ventilation is of highest importance. The quick reintubation with the rigid tracheoscope (bronchoscope) after the stent deposition in the proximal trachea allows for secure airway with quick return of ventilation, and thus the apnea time is minimized compared with the classic techniques, in which the patient remains apneic until the stent is deposited in the distal trachea or proximal main stem bronchus.

The mean procedural time in our series was 38 minutes, which compares well with the procedure time reported by Oki and Saka.⁹ In their case series, they described a mean procedure time of 55 minutes for the conventional Y-stent technique. Thus, the procedural time using the modified technique was 31% less than the their procedural time with the conventional technique.

CONCLUSIONS

Our modification of the classic Y-stent insertion technique with Seldinger-like guidance over the flexible bronchoscope is safe, effective, expedient, and easy to master, and does not require new equipment. The advantages of

this technique are visualization of the airway through most of the procedure, guided advancement of the stent, quick return of ventilation, and shorter procedural time.

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EDITORIAL COMMENTARY

Pushing, pulling, or Seldinger technique: What matters is understanding the principles, not the methods

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As has been clearly stated, “As to methods, there may be a million and then some, but principles are few. The man who grasps principles can successfully select his own methods. The man who tries methods, ignoring principles, is sure to have trouble.”

In this issue of the *Journal*,¹ Kazakov and colleagues describe their method of placing tracheobronchial Y stents for benign and malignant airway disease in 29 patients with very good results and possibly less time. The limited literature on the topic of Y-stent placement is a surrogate marker

Coronal computed tomography showing mediastinal air from tracheal rupture during Y-stent placement (arrow).

Central Message

Tracheobronchial stenting may result in potentially significant complications. Mastery of safe technique for placement is essential.

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for the limited expertise available in the use of Y stents, and thus Kazakov and colleagues' contribution is an important one. Their technique does not appear to be difficult, but it is not for the faint of heart. It involves the placement of a Y stent through direct laryngoscopy, followed by rigid intubation and quick introduction of a flexible bronchoscope through the bronchial limb of the stent. Finally, the rigid bronchoscope is slowly but blindly advanced to push the tracheal limb into position. Although Kazakov and colleagues describe this technique as nonblind, anyone doing the procedure will need to ask how hard to push and how far to push. Nevertheless, their results are exciting and worth of replication. A particular strength of their technique is that they were able to place dynamic Y stents, also known as Freitag stents. These metal-reinforced Y stents are not easily deployed by the "pull technique," in which you place the stent into the barrel of a deployer tube and release the stent in a main stem bronchi, only to pull it back into the carina. This is not possible with dynamic Y stents because of the metallic reinforcement of the tracheal limb. With the modified technique described by Kazakov and colleagues, however, this is clearly possible. Some experts advocate a method in which a jet ventilation cannula is used to maintain continuous oxygenation.² These devices, however, although useful and small (2 mm), compete for space in the narrow suspension laryngoscope or rigid bronchoscope (inner diameter 10-12 mm).

Regardless of the technique used, what one should keep in mind is that we are introducing a foreign body that will partially or totally obstruct the airway during placement, and for this reason, everyone in the team should have clear roles, with all the equipment ready and a focus on minimizing any delays. Unfortunately, this patient population frequently has limited pulmonary reserve and tends to have quick desaturation; when this background is coupled with intermittent ventilation, the risk of hypoxic and hypercapnic respiratory failure is significant.

It is important to mention the appealing characteristics of the Y stents. They imitate the airway anatomy and are able to treat airway stenosis involving the lower trachea, main carina, and proximal main stem bronchi. In addition, they can be customized by opening adequate orifices to permit ventilation of the right upper lobe. Most importantly, however, the rate of migration is exceedingly low.

In 1994, Freitag and colleagues³ described the theoretic and experimental bases for a dynamic Y stent, as well as their experience in placing Y stents in 142 patients during a 5-year period.³ Their experience with 2 different placement techniques also speaks to this group's expertise and confidence in modifying the methods.⁴ Dutau and associates⁵ published in 2004 their experience with Dumon Y stents in 86 patients with central airway obstruction or fistula. Subjective symptomatic improvement was reported in 97% of the patients, and the average time with the stent in place was 133 days.

In summary, there are multiple methods to place Y stents in the airway, but the principles remain as follows:

- (1) The Y stent should be used in cases in which the lower trachea, carina, or main stem bronchi are involved.
- (2) The operator, whether a thoracic surgeon or an interventional pulmonologist, should be ready to remove the stent rapidly if necessary.
- (3) A backup plan should be always available.
- (4) The complications associated with airway stents (mucostasis, colonization, and granulation) should be kept in mind, and the patients should be followed up closely after placement.
- (5) Any method used to introduce a Y stent carries the inherent risk of vocal cord injury and also risks of edema, stridor, carinal rupture, hemoptysis, pneumomediastinum, hypoxemia, and death.
- (6) Training in Y-stent placement under direct proctorship is very important; simulation training in low-fidelity models is likely to shorten the learning time.

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