Case report - Thoracic non-oncologic

Total cricoidectomy and laryngotracheal reconstruction for subglottic stenosis with glottic involvement

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Received 12 April 2011; received in revised form 1 June 2011; accepted 6 June 2011

Abstract

We present a case of subglottic stenosis involving the glottis with inflammatory destruction of the cricoid cartilage after prolonged endotracheal intubation. Total cricoidectomy and laryngotracheal anastomosis were performed with T-tube placement that was retained for five months postoperatively. After decannulation of the T-tube, the airway was well restored, with good vocal cord opening. Good respiratory and phonatory results were obtained during normal daily activity, although a slightly hoarse voice was present, but no aspiration was observed. Total cricoidectomy and laryngotracheal reconstruction may be considered suitable for subglottic stenosis with glottic involvement, if accompanied by inflammatory destruction of the cricoid cartilage.

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Keywords: Glottic stenosis; Laryngotracheal reconstruction; Subglottic stenosis; Total cricoidectomy

1. Introduction

Because of the complex structure and function of the larynx, the surgical procedure for subglottic stenosis is technically more challenging than that for tracheal stenosis, which is best treated by simple end-to-end anastomosis. Partial resection of the cricoid and subperichondrial resection of the laryngeal mucosa followed by end-to-end laryngotracheal anastomosis is the current procedure of choice [1–3]. However, when subglottic stenosis involves the vocal cords, simple laryngotracheal resection and anastomosis are not feasible, and concomitant management for glottic involvement is required. In this paper, we present the case of a patient with subglottic stenosis with glottic involvement and inflammatory destruction of the cricoid cartilage treated by total cricoidectomy and laryngotracheal reconstruction.

2. Case report

A 76-year-old tracheostomised female was referred to us for the evaluation of complete laryngeal obstruction that had occurred after more than two months of nasotracheal intubation for acute myocardial infarction. The vocal cords were closed because of scar formation in the posterior commissure, and the laryngeal space between the vocal cords and the first tracheal ring was completely obstructed (Fig. 1). We performed the following procedure (Fig. 2) (Video 1):

1. After a cervical incision, the trachea was cut between the second and third tracheal rings, and cross-field ventilation was started intraperatively.
2. The median portion of the anterior arch and the posterior plate of the cricoid cartilage were seen to have been destroyed, and inflammatory destruction of the remaining portion of the cricoid cartilage was found to have occurred, probably because of compression necrosis caused by the nasotracheal tube.
3. We performed subperichondrial resection of the anterior arch of the cricoid cartilage, and the trachea was cut along the median line from the tracheal stump to the inferior border of the thyroid cartilage, which revealed that the laryngotracheal lumen was completely obstructed.
4. Laryngofissure was then performed, which revealed that the vocal cords were closed and adherent because of scar formation at the interarytenoid ligament.
5. Next, we performed total subperichondrial cricoidectomy with resection of the involved intraluminal mucosa. The length of the resected trachea and the cricoid cartilage was about 4 cm.
6. The membranous portion of the trachea was sutured to the posterior commissure of the larynx to cover the perichondrium after total cricoidectomy. A T-tube with its upper edge positioned above the vocal cords was placed in situ, and laryngotracheal anastomosis was performed.

The patient's postoperative course was uneventful, and the T-tube was retained for five months, after which it was replaced with a Tracheal Stoma Retainer (Koken Inc, Tokyo, Japan). After one month, the retainer was removed, and the...
the larynx at the thyrocricoid junction; therefore, simple resection and anastomosis of the laryngotracheal segment is not sufficient to restore the laryngotracheal lumen. In addition, when the glottis is involved, concomitant glottic management is required to restore the normal airway, which is technically demanding because of its complex functions, such as phonation, swallowing and respiration.

In 1992, Maddaus et al. reported laryngotracheal reconstruction with laryngofissure for subglottic stenosis with glottic involvement caused by scar formation at the intraarytenoidal mucosa [4]. With this technique, the intra-arytenoidal scar is resected through laryngofissure followed by laryngotracheal anastomosis, with a T-tube placed and retained for several weeks or months to prevent the vocal cords from closing just after the operation. This technique is recommended for subglottic stenosis with glottic involvement caused by scar formation at the intra-arytenoidal mucosa [4]. With this technique, the intra-arytenoidal scar is resected through laryngofissure followed by laryngotracheal anastomosis, with a T-tube placed and retained for several weeks or months to prevent the vocal cords from closing just after the operation. This technique is recommended for subglottic stenosis with glottic involvement caused by intra-arytenoidal scarring. However, if inflammatory destruction of the cricoid cartilage occurs along with intra-arytenoidal scarring, resection of the scar alone is not sufficient to allow tracheostoma was closed. The vocal cords were fixed in the open position, and no stenosis or granuloma was observed at the anastomotic site. Good respiratory and phonatory results during normal daily activity were obtained, and a slightly hoarse voice but no aspiration was observed at one year after the operation (Video 2).

3. Discussion

Surgical treatment for subglottic stenosis is technically challenging because the recurrent laryngeal nerves enter

Fig. 1. Preoperative (a) endoscopic findings and (b) computed tomography scan. (a) The vocal cords were closed, and the arytenoidal mucosa had completely collapsed because of the lack of airflow. (b) The subglottic space was completely obstructed.

Fig. 2. Laryngotracheal reconstruction with total cricoidectomy. The cricoid cartilage was completely resected subperichondrially, and laryngotracheal reconstruction with T-tube placement was performed. The T-tube was retained in situ for five months after the procedure. C, the resected portion of the cricoid cartilage and the trachea; P, outer perichondrium; M, membranous flap of the trachea.

Video 1. Surgical procedure.
due to cricoarytenoidal ankylosis. In this case, necrosis of the cricoid cartilage was observed due to direct compression of the endotracheal tube. The patient was effectively treated by total cricoidec- tomy followed by laryngotracheal anastomosis, and the respiratory result was good during normal daily activity.

In spite of fixation of the vocal cords in the open position, the voice was better than expected, and no aspiration was observed. The false cords, which are closed by the contraction of the thyroarytenoid muscle innervated by the recurrent laryngeal nerve, were closed when the patient intended to phonate or swallow, and it is possible that the false vocal cords may contribute to the good voice and the prevention of mis-swallowing; however, further physiological investigation is required to confirm this hypothesis.

In conclusion, total cricoidec- tomy and laryngotracheal reconstruction should be considered for subglottic stenosis with glottic involvement, along with inflammatory destruction of the cricoid cartilage.

References