A simplified insertion technique for tracheal T-tube

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▶ Video clip is available online.

Montgomery T-tube is a palliative treatment for subglottic stenosis. It is usually inserted through a tracheostomy stoma by forcing in the vertical portion of the tube with a clamp. This method may be technically challenging because the silicone T-tube may kink during the insertion through a tight stenosis above the stoma. We proposed a new technique to facilitate T-tube insertion in severe subglottic stenosis.

TECHNIQUE

A 0/0 silk suture is inserted using a small needle into the lumen and through the wall of proximal portion of the T-tube. The needle is then cut off and a long loop made by tying a knot at the end of the suture (Figure 1 and Video 1). In an operating room and under general anesthesia, the patient is intubated with a 14-mm or smaller rigid bronchoscope, the ventilator is connected to bronchoscope, and the tracheostomy cannula is removed. After successful dilation of the stenosis, the loop of the suture is passed from the stoma into the trachea, endoscopic forceps grasp it, and the suture is withdrawn through the bronchoscope. A curved clamp is placed through the horizontal limb and into the lumen of the vertical, distal end of the T-tube, introduced into the trachea through the tracheostomy stoma, and directed inferiorly. Once the vertical, proximal end of the T-tube is passed intratracheally, gentle traction is placed on the suture until the proximal end is pulled across the stenosis. The suture is then cut and pulled out and the clamp is gently withdrawn through the horizontal limb of the T-tube. Figure 2 and Video 2 summarize the procedure.

During the past 15 months, this technique has been performed for postintubation subglottic stenosis in 5 consecutive patients with previously existing tracheostomy and unfit for surgery. The mean procedural time was

A, Vertical, proximal end of T-tube pulled across the stenosis. B, Traction suture.

Central Message

A suture is inserted through the wall of the vertical, proximal end of the T-tube. The suture is extracted out through rigid bronchoscopy placed from above and pulls the stent upward.

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18 ± 2.3 minutes. No complications related to the procedure, stenosis recurrence, stent damage, or vocal folds dysfunction were found (mean follow-up, 10 ± 3.1 months).

DISCUSSION

The traditional method of T-tube insertion consists of grasping the vertical, distal limb with a clamp and advancing it inferiorly, applying the same technique on the vertical, proximal limb in a superior direction, and finally pulling the extraluminal limb anteriorly to help direct it.¹ However, the proximal, vertical limb of a T-tube often cannot be pushed in upward from the stomal site and must be pulled from above, often with significant force to get it through tight and convoluted strictures.

Previous articles have offered different solutions to this technical problem, but there is still no solution that works in all cases. Cooper and colleagues² demonstrated the use of a suture tied around the proximal end of the T-tube and withdrawn through the upper airway to pull the proximal end through the stenosis. Other authors used a cone-shape dilator³ or an endotracheal tube⁴ fixed to the proximal end of the T-tube to get it through the stenosis. To offer an additional solution, we modified Cooper's technique by inserting a suture through the wall of the

FIGURE 1. A, A 0/0 silk suture is inserted into the lumen and through the wall of proximal portion of the T-tube. B, The needle is then cut off and a long loop made by tying a knot at the end of the suture. C, A curved clamp is placed through the horizontal limb and into the lumen of the vertical, distal end of the T-tube.

VIDEO 1. Insertion of silk traction suture into the vertical, proximal end of the T-tube. Video available at: [http://www.jtcvsonline.org/article/S0022-5223\(17\)33067-2/fulltext](http://www.jtcvsonline.org/article/S0022-5223(17)33067-2/fulltext).

FIGURE 2. A, Insertion of distal end of the T-tube with the curved clamp through tracheostomy stoma into trachea. B, Once the vertical, proximal end of T-tube is passed intratracheally. C, Gentle traction is placed on the suture until proximal end is pulled across the stenosis. D, The suture is then cut and pulled out.

vertical, proximal limb of the T-tube, withdrawing the suture through rigid bronchoscopy placed above, and pulling the stent upward using the traction suture. In contrast to standard technique, the distal end of the T-tube telescoped on the clamp was inserted through

VIDEO 2. Main steps of the procedure, including endoscopic dilation of the stenosis and T-tube insertion using the silk traction suture. Video available at: [http://www.jtcvsonline.org/article/S0022-5223\(17\)33067-2/fulltext](http://www.jtcvsonline.org/article/S0022-5223(17)33067-2/fulltext).

the tracheostomy stoma into the trachea and advanced distally until the upper limb was also placed in the trachea.

Our procedure is technically easy, avoids the cumbersome use of tubes or other devices, and maintains constant control of the patient's airway because the bronchoscope is in place throughout the entire process. However, it should be applied with appropriate cautions. Despite the fact that sutures have previously been used for the external fixation of silicone stents without damaging them,⁵ we recommend

using a small needle to prevent making a large puncture on the stent wall. Then, from a technical point of view, dilation of the stenosis is needed before inserting the T-tube to minimize the risk of tearing the proximal end of the T-tube by pulling on the suture too hard. During the insertion of the T-tube into the airway, the clamp should advance in the longitudinal tracheal axis direction to avoid injuring or perforating the trachea by the vertical distal tip of T-tube telescoped on the clamp. Because the external arm could migrate into the trachea during pulling on the suture, the clamp should be withdrawn through the external arm when the stent is properly placed.

CONCLUSIONS

Ours is among several techniques that might be tried by physicians when a T-tube cannot be placed by the traditional method.

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