

## Evaluation of the causes of upper airway obstruction leading to tracheostomy in Shiraz

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### Abstract

**Introduction:** To determine the causes of upper airway obstruction leading to tracheostomy; endoscopic evaluation was done in Khalili Hospital, Iran.

**Materials and Methods:** During a 2 year period, 47 patients who underwent tracheostomy, were evaluated endoscopically to determine the causes of airway obstruction leading to tracheostomy.

**Results:** forty-seven cases were included in the study including 40 males and 7 females with mean age of 31.9 years. The most common cause of obstruction was subglottic stenosis (40.5%) and laryngeal carcinoma (38.3%). The cause of subglottic stenosis in the majority of the patients was prolonged endotracheal intubations (95%). Other less common causes were direct laryngeal trauma (4.5%), vocal cord paralysis (2.1%), supraglottitis (2.1%), tracheal foreign bodies (2.1%), severe trismus (2.1%), and status asthmaticus (2.1%).

**Conclusions:** Subglottic stenosis secondary to prolonged intubations is the major cause of upper airway obstruction leading to tracheostomy. Converting endotracheal intubations to tracheostomy in patients who need prolonged ventilator support may prevent subglottic stenosis and decrease the rate of serious complications following prolonged endotracheal intubations.

**Keywords:** Upper airway obstruction, Subglottic stenosis, prolonged intubations, Tracheostomy

### Introduction

Upper airway obstruction has many causes. An otolaryngologist may be called to perform tracheostomy to save a patient in severe respiratory distress. Frequently direct laryngoscopic and bronchoscopic evaluation are performed to evaluate the cause of obstruction. In some of these patients, the underlying pathology of airway obstruction cannot be removed, and the patient may remain dependent on tracheostomy for a long time.

Tracheostomy is one of the oldest known operations dating back to ancient Egypt and India about 3,000 years ago.

The indications for tracheotomy changed and expanded during the twentieth century. Today, owing to advancements in intensive care units and the wide spread use of mechanical ventilation, tracheotomy is one of the most commonly performed surgical procedures and is encountered by hospital physicians in all fields (1).

Comparing tracheostomy with endotracheal intubations, tracheostomy has many advantages because it has less serious side effects (2).

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Acceptation date: 83/1/26 Confirmation date: 83/7/14

It is reversible if the underlying pathology is eliminated. Endotracheal intubation is another way to secure a patent airway but it may have many serious sequela especially if performed for a long time. The most common complication is subglottic stenosis (2).

With conversion of intubations to tracheostomy at the proper time many of these sequela may be prevented.

In this study the causes leading to tracheostomy were evaluated in patients undergoing tracheostomy in Khalili Hospital, a referral Otolaryngology center in Shiraz, Iran.

### Materials and Methods

During a 2-year period (1999-2000) all patients undergoing tracheostomy in Khalili Hospital (Shiraz, Iran) were evaluated endoscopically to determine causes of airway obstruction leading to tracheostomy. The data was gathered from history, physical examination and direct laryngoscopic and bronchoscopic examination. 47 patients were evaluated including 40 males and 7 females. The age of the patients were from 3.5 to 80 years old.

### Results

Eighty-five percent of the patients were male, and 15% were female. Mean age of the patients was 31.9 years (Table1).

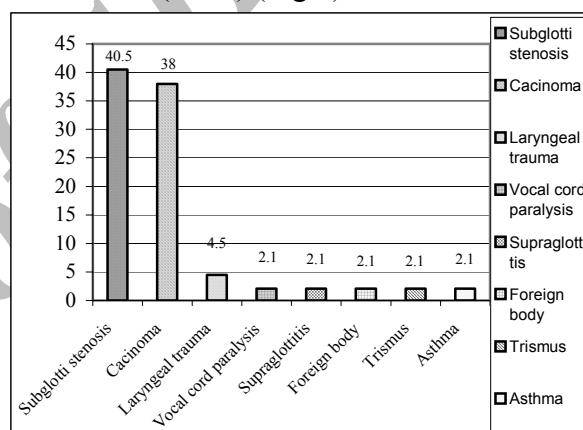
**Table 1:** Age distribution of patients

Age (years)	Number	Percent
0-10	8	17%
11-20	13	27.7%
21-30	4	8.5%
31-40	2	4.2%
41-50	6	12.8%
51-60	2	4.2%
61-70	6	12.8%
71-80	6	12.8%

The main reason of referral was respiratory distress. The most common cause of airway obstruction was subglottic stenosis (40.5%). 95% of patients had history of head injury and prolonged intubations.

In this group the mean age was 17.4 years and 85% of them were male.

Other causes of airway obstruction were laryngeal carcinoma (38%), direct laryngeal trauma (4.5%), vocal cord paralysis (2.1%), supraglottitis (2.1%), laryngotracheal foreign bodies (2.1%), trismus (2.1%), and status asthmaticus (2.1%) (Fig 1).



**Figure 1:** The causes of tracheostomy

Successful decanulation was done in 4.5% of the patients, total laryngectomy was done in 38% and tracheoplasty in 2.1% of the patients. In 46.4% of the patients attempts for treating the underlying pathology and decanulation failed, and they remained dependent on tracheostomy for adequate ventilation.

### Discussion and conclusion

Tracheostomy is one of the most frequently performed surgical procedures in the critically ill patient. It is frequently performed as an elective therapeutic procedure and sometimes as an emergency procedure. Complications occur in 5% to 40% of tracheotomies depending on the study design, patient follow-up, and the definition of different complications (3).

Indications for tracheostomy are conditions such as subglottic and tracheal stenosis, respiratory papillomatosis, caustic alkali ingestion and craniofacial syndromes (4). Conditions in which tracheostomy is less commonly indicated are subglottic hemangioma and laryngeal clefts (4).

The commonest indication for tracheostomy in the 1970s was acute inflammatory airway obstruction such as acute epiglottitis and laryngotracheobronchitis (5,6).

Recent series have shown that prolonged ventilation or Subglottic stenosis are now the most common indications(4-7).

This study was performed to determine the causes of upper airway obstruction leading to tracheostomy in patients undergoing tracheostomy in Khalili Hospital, a tertiary Otorhinolaryngology hospital in Shiraz, Iran. The majority of our patients (60%) were less than 45 years old and 85% were male.

The most common cause of airway obstruction in our patients was subglottic stenosis following prolonged endotracheal intubations (40.5%). Most of these patients were referred from the Neurosurgery ward after failure to decannulate tracheostomy tube. In the study performed by Simma et al(8), the most common indication of tracheostomy was acquired subglottic stenosis followed by bilateral vocal cord paralysis and congenital airway malformation.

In the study performed by Puhakka et al (9), subglottic stenosis and respiratory distress syndrome and prolonged endotracheal intubation were the common indications of tracheostomy.

This study showed that the main group of patients needing tracheostomy in our center were young men needing ventilatory support following head injury.

Laryngeal trauma from prolonged endotracheal intubation occurs in patients of all ages. Most changes are superficial and heal quickly but in severe cases irreversible scarring replaces normal tissue (10). When

subglottic stenosis has developed and the majority of the tissues have been replaced by dense fibrous tissue, partial cricotracheal resection or other procedures are indicated (11). With frequent evaluation and early conversion of endotracheal intubation to tracheostomy, the surgeon may prevent the development of subglottic stenosis condition that is very difficult to cure and many patients may finally remain dependent on tracheostomy for their life. Other causes of airway obstruction such as carcinoma, trauma or infection are not iatrogenic and the surgeon has only the responsibility of curing not preventing them.

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### خلاصه

## بررسی علل انسداد راه هوایی فوقانی منجر به تراکتوستومی در شیراز

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**مقدمه:** در این مطالعه در بیماران مراجعه کننده به بیمارستان خلیلی شیراز، علل انسداد راه های هوایی فوقانی که منجر به تراکتوستومی شده اند از لحاظ آندوسکوپییک مورد بررسی قرار گرفتند.

**مواد و روش کار:** ۴۷ بیمار که در عرض ۲ سال تراکتوستومی شده اند تحت بررسی آندوسکوپی قرار گرفتند تا علل انسداد راه های هوایی در آنها مشخص شود.

**نتایج:** از ۴۷ بیمار این مطالعه ۴۰ نفر مرد و ۷ نفر زن، با میانگین سن ۳۱/۹ سال بودند. شایعترین علل انسداد تنگی ساب گلوت (۴۰/۵٪) و کارسینوم حنجره (۳۸/۳٪) بودند که علت تنگی ساب گلوت نیز در اکثر این موارد (۹۵٪) لوله گذاری طول کشیده داخل تراشه بود. علل دیگر با شیوع کمتر شامل تروما به حنجره (۴/۵٪)، فلج طناب صوتی (۲/۱٪)، التهاب سوپراگلوت (۲/۱٪) جسم خارجی تراشه (۲/۱٪) تریسموس شدید (۲/۱٪) و آسم پایدار (۲/۱٪) می شوند.

**نتیجه گیری:** تنگی ساب گلوت ثانویه به انتوباسیون طولانی مدت علت عمده انسداد راه هوایی فوقانی منجر شونده به تراکتوستومی است. تبدیل لوله گذاری تراشه به تراکتوستومی در بیمارانی که به تهویه کمکی طولانی مدت نیازمند هستند می تواند از تنگی ساب گلوت پیشگیری کند و عوارض جدی لوله گذاری طول کشیده را کاهش دهد.

**واژه های کلیدی:** انسداد راه هوایی فوقانی، تنگی ساب گلوت، انتوباسیون طولانی مدت، تراکتوستومی