Open Journal of Respiratory Diseases, **2013, 3, 1-3**
http://dx.doi.org/10.4236/ojrd.2013.31001 Published Online February 2013 (http://www.scirp.org/journal/ojrd)

Stenting for the Management of Post-Tracheostomy Tracheomalacia: Case Report

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Received September 27, 2012; revised October 28, 2012; accepted November 10, 2012

ABSTRACT

In patients who undergo prolonged endotracheal intubation, tracheostomy is performed to prevent the tracheal and laryngeal trauma which may be caused by the intubation tube. In this report, a patient who was intubated after a cerebrovascular embolism and required a tracheostomy for 6 months due to decannulation problems is presented. The patient subsequently developed a tracheomalacia. A stent was inserted and seen to provide functional support. Upon removal of the stent, the tracheomalacia improved. Although surgical therapy is claimed to provide higher success rate, stenting may also be a viable option for the management of tracheomalacia and improve the quality of life in patients with good general condition.

Keywords: Tracheostomy; Tracheomalacia; Stent

1. Introduction

The optimal timing of tracheostomy is controversial. It may be delayed to facilitate extubation in intubated patients, or conversely, performed early to avoid long term complications such as intubation granuloma, posterior commissural stenosis, edema, and subglottic stenosis. The complication rates of endotracheal intubation are correlated with its duration. Prospective studies have shown that 6% of patients intubated for 2 - 5 days had a transient, 5% of patients intubated for 6 - 10 days had ireversible, and 12% of patients intubated for 11 - 24 days had widespread translaryngeal injury [1]. It has been shown that use of a tracheostomy care protocol for patients with a tracheostomy lead to decreased morbidity and mortality with a reduced average time to decannulation [2]. Complications can be related to the procedure itself or the tracheostomy tube (TT) and can occur in the early or late postoperative period [3]. Patients should be evaluated between 7 and 10 days regarding the possibility of extubation. If long term intubation is necessary, a tracheotomy should be made. The TT needs to be removed as soon as possible in order to minimize the rates of tracheobronchitis, tracheal ulceration, tracheomalacia, and persistent tracheocutaneous fistula. There is a consensus panel that made suggestions about a large number of statements that dealt with a variety of subjects, including the most appropriate TT type, suctioning, humidification, patient and caregiver education, home care, emergency care, decannulation, tube care (including use of cuffs and sutures), and overall clinical airway management [4]. Tracheostomy decannulation describes the process of TT removal [5]. Decannulation can be carried out when the patient no longer needs assistive respiration, the tracheobronchial secretion is decreased or ceased, or the infection has been managed [6]. Since all these factors are prerequisites of decannulation, there is no definite time for decannulation. If the patient can cough, has good vital capacity, and can effectively take a deep breath, then decannulation can be carried out.

Late decannulation may be associated with laryngeal stenosis, tracheal stenosis, and localized tracheomalacic development. The use of low pressure baloon tubes in recent years have enabled a significant decrease in the rate of these complications. The pathologic process that begins as a mucosal erosion and continues as an ulceration and cartilage dissolution may lead to tracheomalacia, or lead to tracheal obstruction if there is more fibrotic tissue. Therefore as mentioned in one study individualized plans for tracheostomised patients as well as intensivist-led follow-up on the ward may improve patient outcome and safety [7].

In this report we aimed to note the success of stent deployement method in the treatment of tracheomalacia which occurred as a complication of tracheostomy.

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2. Case Report

A 70-year-old lady presented to the hospital on December 2008 following a sudden loss of consciousness. After she was diagnosed with cerebrovascular embolism, she transferred to the intensive care unit. She remained in the intensive care unit for 10 days. During this period she developed a right sided hemiplegia, swallowing problem and also respiratory failure that required intubation. She was intubated for five days, and considering her present condition, a tracheostomy was opened. She was followed up for 10 more days and subsequently discharged home with a tracheostomy. She suffered a decannulation problem after her discharge from the hospital, and was taken her care for six months at home with obligatory tracheostomy.

She presented to the emergency department of our hospital on May 2009, with stertorous respiration and severe dyspnea. On physical examination she was awake but uncooperative, agitated, tachypneic, and had stertorous breathing. A tracheostomy incision was inspected. She did not have a fever, her blood pressure was 150/90 mmHg, respiratory rate 32/minute, and pulse rate 110/minute. Widespread rhonchi and inspiratory stridor were auscultated bilaterally. Physical examinations of other organ systems were normal. Chest X ray showed increased bronchovascular markings. Body temperature was normal, arterial blood gas analysis showed PaO_2 54 mmHg, $PaCO_2$ 64 mmHg, and oxygen saturation 75%. Complete blood count and biochemistry were normal. The patient was taken to the ICU and mechanical ventilation was initiated. A deep tracheal aspiration was made through the tracheostomy cannula, and a bronchoscopy was planned due to the presence of copious and dense secretions. She lacked adequate swallowing reflex, therefore an empiric intravenous antibiotherapy was initiated against a possible infection secondary to aspiration. During bronchoscopy, a narrowing in the proximal aspect of the trachea and widespread collapse of the anterior tracheal wall toward the lumen during inspiration (tracheomalacia) was observed. Decannulation was considered to be impossible, and due to her good general condition and the possibility that her quality of life could have been improved, insertion of a tracheal stent instead of using a home type ventilator was decided. Using a fiber-optic bronchoscope, a tracheal stent (Alveolus 16 × 60 mm TB-STSTM, Alveolus Inc., Charlotte, NC, USA) was inserted. She was discharged after prescription of mucolytic treatment (N-acetyl cystein 1 × 600 mg) and recommendation of hydration. Her quality of life and respiration improved, with 98% SaO_2 at room air.

She presented to the hospital 4 weeks later, with severe cough, bloody sputum, and respiratory distress. She had stertorous breathing on physical examination. No infectious foci were detected. A control bronchoscopy was made, which revealed a breakage in the posterior wall of the stent, measuring approximately 15 mm in length. The stent was removed, and a second stent (Alveolus 16 × 80 mm, TB-$STS_{TM,}$ Alveolus Inc., Charlotte, NC, USA) was placed. A control bronchoscopy was performed 4 weeks later, and no problems were observed. The patient was kept on the same stent for the next 3 months.

She presented to the emergency department again 3 months later, with stertorous breathing and copious discharge. Because physical examination showed widespread rhonchi, a fiberoptic bronchoscopy was made in an attempt to clear the secretions. During bronchoscopy, folding in the proximal part of the stent and migration in this area were noted. The stent was removed, and the patient was intubated and transferred to the intensive care unit. Two days later a tracheostomy was made. She was then transferred to the in-patient unit, and later discharged home after her saturation remained at 98% - 99%. During her follow up she did not have respiratory distress, therefore the tracheostomy was occluded intermittently, and her saturation was monitored under normal spontaneous breathing. Decannulation was carried out after it was seen that she did not experience any decrease in O_2 saturation values. She is still under normal spontaneous breathing.

3. Discussion

As long as the tracheal length is adequate, the treatment of postintubation stenosis or problems that may be caused by prolonged decannulation is resection and reconstruction [8]. However, surgical resection is difficult in tracheal stenoses, and even impossible in some cases. Particularly many elderly patient with underlying conditions are inoperable and require endobronchial palliation. These methods include bronchoscopic dilation, laser ablation, argon plasma coagulation, stent deployement or the application of a T tube [9]. However, successful management with these methods may be difficult in lesions located at or close to the subglottic area [10]. Although stenting is a simple procedure, it may potentially result in severe complications. Therefore, it must be performed meticulously and by experienced teams. Fatal complications such as vascular erosion, fatal hemoptysis, bronchial wall necrosis may be observed. Other complications include incorrect location, migration, stent breakage, secretion and occlusion of the stent with granulation tissue, fistula formation, and pneumothorax [11].

In conditions where the initial treatment is inadequate and there are no medical contraindications, surgical methods are considered as appropriate methods [12]. However when compared to surgical treatment or home ventilators, tracheal stent placement increases the quality of life, and may be preferred in appropriate patients who cannot be decannulated after prolonged intubation or tra-

cheostomy. Lim *et al*. reported that the stent could be successfully removed in patients undergoing stenting due to initially inoperable post-intubation tracheal stenosis [13].

As a conclusion, it should be kept in mind that stent deployed by fiberoptic bronchoscopy provides functional support to tracheal cartilages, and the tracheomalacia may regress after removal of the stent.

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