

REVIEW

Postoperative surgical complications after lung transplantation



M. de la Torre*, R. Fernández, E. Fieira, D. González, M. Delgado, L. Méndez, J.M. Borro

Department of Thoracic Surgery and Lung Transplantation, University Hospital of A Coruña, A Coruña, Spain

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Abstract This is a review article on the main postoperative complications after lung transplantation: airways complications, vascular complications, pleural complications, surgical wound complications, and abdominal complications.

Incidence data, severity, and major management regimens are reported.

Postoperative complications after lung transplantation result in a significantly increased morbidity and mortality, with early diagnosis and therapy being extremely important.

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Indications for lung transplantation are clearly defined and surgical technique has been standardized. Risk and incidence of postoperative surgical complications are, however, high and result in a significantly increased mortality. For most serious complications, such as bleeding, vascular stenoses, and bowel perforations, a high level of suspicion and early measures are key steps to reduce mortality¹.

Airways complications

Incidence of airways complications is 5-15% depending on the series and appears higher in patients receiving

transplantation due to infectious diseases (bronchiectasis and cystic fibrosis), with cultures positive for aggressive microbes such as *Pseudomonas* and fungi such as *Aspergillus*, *Scedosporium*, or *Penicillium*. In such patients, incidence doubles, risk of bronchial suture dehiscence is higher and management becomes more challenging due to mucosa membrane inflammation and persisting secretions.

Additional incriminated factors are good preservation of lung graft, ischemia time, occurrence of hemodynamic instability during surgery, and the need of high doses of amines during postoperative period².

The following complications are observed:

- Bronchial suture dehiscence
- Bronchial suture stenosis
- Non-suture-related stenosis
- Bronchomalacia

* Corresponding author.

E-mail address: mtorre@canalejo.org (M. de la Torre).

Suture dehiscence is usually an early complication and results in air leakage through chest drains or in pneumothorax and subcutaneous emphysema when drains have already been removed. It is due to poor healing (remember bronchial vasculature is sectioned during surgery), particularly when an associated infection is present. Diagnosis is based on bronchoscopy, although multisection CT is also very useful and provides 2D and 3D reconstructions. For small dehiscences (smaller than 1 cm), therapy can be conservative, with chest drains being left in place and aspiration bronchoscopies being performed, along with appropriate antibiotic and antifungal therapy when needed. Repeated bronchoscopies allow not only clear airways to be maintained but also the healing course to be monitored. For major or very early fistulas after surgery, surgical repair is recommended, using a repeated bronchial suture and a plasty based on adjacent well-vascularized tissue. When a poor condition of donor bronchial tissue is present, and in patients receiving double-lung grafts, right upper lobectomy followed by reanastomosis of donor's intermediate bronchus to receptor's main right bronchus is also possible. In left side transplantation, a longer bronchus usually allows bronchial tissue to be sectioned more proximally in a region showing a better condition³.

Bronchial suture stenoses usually have a later appearance and are due to abnormal healing. Most of them occur after 2 to 3 months. Most common presentation is a non-significant stenosis found during follow-up bronchoscopies or CTs; occasionally stenoses are purely secondary to a size discordance between donor's bronchus and receptor's bronchus. In such cases, follow-up to monitor stenosis course is used. In symptomatic patients having stenoses that result in a compromised bronchial lumen (>50%), therapy is based on balloon dilation and removal of any existing abnormal healing tissue; intercurrent infections should be ruled out or treated. When stenoses recur after 3-4 dilations, an endobronchial stent implant should be used. Based on our experience we favor autoexpandable bare metallic stents (Ultraflex®), which are implanted under general anesthesia and laryngeal mask, using flexible bronchoscopy and under fluoroscopic monitoring⁴.

Multisection CT with 2D and 3D reconstructions is very useful to diagnose such bronchial complications. Furthermore, it allows measurements to be obtained for stent implant and a later follow-up not requiring bronchoscopies which are more invasive and bothersome for patients. Sixty-four sections are used, with a fast image acquisition and radiation dose modulation.

Non-suture-related stenosis mainly refers to intermediate right bronchus stenoses and lobar bronchial stenoses distal to bronchial suture. Intermediate bronchus stenoses are caused by difficult revascularization in the area due to a thicker bronchial tissue, and are also treated with dilations and stent implants. Distal lobar stenoses are usually secondary to bronchial inflammation or infection, associated to mucosa membrane thickening; thus, besides medical treatment, dilations and bronchoscopic follow-up are also used.

Bronchomalacia in transplanted lung is not uncommon, and results in a dynamic stenosis and cough; diagnosis is achieved bronchoscopically. Symptomatic patients showing an impact on spirometric measurements can be treated with

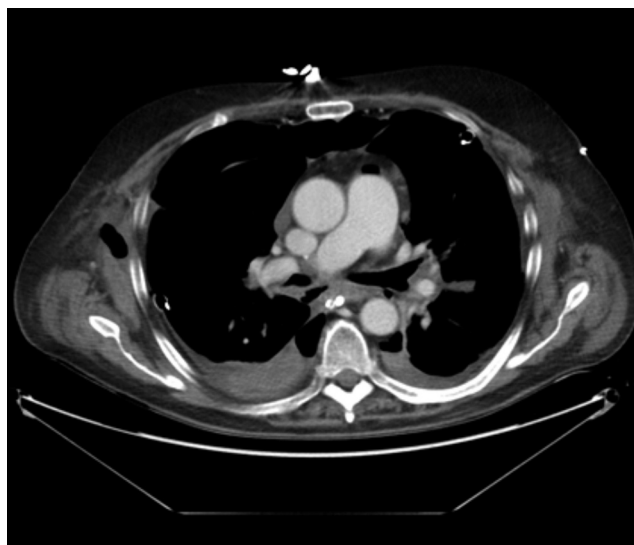


Figure 1 CT image showing a bronchial dehiscence in posterior aspect of a left bronchial suture after double-lung transplantation.

repeated dilations and/or several bronchial stents. Some patients show a progressive and eventually lethal course⁵.

Fig. 1, Fig. 2

Vascular complications

Vascular complications are less common, and are found in 1-3% of lung transplants. However, mortality associated to such complications is high.

Venous suture complications include pulmonary vein stenosis and thrombosis. Lower veins, and particular left lower vein, are more commonly involved, due to their anatomical disposition. A higher incidence in women with pulmonary fibrosis has been reported in literature; this is probably related to a smaller chest cage size. Appropriate



Figure 2 Multisection CT with 3D reconstruction showing a stenosis distal to right bronchial suture in double-lung transplantation.

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