Silicone Y stent placement at secondary left carina for malignant central airway obstruction

Septimiu D. Murgu, MD, FCCP, and Henri G. Colt, MD, FCCP, Irvine, Calif

The Y silicone stents are shaped with long tracheal and left main bronchial limbs and a shorter right main bronchial limb. These stents can be used for patients with fixed or dynamic central airway obstruction from benign or malignant disease.¹ More often, these stents are used for patients with extensive tumor involvement in the lower trachea and mainstem bronchi.² To our knowledge, their use specifically for unilateral central airway obstruction has not been previously published. In this report, we describe the indication, method, and outcome of Y stent insertion at the level of the secondary left carina separating the left upper and lower lobe bronchi, to restore airway patency of the left lobar bronchi in a patient with primary squamous cell lung cancer.

CLINICAL SUMMARY

A 73-year-old man with hemoptysis was found to have a left infrahilar mass involving the distal left main bronchus and the entrance of the lobar bronchi (Figure 1). Rigid bronchoscopy, neodymium:yttrium-aluminum-garnet laser photocoagulation and debulking was performed under general anesthesia with assisted spontaneous ventilation using a 13-mm Efer-Dumon rigid ventilating bronchoscope (Bryan Corporation, Woburn, Mass). Tumor infiltration, cartilaginous collapse, and extrinsic compression prompted insertion of a Y silicone stent (16-mm-diameter tracheal, 12-mm-diameter bronchial limbs) within the left main bronchus. The left bronchial limb was shortened to 1.5 cm using a scalpel prior to loading the longitudinally folded stent into a large, rigid, stent introducer tube. The stent was then deployed into the entrance of the left upper lobe bronchus. While the stent was still partially folded along its long axis, rigid forceps were used to grasp the stent and pull it proximally into the distal left main bronchus, allowing unfolding of the right bronchial limb into the relatively straight left lower lobe bronchus. Forceps were then used to push the stent

down onto the secondary left carinal spur. The right limb of the Y stent was thus directed into the left lower lobe bronchus while the left limb was shortened to provide access into the left upper lobe bronchus (Figure 2). There were no perioperative complications. The patient received chemotherapy and radiation therapy. Bronchoscopy 4 months later revealed patent airways and no evidence of stent-related complications. At 1-year follow-up, the patient's airways remain patent.

DISCUSSION

A variety of stents are available to improve dyspnea and quality of life in patients with central airway obstruction that is unresectable because of anatomic limitations, metastatic disease, or significant comorbidities.¹⁻⁵ These stents come in various sizes and shapes and are made of a variety of different materials. When made of silicone, they can be shortened by tapering the distal extremities to allow ventilation to the lobar bronchi. In general, the largest stent possible should be selected for insertion to reduce the possibility of migration. Y stents are usually deployed using the "push" or the "pullback" techniques. In the push technique, the stent is ejected from the bronchoscope above the carina and then is pushed with an open forceps placed at the stent bifurcation. In the pullback technique, both bronchial limbs are placed within one bronchus and the stent is pulled until the shorter limb pops into position in the contralateral bronchus. The stent can then be adjusted by using forceps.

Distal left main bronchial deployment of silicone Y stents obviously risks bronchial perforation, laceration of secondary left carina, or vascular disruption because of the proximity of large vessels. Complete bronchial obstruction can occur if stents do not satisfactorily unfold, and hypoxemia can be related to inadequate right lung ventilation because the rigid bronchoscope is deep within the distal left main bronchus. Intraoperative complications can be avoided by ensuring the selection of an appropriately sized stent, optimizing oxygenation, and using careful bronchoscopic technique whereby the rigid bronchoscope and stent are correctly aligned within the airway lumen before stent deployment. Airway laceration and even perforation can occur, especially if resistance is felt as the deploying stent is pushed out of the introducer tube. Over the long term, persistent cough, dyspnea, or postobstructive pneumonia by stent obstruction from

From the Department of Medicine, Pulmonary and Critical Care Medicine, University of California School of Medicine, Irvine, Calif.

Disclosures: None.

Received for publication July 20, 2008; accepted for publication Oct 3, 2008; available ahead of print Feb 23, 2009.

Address for reprints: Septimiu Murgu, MD, Assistant Professor, UCI Medical Center, 101 the City Drive South, Bldg 53, Rm 119, Rt 81, Orange, CA 92868 (E-mail: smurgu@uci.edu).

J Thorac Cardiovasc Surg 2010;139:494-5
0022-5223/\$36.00

Copyright © 2010 by The American Association for Thoracic Surgery
doi:10.1016/j.jtcvs.2008.10.041

FIGURE 1. A, Tumor extension in the distal left main bronchus (arrow). The lung parenchyma distal to the obstruction is functional. B, Distal left main bronchial obstruction. The tumor is highly vascular, invading the posterior and medial wall of the distal left main bronchus.

FIGURE 2. A, Diagram showing Y stent position with the tracheal limb in the left main bronchus, the shortened left limb in the left upper lobe, and the right limb in the left lower lobe. B, Restored airway patency of the left upper and lower lobe bronchi after Y stent insertion.

secretions, granulation tissue, or tumor overgrowth may require repeat bronchoscopic intervention.

There are several potential limitations of Y stent deployment at the level of the secondary left carina. For example, the bifurcated stent may not fit well onto the spur between the left upper and left lower lobe bronchi, causing partial airway obstruction. It may also be necessary to reshape the stent by shortening one of its limbs prior to insertion. Finally, long-term efficacy may be limited by disease progression causing segmental airway obstruction distal to the stent.

In conclusion, we suggest that for patients with tumor in the distal left main bronchus extending to the secondary

left carina and the lobar bronchi, an adequately sized Y stent can provide good palliation.

References

1. Murgu SD, Colt HG. Complications of silicone stent insertion in patients with expiratory central airway collapse. *Ann Thorac Surg.* 2007;84:1870-7.
2. Dutau H, Toutblanc B, Lamb C, Seijo L. Use of the Dumon Y-stent in the management of malignant disease involving the carina: a retrospective review of 86 patients. *Chest.* 2004;126:951-8.
3. Ernst A, Majid A, Feller-Kopman D, Guerrero J, Boisselle P, Loring SH, et al. Airway stabilization with silicone stents for treating adult tracheobronchomalacia: a prospective observational study. *Chest.* 2007;132:609-16.
4. Cavaliere S, Venuta F, Foccoli P, Toninelli C, La Face B. Endoscopic treatment of malignant airway obstructions in 2,008 patients. *Chest.* 1996;110:1536-42.
5. Shiraishi T, Kawahara K, Shirakusa T, Inada K, Okabayashi K, Iwasaki A. Stenting for airway obstruction in the carinal region. *Ann Thorac Surg.* 1998;66:1925-9.