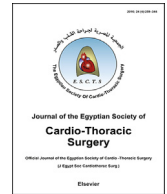




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Tracheal resections and anastomosis for benign tracheal stricture. A seven-year experience in a single tertiary institute



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ABSTRACT

Background: Tracheal stenosis is one of the major complications following prolonged endotracheal intubation. Tracheal resection and anastomosis (TRA) is a definitive solution for this serious problem. This study aimed to review the experience of our institute in 7 years with patients presenting with postintubation tracheal stenosis.

Methods: A retrospective analysis of patients with post-intubation tracheal stenosis who presented to the pulmonology and Thoracic Surgery departments, Ain Shams University Hospitals, Cairo, Egypt during the period from January 2009 to January 2016. All patients were subjected to diagnostic bronchoscopy, and radiological evaluation. TRA was performed as a primary treatment. Sixty patients were selected and data were collected from their files.

Results: Age range was 2–72 years with mean age of 29.76 ± 17.04 years, 42 were males (70%) and 18 were females (30%), 40 patients (66.7%) had previous bronchoscopic dilatations, 35 patients (58.33%) had tracheostomies, 4 patients (6.7%) had history of tracheal stenting. Twenty-five patients (41.67%) had cricotracheal resection (CTR) for subglottic stenosis. Patients were followed up for 6 months. Anastomotic success rate was (96.6%). Two patients died during the in-hospital stay (3.3%).

Conclusions: TRA proved to be a safe and reliable solution for post-intubation tracheal stenosis. This procedure should be considered first in developing countries where there is frequent rush for tracheostomies and tracheal stenting. Quality of life improved dramatically following this definitive surgery.

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1. Introduction

One of the major complications of prolonged ventilation is post-intubation tracheal stenosis [1]. The main etiological factor is prolonged mechanical ventilation associated with endotracheal intubation [1]. Grillo et al. [2], Pearson & Andrews [3] and many others have detailed the technical principles of the intervention. This comprises the complete resection of the stenotic segment and then approximating healthy mucosa of the two ends of the trachea without tension using monofilament

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absorbable interrupted sutures [1,2]. This technique yielded successful results with complete cure and minimal comorbidities [4]. Other modalities such as balloon dilatation, and tracheal stenting [5–7] are alternative treatments but not as effective as the radical surgical solution [2].

In this study, we retrospectively analyzed the data of sixty patients who underwent tracheal resection and anastomosis (TRA) as the primary definitive treatment. Other modalities of treatment were excluded whenever possible. This strategy was adopted in this study to evaluate the surgical outcome.

2. Patients and methods

Between January 2009 till January 2016, sixty patients who underwent TRA for benign post intubation tracheal stenosis were included in this retrospective study. Patients were mostly referred from the pulmonology department, the Ear, Nose, and Throat department, or presented at the Emergency department with stridor. The study was approved by the Ethics Committee of faculty of medicine Ain Shams University. All subjects voluntarily participated in the study and gave their informed consent.

Patients who had history of previous bronchoscopic or balloon dilatation, stent insertion, or tracheostomies done for benign tracheal stenosis were included. We excluded patients with glottis stenosis, stenosis due to malignant compression or invasion, and lastly patients with tracheostomies and stents due to benign stenosis but with major co-morbidities that hindered the surgical solution.

2.1. Preoperative data

All patients were subjected to medical history taking, and thorough clinical examination. They underwent multi-slice CT scan on neck and chest with reconstruction of the airway.

In addition, if the patient's condition permitted, fiberoptic bronchoscopy was done at the pulmonology department before surgery to assess the site and length of the stenotic lesion. Subglottic involvement was accepted for surgery. All patients excluding those with severe stridor had indirect laryngoscopy to exclude glottis stenosis, and vocal cord pathologies. Patients who presented as an emergency were transferred immediately to the operating room for rigid bronchoscopy followed by instant surgery.

2.2. Operative details

The patient was kept in the supine position. Neck hyperextension was conducted via an inflatable cuff kept under the shoulders of the patient. A nasogastric tube was placed for later easier identification of the esophagus during dissection. If the patient had a tracheostomy, induction of anesthesia was carried out directly through the tracheostomy. For non-tracheostomized patients, attempted tracheal dilatation was performed first. If the lesion was found to be more than half the length of the trachea, it was considered irresectable. Finally, assessment of the presence of tracheomalacia was crucial for subsequent surgical decisions.

Routinely we started with a transverse neck incision, and skin flaps were raised. Dissection of the strap muscles was carried out and the division of the thyroid gland isthmus then followed. Mobilization of the lower part of the trachea was done by entering the pretracheal fascia. No attempts to find the recurrent laryngeal nerves were done. Sharp dissection was kept strictly on the wall of the trachea. Another important issue here was that the lateral tracheal attachments were kept intact because of the important blood supply which is crucial for the process of healing.

For longer, or distal stenotic segments, a manubriotomy or full sternotomy were done. When the whole cervical trachea was dissected and the stenotic area was identified, the trachea was divided horizontally at the stenotic segment. Excision of the stenotic segment cranially and caudally followed till healthy mucosa was obtained.

If the subglottic area was involved, the anterior arch of the cricoid cartilage is excised too. This necessitates fashioning of the lower part of the trachea to adapt to the thyroid cartilage and the lateral and posterior segments of the cricoid cartilage.

If a lengthy stenotic segment was encountered, a variety of release techniques were available. A laryngeal drop was very effective in most cases. Sometimes, full sternotomy was achieved for a hilar release and division of the inferior pulmonary ligament.

Then the trachea was opened, cross field ventilation was performed. It is advisable here while the neck was still extended that the anesthetic stuff introduces an oral suitable sized endotracheal tube (ETT).

Anastomosis was done by monofilament absorbable interrupted sutures (PDS 4/0). First, it was started joining the membranous part of the trachea with 6 sutures. Lateral pillar sutures were taken more deeply to strengthen the anastomosis and to decrease the tension on the rest of the sutures. Before placing the anterior sutures joining the cartilaginous part of the trachea, the neck was flexed, the cross-field ventilation was interrupted and the oral ETT was advanced into the distal trachea. The anastomosis was secured then anteriorly. In case of cricotracheal resection (CTR), the thyroid cartilage was anastomosed with the anterior tracheal rings.

After hemostasis, a small drain was left and the wound is closed in layers. Two guarding sutures were placed between the chin and the skin covering the sternal angle.

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