We report an 86-year-old woman with a large tracheal laceration caused by tracheal intubation at cardiopulmonary arrest who underwent a successful stent procedure. Tracheal laceration developed in the membranous portion longitudinally 6 cm in length to 2 cm above the carina. Following 9 days’ tracheal intubation, a Y-shaped silicon stent was inserted over the lacerated trachea. Four months after the stenting procedure, we removed the Y-shaped silicon stent from the healed membranous wall. The patient returned to daily life without requiring thoracotomy.

Keywords: tracheal laceration, silicon stent, critical care medicine

Introduction

Iatrogenic tracheobronchial injury after endotracheal intubation is life-threatening. Most cases require urgent thoracotomy, but there are difficult cases of thoracotomy because of high risks of perioperative morbidity and mortality. We describe a case of tracheal wall laceration treated by Y-shaped silicon stent insertion.

Case Report

An 86-year-old woman was transported to an emergency hospital for cardiopulmonary arrest caused by ischemic heart disease. The heartbeat was restored by cardiopulmonary resuscitation, and mechanical ventilation was performed. On the second day, subcutaneous emphysema was present. Bronchoscopic examination showed a tracheal wall laceration of the membranous portion caused by the endotracheal intubation. The tip of the endotracheal tube was advanced over the distal end of the laceration. On day 7 after cardiopulmonary resuscitation, the patient’s condition improved enough to relieve mechanical ventilation, and she was transferred to our hospital to treat the tracheal wall laceration.

Repeated bronchoscopy while pulling up an endotracheal tube showed that the membranous wall was lacerated longitudinally 6 cm in length to 2 cm above the carina. The esophagus was visible through the laceration (Fig. 1). The patient was not a candidate for thoracotomy because of the cardiopulmonary compromise. On day 9 after cardiopulmonary resuscitation, a Y-shaped silicon stent (Dumon Y; outer diameter of the main part, 14 mm; outer diameter of branching part, 10 mm; Novatech SA, La Ciotat Cedex, France) was inserted to seal the longitudinal laceration using a rigid bronchoscope under general anesthesia, from 9 cm above to 1 cm below the carina. The stenting procedure, which took approximately 30 minutes, was uneventful, even though subcutaneous emphysema was transient. Difficult sputum expectoration required cricothyroidectomy (Fig. 2). Four months after the stenting procedure, we removed the Y-shaped silicon stent using a rigid bronchoscope under general anesthesia because it was confirmed that the lacerated membranous wall was healed (Fig. 3). The patient was discharged from our hospital without major complications on day 13.
after removal of the stent. The patient returned to daily life without requiring thoracotomy.

Discussion

Iatrogenic tracheobronchial injury after endotracheal intubation is rare, occurring in <1% of patients.\(^1,2\) Proposed etiologic factors of this injury relate to the patient, operator, endotracheal tube, and technique of intubation and anesthetic management.\(^3\) The injury is notable for dyspnea, pneumothorax, and subcutaneous or mediastinal emphysema. The present case revealed subcutaneous emphysema and confirmed tracheal wall laceration by flexible bronchoscopy. When subcutaneous emphysema is seen during mechanical ventilation, the occurrence of tracheobronchial injuries as well as ventilation lung injury should be considered.

Tracheal wall laceration may be treated by thoracotomy or conservatively with stenting.\(^2,4–6\) Yopp et al. reported a patient with a 4-cm intubation-related tracheal tear that was treated by deployment of a self-expanding, covered metallic stent (Microinvasive, Natick, MA).\(^2\) Creagh-Brown reported a patient with a 3-cm rigid bronchoscope-related posterior tracheal tear that was treated with a covered, expandable, hybrid stent (Aero; Alveolus, Charlotte, NC).\(^4\) Finally, Madden et al. reported a patient with a 3.5-cm tracheostomy-related tracheal tear that was treated with a self-expanding, covered metallic stent (Ultraflex; Boston Scientific, Watertown, MA).\(^5\) In general, urgent surgery is necessary when the laceration is large or subcutaneous emphysema and respiratory failure worsen. Conservative treatment such as tracheal stenting is proposed when the overall condition of the patient precludes formal thoracotomy, given the relatively high rate
of perioperative morbidity and mortality.\textsuperscript{2,7} Yopp et al. stated that large tracheal tears (>4 cm in length) are managed with tracheal stenting when the patient is a poor surgical candidate.\textsuperscript{2} In our patient with compromised cardiopulmonary function associated with ischemic heart disease, the stent procedure was selected. The stent procedure for the long tracheal wall laceration was successful with no major complications, because the tracheal wall laceration was sealed by the endotracheal tube for 9 days before the stenting. Thoracotomy might have been required, if the subcutaneous emphysema had worsened.

**Conclusion**

Silicon stent replacement provided effective treatment for large tracheal wall laceration caused by emergency endotracheal intubation. We believe tracheal stenting is a valid alternative in patients in whom the overall condition of the patient precludes thoracotomy, given the relatively high rate of perioperative morbidity and mortality.

**Disclosure Statement**

There is no conflict of interest.

**References**