

## Surgical management of scleromatous laryngotracheal stenosis

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### ABSTRACT

**Objective:** Scleroma is a chronic specific granulomatous disease of the upper respiratory tract caused by Klebsiella Rhinoscleromatis. It usually affects the subglottic region and upper trachea resulting in various degrees of stenosis. Patients with laryngotracheal stenosis may present with stridor, shortness of breath or exercise intolerance and may be tracheostomy dependent. In this work, we presented the experience of our Institute in the management of patients with scleromatous laryngotracheal stenosis using the already designed procedures for traumatic laryngotracheal stenosis.

**Patients and methods:** The study was a non controlled prospective study. It was conducted in Oto-Rhino-Laryngology and Head and Neck Surgery Department of Zagazig University Hospitals, Egypt. It included 38 patients with scleromatous subglottic stenosis and/or upper tracheal stenosis. The patients were classified into four grades according to Myer–Cotton's scale. The surgical treatment modalities included endoscopic CO<sub>2</sub> laser surgery with dilatation, laryngotracheal reconstruction, and partial cricotracheal resection with thyrotacheal anastomosis.

**Results:** The average follow-up period was 32.1 months. Twenty four patients (63%) had an excellent outcome. Nine patients (24%) had a good outcome. Five patients (13%) were still tracheostomy dependent. Eleven patients (29%) developed postoperative granulation tissue. The overall success rate was 87%.

**Conclusion:** Scleromatous laryngotracheal stenosis is considered a challenging surgical problem. It requires a multidisciplinary approach by well-trained personnel. The surgical techniques designed for cases of laryngotracheal stenosis of a traumatic etiology can be applied for cases of scleroma with approximately the same success rates.

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## 1. Introduction

Scleroma is a chronic specific granulomatous disease of the upper respiratory tract caused by Klebsiella rhinoscleromatis. The disease is endemic in Egypt, Central Africa, Central and South America, Eastern and Central Europe, Middle East, India, and Indonesia [1]. It usually affects the subglottic region and upper trachea resulting in various degrees of stenosis [2].

Patients with laryngotracheal stenosis may present with stridor, shortness of breath or exercise intolerance and may be tracheostomy dependent [3]. Multiple options are available for the

treatment of laryngotracheal stenosis, and no surgical procedure is appropriate in all situations [4]. Management of such cases aims at providing a satisfactory airway, keeping the patient away from a tracheostomy tube, and preserving the other laryngeal functions as phonation and protection [5].

This work was designed to present the experience of our Institute in the management of patients with scleromatous laryngotracheal stenosis aiming at presenting different methods of diagnosis and management of such patients and testing the applicability of the already designed procedures for the management of subglottic and upper tracheal stenosis that resulted from a traumatic etiology to those cases of a scleromatous etiology.

## 2. Patients and methods

This study included 38 patients known to have rhinoscleroma by previously evidencing Klebsiella rhinoscleromatis in the nasal secretions. All patients were managed through the department of Oto-Rhino-Laryngology and head and neck surgery of Zagazig

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University Hospitals during the period from January 2007 to January 2011. Twenty four patients were female and 14 patients were male. Their ages ranged from 18 to 50 years with an average of 29.6 years. All patients had subglottic stenosis and/or upper tracheal stenosis. All other causes and sites of stenosis were excluded from the study.

All patients underwent the following diagnostic protocol: (1) history with attention for the duration and severity of symptoms (shortness of breath at rest or upon various degrees of exertion), the presence of a tracheostomy, and any previous endoscopic or surgical procedure; (2) complete upper airway examination by flexible fiberoptic nasopharyngoscope to rule out the possibility of airway obstruction in other areas and evaluate mobility of the vocal folds; (3) a high resolution computed tomography (CT) scanning of the neck and chest; (4) rigid endoscopic evaluation under general anesthesia for direct objective assessment of the stenosis in terms of location and dimensions (the length of obstruction and the diameter of the remaining lumen).

Preoperatively, seven patients (18%) had dyspnea at rest, 14 patients (37%) had dyspnea on exertion, and 17 patients (45%) were tracheostomy dependent. Based upon the percentage of obstruction, the patients were classified into four grades according to Myer–Cotton's scale [6] (Table 1) (Figs. 1–5).

The ethics committee of Faculty of Medicine, Zagazig University, Egypt approved the study. A fully informative written consent was obtained from all patients. The surgical treatment modalities included endoscopic CO<sub>2</sub> laser surgery with dilatation, laryngotracheal reconstruction (LTR), and partial cricotracheal resection with thyrotracheal anastomosis (PCTR). The aim of surgery was to provide a satisfactory airway with preservation of other laryngeal functions. The surgical modality was selected according to the grade of stenosis. So, the patients were divided into 3 groups.

The first group included patients with a grade I stenosis. The length of stenotic segment was less than 1 cm with bilateral mobile vocal cords. They were managed by endoscopic CO<sub>2</sub> laser surgery. CO<sub>2</sub> laser (Sharplan 1055S) was used at a continuous super pulsed mode and a power of 5–10 watts to make four radial incisions of the stenosis at the 12, 3, 6 and 9 o'clock positions followed by dilatation by using endotracheal tubes of different sizes starting from the smallest to the largest admissible size with inflation of the cuff opposite to the stenotic area.

The second group included patients with a grade II stenosis. They were managed by laryngotracheal reconstruction. Anterior transverse neck incision was made at the level of the cricoid cartilage. The fifth or sixth costal cartilage was harvested. The cartilage graft was used to expand the lumen and provide a structural support and an epithelial lining. The overlying perichondrium faced the lumen. An appropriately sized Montgomery T-tube was used and was left in place for three weeks. The tracheostomy tube was removed when the airway was stable and the patient tolerated a full tracheostomy tube plugging continuously for 48 h.

The third group included patients with grade III and grade IV stenosis. They were managed by partial cricotracheal resection with thyrotracheal anastomosis. An anterior cervical U-shaped skin incision was made. An elliptical incision was made around the



Fig. 1. Grade I subglottic stenosis.



Fig. 2. Grade II subglottic stenosis.

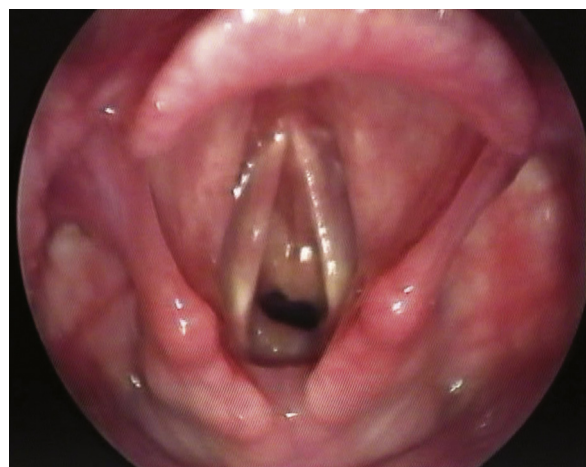


Fig. 3. Grade III subglottic stenosis.

**Table 1**  
The grades of stenosis.

Grade	Degree of obstruction	No. of patients (38)	Male (14)	Female (24)	Percentage
Grade I	Up to 50%	17	7	10	45%
Grade II	From 51% to 70%	11	4	7	29%
Grade III	From 71% to 99% with a detectable lumen	5	1	4	13%
Grade IV	Complete with no detectable lumen	5	2	3	13%

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