Successful treatment of long-segmental tuberculous tracheal stenosis with combined Montgomery T-stent and Hood stent

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Abstract

We used combined Montgomery T-stent and Hood stent in a long segment (11 cm), benign tracheal stenosis after treatment with a standard Montgomery T-stent failed. Respiratory and phonation function was restored immediately after the procedure. The patient became pregnant 2 months later. Her baby was born at full-term with a smooth vaginal delivery. She was in good health 18 months after the operation.

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1. Introduction

Most patients with pulmonary tuberculosis can be successfully treated with anti-tuberculosis medical therapy. However, a few patients suffer cicatrizining tracheobronchial stenosis as a chronic complication. Various methods have been applied to these patients, including bronchoscopic dilatation, laser ablation, and airway stenting [1,2]. We report our successful experience using combined Montgomery T-stent and Hood stent in a young female with long segment tracheal stenosis.

2. Case report

A 27-year-old female with pulmonary tuberculosis underwent anti-TB medical treatment for 1 year. She suffered progressive dyspnea on exertion for 2 months. Clinical examination revealed dyspnea and labor breathing with diffuse wheezing. She was treated for asthma but the response was poor.

Bronchoscopy revealed a stricture causing 90% obstruction over the upper trachea and tuberculosis was proved after bronchoscopic biopsy (Fig. 1A and B). Computed tomography demonstrated a tapering of the trachea from cervical level to intra-thoracic level, 6 cm in length, compatible with the bronchoscopy.

Montgomery T-stent (no. 13) was inserted elsewhere to relieve the airway stricture. Her symptoms improved after Montgomery T-stent insertion. Removal of the Montgomery T-stent was tried twice (6 and 18 months after the first operation) but failed due to recurrence of the stricture even when combined with laser ablation and bronchoscopic dilatation.

The patient was transferred to our unit for evaluation of the possibility of airway reconstruction. After obtaining consent and careful communication with the anesthesiologist, the patient was placed in a supine position. The airway was secured by maintaining spontaneous ventilation with inhaled (enflurane) and short-acting intravenous agents (propofol 2.0 mg/kg). Under rigid bronchoscopy, airway stenosis was noted over both the proximal (60% obstruction, 1 cm) and distal (80% obstruction, 0.5 cm) ends of the Montgomery T-stent. The stricture segment measured 11 cm in length, which could not be covered by a standard Montgomery T-stent (Fig. 2A). We inserted a Hood stent (12 × 60 mm) by rigid bronchoscopy and the distance was 10 mm from carina. In order to prevent recurrence of upper airway stenosis, Montgomery T-stent (no. 11) was inserted via the previous tracheal stoma in reverse (the long arm was located proximally and the short arm was located distally). The proximal end of the Montgomery T-stent was located...
0.5 cm below the vocal cord (Fig. 1C). The distal end of the Mongomery T-stent was incorporated into the proximal end of the Hood stent (Figs. 1D and 2B). The patient tolerated the procedures and discharged smoothly.

The patient described significant relief of her symptoms and exercise tolerance during follow-up. Although pregnancy was not suggested under the concern of potential insufficiency of the airway and pulmonary capacity, she became pregnant accidentally 2 months after the operation and the baby was born at full-term with a smooth vaginal delivery. At 18 months follow-up, the patient and her child are doing well.

3. Discussion

Direct erosion of mediastinal lymph nodes infected by tuberculosis bacilli may be the possible mechanism of tracheal bronchial tuberculosis. It frequently heals with concentric scarring and permanent fibrosis [3]. Traditional management of tuberculous airway stenosis was tracheobronchoplastic procedures [4,5]. In unresectable patients, bronchotherapeutic procedures (dilation, laser ablation, and electrocoagulation) can be used to keep the airway patent and improve quality of life [1,2].

Stent placement for tracheal and bronchial stenosis has been reported for more than 10 years. Fujihara et al. [6] published his successful experience of expandable metal stents in patients with tuberculous tracheobronchial stenosis. Han et al. [7] also reported good therapeutic outcome in this subject. However, applying a metallic stent in the benign tracheobronchial stenosis may convert resectable lesions to lesions of irresectable length which are difficult to remove after the treatment is complete.

Relating to the use of a silicone stent, Nomori reported that two patients with tuberculosis tracheobronchial

![Fig. 1. (A) Bronchoscopy revealed severe airway obstruction over the upper trachea. (B) CT revealed severe airway obstruction over the suprasternal notch region. (C) The proximal end of a Mongomery T-stent was located 0.5 cm below the vocal cord. (D) Patent airway lumen after insertion of a Mongomery T-stent and a Hood stent.](image)

![Fig. 2. Schematic representation before and after combined Mongomery T-stent and Hood stent insertion.](image)
stricture suffered granulation stenosis after placement of a Dumon stent [8]. Yim described seven patients who underwent 11 dilatations and 11 stents with marked improvement in dyspnea and acceptable two stent migration [9]. He concluded that endoscopic dilatation with placement of a silicone stent is an effective treatment for patients with tuberculous tracheobronchial stenosis. In our patient, we did not have the complications of stent migration and granulation growing after 18 months of follow-up. They may be due to the tightness and the long segment of benign stricture to fix the stent, and adequate length of the combined stent to cover the granulation surface.

Resection and reconstruction was the goal for the standard therapeutic method for central airway stenosis. In our patient with a very long segment airway stenosis, such an approach was not easy because extensive experience in airway management was needed. Endo-luminal silicone stents have cosmetic benefits and good hygiene compared to our combined approach. For reasons of safety (pregnancy) and complete satisfaction with the combined stent, we decided not to perform further surgery and the stent will be removed when the stricture segment has stabilized.

We used the ‘combined Mongomery T-stent and Hood stent’ for several reasons. First, it is time consuming to order an extra-long Montgomery T-stent in our country (it takes 2–3 weeks to get a new one). Second, the length of the tracheal stenosis was greater than that of a standard Montgomery T-stent and a Hood stent. Third, the patient was young, and had potential for removal of the tracheal stent after complete treatment. Fourth, the combined Hood and Montgomery T-stent could preserve the phonation and respiratory function and facilitate daily activity.

In conclusion, we treated a young female with a combined Hood and T-stent for her long segmental tracheal stenosis. The patient regained daily activity, her pregnancy was carried to term and she delivered a healthy baby 18 months later. To our knowledge there have been no reports on similar patients. We believe that our approach could be an alternative choice when an extra-long Montgomery T-stent is not available.

References