

Surgical Management of Acquired Subglottic Stenosis in Patients Attending Al-Thawrah Teaching Hospital

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Abstract

Background: Subglottic stenosis is one of the most complex and challenging issues in the field of otolaryngology. The management involves a multidisciplinary approach with multiple procedures. The main aim of the management is to keep the airway patent and preserve voice production. The aim of the study was to evaluate the results of treatment methods of subglottic stenosis.

Methods: The prospective study was conducted on 40 patients between January 2012 and March 2018 at

Otorhinolaryngology Department, Al Thawra Teaching Hospital, Sana'a, Yemen.

Results: Of the subglottic stenosis patients studied, 30 (75%) were male and 10 (25%) were female. The mean age was 18.6 years. High incidence of 60% was found in the age group (15-24 years) while less was found in the age group >34 years (7.5%). Grade III stenosis represented (50%) and grade IV (25%). Endoscopic dilation was successful in grade I (100%) and grade II (80%). The external approach was successful in 18/31 (58.1%), while the success rate in all grades was (67.5%). About 50% of the patients were presented with tracheostomy in place.

Conclusion: Acquired subglottic stenosis causes airway compromise and significant morbidity to the patients. The management involves a multidisciplinary approach with multiple procedures. A large number of endoscopic and open procedures are currently in use for the treatment of this condition. There is no single method of treatment that is universally successful. Results of treatment are not very satisfactory due to multiple factors.

Keywords: : Bronchoscope, endotracheal intubation, endoscopic dilation, external approach subglottic stenosis, otolaryngology.

I. INTRODUCTION

Subglottic stenosis (SGS) is the narrowing of the subglottic lumen. It can be acquired or congenital. The etiology of

acquired SGS is related to the trauma of the subglottic mucosa. Injury can be caused by infection or mechanical trauma, usually from Endotracheal intubation but also from blunt, penetration or other trauma [1-3]. Laryngeal stenosis is one of the most complex and challenging problems in the field of head and neck surgery. Laryngeal stenosis with airway compromise causes significant morbidity to the patients and is difficult to treat in both adult and pediatric population [4]. Often the results of these operations are not very satisfactory due to multiple factors. There have been many procedures and equal numbers of modifications for the treatment of laryngeal stenosis which in itself show that no one of the procedures is standard and treatment operations can vary according to the need of the patient [5]. Recurrence rates remain high at 40 - 70% over a period of months to years [6].

This has led to a focus on different modalities to increase patency rates and the development of many technological improvements over the past decades [7]. There are various treatments that have been reported in the medical literature. Several different surgical procedures have been used to treat subglottic stenosis, but are generally categorized into endoscopic dilatation, resection of stenosis, and open neck surgery with cartilage incision [8].

The aim of this study was to evaluate the results of acquired subglottic stenosis treatment.

II. PATIENTS AND METHODS

This is prospective study included 40 patients complaining of subglottic stenosis, carried out in OtorhinoLaryngology Department, AL-Thawra Teaching Hospital, Sana'a, Yemen during the period from January 2012 to March 2018. Ethical approval was obtained from the medical ethics committee of our Department. Written consent was obtained from all

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patients. All patients underwent history taking, clinical examination, radiological evaluation (Xray, CT, MRI), and endoscopic evaluation (fiberoptic, rigid laryngoscopy, bronchoscopy, oesophagoscopy). The results were statistically analyzed as data were processed using SPSS statistical software, where t-test and chisquare were applied for analysis. A p-value <0.05 was considered statistically significant.

III. TECHNIQUE

A combined technique of both endoscopic and anterior cricoid split approaches was performed on all cases under general anesthesia. Endoscopic approach was firstly done to dilate the stenotic part using a rigid bronchoscope or balloon. Then, an anterior transverse neck incision was made at the level of the cricoid cartilage. Subplatysmal flaps were elevated superiorly to the thyroid notch and inferiorly to the suprasternal notch. The strap muscles were separated vertically in the midline and retracted laterally. The anterior cricoid ring was divided vertically with either a knife or a saw, according to the degree of ossification. The goal was to open the lower part of the stenotic segment. To maximally preserve the voice, great care was experienced in order not to extend the incision to the anterior commissure. Submucosal resection of scar tissues was attempted meticulously to avoid scar regeneration that could happen if much mucosa has been damaged. The Montgomery Tracheal T-Tube of outer diameter 10-12 mm was inserted in the interior of the larynx. T-tube left for 6-8 weeks (Fig. 1), or costal cartilage inserted into the anterior part of the cricoid cartilage (Fig. 2).



Figure 1.T-Tube.

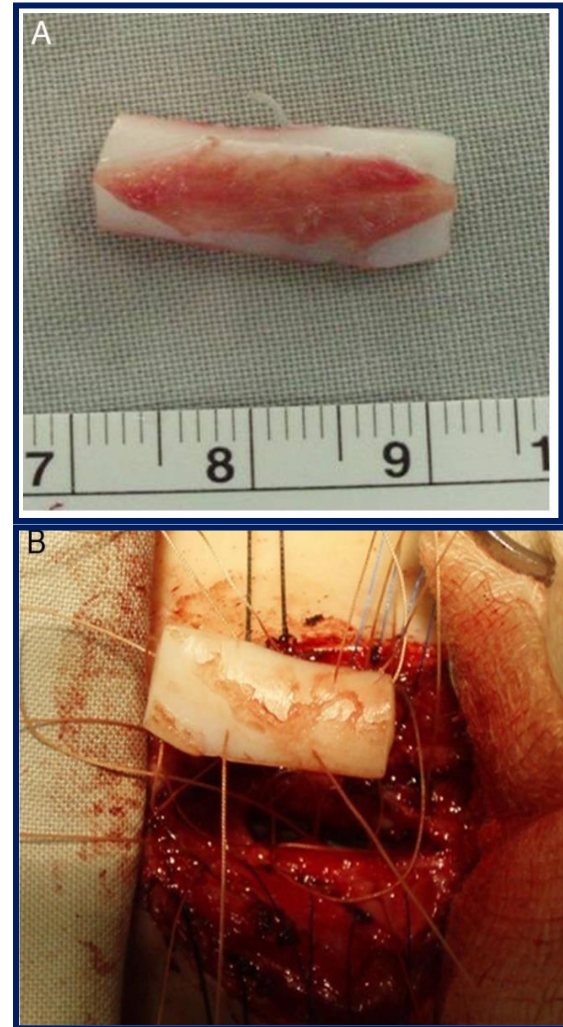


Figure 2: Costal cartilage. (A) preparation, (B) insertion.

IV. RESULTS

A total of 40 patients were enrolled in the study. Males 30 (75%) and females 10 (25%). The age range was 5-60 year with mean age of 18.6 years. Age groups of the patients were shown in table1. High incidence of subglottic stenosis 24 (60%) was found among the age group 15-24 years. Grade III stenosis was found in 20 patients followed by grade IV in 10 patients and fewer number in grade I and II (Table 2).

Table 1: Distribution of patients according to age

Age Groups	No	%
5-14	5	12.5
15-24	24	60
25-34	8	20
>34	3	7.5
Total	40	100

History of endotracheal intubation in all patients, with different duration of the intubation; ranged from 1-4 weeks. All grade IV and 10/21 of grade III were presented with tracheostomy in place. All patients had undergone rigid bronchoscopy under general anesthesia to confirm the diagnosis, grading, type and extension of stenosis, and dilatation if possible. Endoscopic dilatation was successful in 100% of grade I, 80% of grade II and one patient of grade III. This patient had membranous type of stenosis and underwent 3 times dilatation (Fig. 3).

A total of 31/40 (grade IV, 20 of grade III, and 2 patients of grade II) underwent external surgical approach (laryngotracheoplasty) anterior cricoid splitting with cartilage insertion, however T-tube was inserted in 4 patients. The success rate of external approach (77.5 % of patients) was 18/31 (58.1%). The overall success rate of all grades was (67.5%) 27/40 of the patients. Follow up ranged from 1-3 years. Regarding the grading of subglottic stenosis according to Cotton's classification was showed in (Table 2).

Table 2: Distribution of patients according to Cotton's grading of subglottic stenosis

Grade	No	%
I (up to 50%)	2	5
II (51-70%)	8	20
III (71-99%)	21	52.5
IV No hole	9	22.5
Total	40	100

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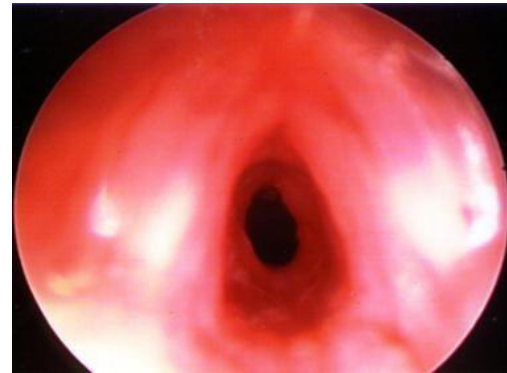


Figure 3: Subglottic stenosis, grade III

V. DISCUSSION

As the subglottic region is the narrowest part of the larynx, it is the most common site of laryngeal stenosis. SGS is a condition that can cause severe patient morbidity as airway obstruction causes respiratory distress and difficulty breathing. Subglottic stenosis continues to provide significant challenges in treating specialists, primarily due to the regrowth of granulation tissue at the site of intervention or at the anastomotic site [10,11]. Subglottic stenosis is one of the most common causes of upper airway obstruction. Almost 90% of them result from endotracheal intubation. Acquired SGS is more common and results from prolonged endotracheal intubation in more than 50% of the cases. Autoimmune disease and idiopathic etiology can account for 18% of the cases [12]. Therapy depends on the degree of stenosis, among other factors. Therapeutic approaches range from watchful waiting in mild stenosis to complex surgery for severe cases [13]. The main findings show that Laryngotracheal resection with anastomosis decreases additional surgery and increases the rate of decannulation when compared to endoscopic procedures and laryngotracheal augmentation/ expansion grafting. Patients with idiopathic stenosis are less likely to receive additional surgery compared with those with trauma or intubation/ tracheostomy as the cause of stenosis. Lack of additional surgery is commonly considered the ultimate goal of treatment for laryngotracheal stenosis [14]. The treatment of SGS is difficult with the requirement of multiples interventions before successful outcomes can be achieved [15]. High prevalence of subglottic stenosis occurred in the age group (15-24) 60%, and less in middle age (7.5%) and males more than females. Grade III represented a high incidence (50%) followed by grade IV (25%) in this study. Acquired SGS was treated by multiple methods, dilatation was used in grade (I, II) gave a high success rate (81.1%) after

more than two times. While used in grade III, as a primary step to improve breathing for a short time 2-4 weeks then underwent to open procedure. This agreement with previous studies was reported that dilatation of grades I, II, gives a high success rate [16,17]. More concerns were raised in another recent comparative study by Mareschal et al (2014) [18] who stated that there is a poor definition of the safety profile for balloon dilatation. They believed that the procedure carries risks of worsening the stenosis, affects airway tissue integrity, and in particular increases the chance of needing urgent intervention.

T-tube was used in 4 patients with good success rate (50%). T-tube provides a stable and physiologic airway to the patient and can be kept in the palate for long periods of time to follow up the progress of patients till the time of decannulation can be considered [19]. It can be used primarily as definitive treatment, or in the management of the inoperable conditions, or as an adjunct after resection anastomosis till adequate healing is achieved. Splitting of the cricoid cartilage given successful rate (58.1%) in our study this is in agreement with the previous study [4]. The factors that are related to the development of stenosis with a shorter duration of intubation are the large size of the tube, high pressure in the cuff, not deflating the cuff periodically, frequent replacement of the tube. Restless patient and infection around cuff site [21]. There should be a sense of realism both for the surgeon as well as for the patient regarding the expected results of surgery. Patients with minor stenosis should also realize that laryngeal manipulation may be occasionally leads to additional scarring and the requirement of tracheostomy. Often the patients suffering from this condition undergo multiple surgeries and should be warned that the results of treatment of chronic laryngeal stenosis may be unrewarding and their tracheostomy may be permanent [4].

Laser is mostly used for ablation of granulation tissue and laryngeal and subglottic web for dilation of stenosed area; however, wound healing can result in restenosis. Dilation could be indicated as first line treatment for SGS grades III. They considered that endoscopic treatment does not interfere with future surgical Treatment [22].

VI. CONCLUSION

Acquired subglottic stenosis causes airway compromise and significant morbidity to the patients. A large number of endoscopic and open procedures are currently in use for the treatment of this condition. There is no single method of treatment that is universally successful. Results of treatment are not very satisfactory due to multiple factors.

VII. DISCLOSURE.

No conflict of interests and the work was not supported or funded by any company.

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