Tracheal and bronchial stent for native main bronchus laceration after lung transplantation

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A 65-year-old female patient with a history of interstitial lung disease secondary to rheumatoid arthritis presented for bilateral lung transplantation. Bronchoscopy performed at the conclusion of the transplant showed a moderate-sized tear in the medial wall of the left main bronchus, 1 cm proximal to the left main anastomosis (Figure 1, A). This was thought to be caused by the left-sided double-lumen endotracheal tube. Because there was healthy mucosa between the laceration and the anastomosis, the injury was not thought to be due to disruption of the anastomosis. Because there was no air leak from either pleural cavity, a multidisciplinary team decided to pursue conservative management with aggressive antimicrobial coverage, a decrease in corticosteroid dose, and limitation of positive-pressure ventilation.

There was no evidence of primary graft dysfunction within 24 hours, and repeat bronchoscopy on postoperative day (POD) 1 demonstrated no worsening of the laceration. She was extubated on POD 1. Mucus plugging on POD 5 led to reintubation. Computed tomography scan performed on the same day demonstrated pneumomediastinum.

Endobronchial stenting was pursued to facilitate healing of the laceration. A 60-mm × 16-mm covered hybrid stent was placed in the left mainstem bronchus on POD 17 using flexible bronchoscopy. Distal to the laceration, there appeared to be stenosis along the anastomosis, and balloon dilation was performed. Although the stent was in good position after placement, a bronchoscopy performed the next day demonstrated proximal movement of the stent, partially obstructing the right mainstem. The stent was replaced by a shorter 50-mm × 16-mm covered hybrid stent. The following day, bronchoscopy showed that the stent had migrated proximally once again. This was likely due to the high intraluminal pressure from the distal narrowing along the anastomosis compared with the intraluminal pressure proximally at the left mainstem. On POD 26, the stent was removed and a 40-mm × 16-mm covered hybrid stent was placed, followed by a covered metallic expandable hybrid Y stent. The distal end of the left side of the Y stent extended inside the left mainstem stent. This allowed stabilization of the bronchial stent while also providing coverage along all portions of the laceration (Figure 1, C).

Serial bronchoscopies demonstrated both stents in place, with thick secretions along the stent. She was eventually discharged on 2 L/min oxygen on POD 55. During clinic visits, she complained of a productive cough.

Serial bronchoscopies were performed every 1 to 2 weeks for clearance of secretions. Both stents were removed on POD 111, 85 days after their placement. After removal, the laceration was noted to be completely healed, there was no bleeding, and minimal granulation tissue (Figure 1, B). During subsequent clinic visits, the patient reported that her cough had resolved and was not needing oxygen supplementation. The patient provided informed consent.
consent for publication of her case; institutional review board approval was not required.

**DISCUSSION**

In this case report, we describe the first reported case, to our knowledge, of the use of a self-expandible hybrid Y stent to treat an airway injury sustained in a lung transplant recipient. Tracheobronchial injuries after lung transplantation are sparsely described complications.\(^1\)

Management of tracheobronchial lacerations may include conservative management, stenting, application of sealants, and surgical repair.\(^2\) Conservative management, including serial endoscopic monitoring, has been suggested in certain situations, such as the absence of respiratory distress, sepsis, lack of esophageal injuries, and absence of connections into the mediastinum.\(^3\)

Stenting may be a viable option in patients who are poor surgical candidates. In our case, stenting was preferred over a surgical repair, given that it was deemed less invasive. Stents may allow the laceration to heal through formulation of granulation tissue. Stenting may have drawbacks, such as granulation tissue formation causing airway stenosis, stent migration, and mucous proliferation.\(^4\) For our patient, there was no active infection at the time of stent placement, and the possibility of causing an infectious mediastinitis from stenting was considered low. Healing of tracheobronchial injuries varies but may take 2 to 4 weeks.\(^5\) Our patient was on high doses of immunosuppression and, given the extent of the injury, the stent was left for a longer period of time in anticipation of a slower healing process. Combination stenting has been described in cases of multiple areas of disease, but overlapping stents have been rarely described.\(^E1\)

**FIGURE 1.** A, Endoscopic view of left main bronchus laceration before intervention. B, Endoscopic view of left mainstem bronchus after removal of tracheal and bronchial stents. C, Diagrammatic depiction of combination stenting used for a bronchial laceration in the setting of a stenosed left-sided anastomosis.
In conclusion, combination stenting using a Y stent and an endobronchial stent can be a useful modality for patients with airway lacerations in the mainstem bronchi. In particular, in cases in which the risk of stent migration is high, Y stenting over an endobronchial stent can provide stability to allow lacerations to heal with time.

Conflict of Interest Statement
The authors reported no conflicts of interest.

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