months later showed a completely healed bronchial stump without any signs of necrosis. The actual clinical condition of the patient is excellent and he is working in his own company.

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Discussion. Vascular complications are relatively uncommon after lung transplantation and are mostly related to anastomotic problems, carrying a high rate of mortality.¹ A bronchovascular fistula with massive hemoptysis is a rare but serious complication after lung transplantation and is associated with serious morbidity. The fistula may result from either ischemic or infectious necrosis of the bronchus accompanied by an erosion of a large adjacent pulmonary vessel.

A bronchovascular fistula after lung transplantation should be suspected in the case of infectious complications combined with severe hemoptysis, especially if the microbiological tests reveal massive bacterial or fungal contamination. Bronchovascular complications are mostly preceded by minor premonitory hemorrhages before the final and possibly fatal bleeding occurs. In our case, however, there were no preceding signs, such as blood-stained sputum.

Hemoptysis may be caused by trauma, neoplasm, diseases of large vascular structures adjacent to the tracheobronchial tree, or by ischemic and infectious necrosis of the bronchus.^{2,3} The pulmonary artery balloon is another possible cause for this complication, but use of a continuous measuring catheter without balloon inflation makes this cause unlikely. In the present case, right lung ischemia lasted more than 6 hours and may have led to this serious complication accompanied by infection. Because there is very little experience in the treatment of massive hemoptysis after lung transplantation, the diagnostic and therapeutic measures must be related to the clinical knowledge accumulated from similar causes in tuberculosis, tumors, bronchiectasis, and other conditions.^{2,3}

The first diagnostic measure should be a chest radiogram, which may point to the origin of the hemoptysis in the affected lobe. Next, emergency bronchoscopic study should be regarded as the key measure to localize the bleeding site before therapeutic interventions.

Computed tomographic scanning has also been suggested as the best means to confirm the diagnosis. However, computed tomographic scanning depends on the patient's transfer to the department of radiology. The risk of hemoptysis either during the transfer or during the computed tomographic examination has to be taken into account. In our patient the bronchoscopic examination was sufficient to localize the bleeding site, which was decisive for the definite surgical approach. Thus, optimal treatment in our opinion requires all

the diagnostic and therapeutic procedures performed in the intensive care unit or the operating room itself.

The literature contains several reports of major pulmonary resection after lung transplantation, especially for vascular complications.^{4,5} In these instances the underlying problem was a pulmonary venous obstruction. One of the patients underwent a left lower lobectomy, and he did not survive.⁵ Recently, Ruffini and associates⁴ reported the first case of successful bilobectomy for pulmonary venous obstruction.

This is the first report of a successful bilobectomy after lung transplantation for life-threatening hemoptysis due to a bronchovascular fistula. The occurrence of massive hemoptysis after lung transplantation is a serious and potentially lethal complication that requires rapid diagnosis and surgical intervention. In our case, the emergency lower bilobectomy for a bronchovascular fistula after lung transplantation was a lifesaving operation with a good medium-term clinical outcome.

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REFERENCES

1. Clark SC, Levine AJ, Hasan A, Hilton CJ, Forty J, Dark JH. Vascular complications of lung transplantation. *J Thorac Cardiovasc Surg* 1996;61:1079-82.
2. Conlan AA, Hurwitz SS, Krige L, Nicolaou N, Pool R. Massive hemoptysis: review of 123 cases. *J Thorac Cardiovasc Surg* 1983;85:120-4.
3. Knott-Craig CJ, Oostuizen GJ, Rossouw G, Joubert JR, Barnard PM. Management and prognosis of massive hemoptysis: recent experience with 120 patients. *J Thorac Cardiovasc Surg* 1993;105:394-7.
4. Ruffini E, Maggi G, Actis-Dato G, Cavallo A, Oliaro A, Agostinucci A, et al. Successful bilobectomy for pulmonary venous obstruction after bilateral lung transplantation. *J Thorac Cardiovasc Surg* 1998;116:648-9.
5. Sarsam MA, Yonan NA, Beton D, McMaster D, Deiraniya AK. Early pulmonary vein thrombosis after single lung transplantation. *J Heart Lung Transplant* 1993;12:17-9.