IS TRACHEOSTOMY OBSOLETE?

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ABSTRACT

Standard Tracheostomy is the method routinely used to relieve upper airway obstruction. This method though effective has its attendant complications. Minitracheostomy, which is a small cannula of 4 mm diameter introduced through the cricothyroid membrane has been tried in our series to relieve inspiratory stridor and also to deliver anaesthesia. The arterial oxygen saturation increased very significantly from 81.66% to 97.67%. The cannula was well accepted by the patients and there were very few complications.

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KEY WORDS : Minitracheostomy; Stridor.

Introduction

Attempts to save man's life from suffocation have been made from ancient times. These early attempts occasionally succeeded but more often failed. The ancient Egyptians who established the first civilisation, were pioneers in solving problems. Two engravings in the Abydos and Sakkara regions of Egypt (3600 BC) record the performance of a tracheotomy [1] Hippocrates (460-377 BC) suggested a type of pharyngeal intubation using a straight cannula passed orally to maintain the airway. In the 10th century, Avicenna (980-1037) advocated intubation of the larynx using bent tubes of silver and gold. Tracheostomy during this period was reserved for hopeless cases. In early 1900s Chevelier Jackson attempted to standardize indications, techniques and instrumentation for tracheostomy making it safe and practical.

More than 10 years ago, minitracheostomy was suggested as an elective method in the treatment of sputum retention. A minitracheostomy is a small cannula in the trachea through cricothyroid membrane that allows permanent access to the tracheal lumen and is most commonly used for the evacuation of bronchial secretions, while avoiding the disadvantages of tracheostomy, or endotracheal intubation. Minitracheostomy preserves the function of the glottis. Patients retain explosive cough with minimal effect on speech [2]. This method is much simpler and less invasive.

Though the major indication for minitracheostomy is to clear the post operative retention of cough in major thoracic and abdominal surgeries, its role in maintaining upper obstructed airway is also suggested

[3]. However there is scanty literature available on the subject. In view of this a study was undertaken to assess the utility of minitracheostomy in upper airway obstructions.

Material and Methods

The study was carried out in a teaching hospital. Twelve patients with features of ventilatory insufficiency due to obstructive pathologies were included in the study. Cases below 12 years of age and those with obscure laryngeal anatomy were excluded from the study. These patients were subjected to detailed clinical examination. This included :-

- (a) Detailed history and a thorough general examination especially to look for cyanosis, stridor, respiratory rate and pulse rate.
- (b) Complete ENT examination.
- (c) Routine haematological and radiological investigations like X-ray neck/X-ray chest.
- (d) Specific investigations depending upon the cause.
- (e) Minitracheostomy was done using Minitrach II kit (Standard) or Seldinger Minitrach-II Kit.
- (f) Oxygen saturation levels were recorded both before and after minitracheostomy.
- (g) Patients not improving with minitracheostomy were subjected to standard tracheostomy.
- (h) Patients were followed up by regular review :- (i) Immediate postoperative period and subsequent hospital stay; (ii) After 3 months to assess for any delayed complications.

The methods used for minitracheostomy were :-

1. *Standard Method* :The patient is placed in a supine position with head and neck fully extended. The skin and subcutaneous tissues in the region of the cricothyroid membrane are infiltrated with local anaesthetic. A clean incision is made through the skin and cricothyroid membrane. A blunt plastic introducer is then passed through the incision and directed down into the trachea. The minitrach tube is railroaded down the introducer which is then gently withdrawn and the tube is secured around the neck.

2. *Seldinger Technique* :In this method the position of the patient is also supine with extension of the head and neck. After the skin incision in cricothyroid region a 16 FG tuohy needle fitted

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on a syringe is then inserted through the cricothyroid membrane. The syringe is removed and a guide wire is inserted through the needle into the trachea. The needle is then removed and a 16FG dilator is railroaded over the guidewire and then removed. The minitrach cannula is fed premounted on 11FG introducer onto the guidewire and introduced into the trachea. The introducer and guidewire are removed and the cannula is fixed with tapes.

Observation and Results

Twelve patients presenting with stridor, secondary to upper respiratory tract obstruction were subjected to minitracheostomy. The following observations were made.

(1) *Age and Sex Distribution* :The mean age was 56.6 years ranging from 41 to 70 years, 83% were males and 17% were females.

(2) *Diagnosis*: The patients who underwent minitracheostomy were suffering from various pathologies as depicted in Table 1.

TABLE 1
Diagnosis

Diagnosis	No. of cases
Carcinoma supraglottis	4
Carcinoma hypopharynx	6
Rhinoscleroma	1
Abscess epiglottis	1

(3) *Arterial Oxygen Saturation Levels* :The Arterial Oxygen Saturation levels in pre and post minitracheostomy period were as shown in Table 2. The mean saturation before minitracheostomy was 81.66% and after minitracheostomy was 97.67%.

TABLE 2
Saturation of arterial oxygen before and after minitracheostomy

Sr No.	SaO ₂ before minitracheostomy (%)	SaO ₂ after minitracheostomy (%)
X1	80	97
X2	85	98
X3	85	98
X4	80	98
X5	80	98
X6	80	97
X7	80	97
X8	80	98
X9	85	98
X10	80	98
X11	80	97
X12	85	98

(4) *Duration of Cannulation* :The mean duration was 4.83 days with a range of 1 to 7 days.

(5) *Conversion to Tracheostomy* : 50% patients on minitracheostomy had to be converted to standard tracheostomy for reasons explained below.

(6) *Complications* : The only complication was surgical emphysema in one case and hemorrhage in another case.

Discussion

Minitracheostomy is a simple and quick procedure for cannulating the cricothyroid membrane with 4.0 mm plastic tube. It is indicated in the following situations:

1. For early treatment of sputum retention in medical and surgical patients when normal mechanisms of sputum clearance are inadequate.

2. For delivery of humidified oxygen directly into the trachea.

3. To augment respiratory effort and improve arterial oxygenation by means of high frequency jet ventilation.

Minitracheostomy is absolutely contraindicated in children under 12 years of age and there are relative contraindications like gross obesity, obscure anatomy, calcified larynx, uraemia and coagulopathies.

In the present study minitracheostomy was performed in patients having respiratory distress due to upper airway pathologies.

Twelve patients having stridor due to upper airway obstruction underwent minitracheostomy instead of standard tracheostomy to relieve their respiratory distress. The mean age was 56.6 years ranging from 47 years to 70 years. 83% were males and 17% were females.

The main pathology for upper airway obstruction was tumours of supraglottic larynx and hypopharynx. Cases in which growth was seen extending down to the glottis were not subjected to minitracheostomy but standard tracheostomy was done to avoid the possibility of cutting through the tumour.

One case of epiglottic abscess who was having mild stridor was subjected to minitracheostomy before taking up the patient for surgical incision and drainage. Endotracheal intubation was avoided to prevent accidental rupture of the abscess. The minitracheostomy in this case not only relieved the stridor and secured the airway but it was used to deliver anaesthesia by high frequency jet ventilation for surgical incision and drainage of the abscess. Casas et al [4] too reported providing satisfactory general anaesthesia through a minitracheostomy using intermittent positive pressure ventilation with high minute volume and a giant polyp of the larynx was excised. In this case difficult intubation was anticipated and a formal tracheostomy was avoided. Mathew [3] also showed the use of minitracheostomy as a percutaneous route for high frequency jet ventilation (HFJV). HFJV is usually administered through an oral endotracheal tube but with a

percutaneous delivery system as with minitracheostomy there is no need for sedation and also the patient can speak, eat, drink and generate explosive cough.

Gregoretti et al [5] reported the use of minitracheostomy in providing pressure control ventilation in treating severe flail chest trauma with significant improvement in arterial oxygen saturation.

A 60 year old female patient a case of suspected rhinoscleroma having extensive oropharyngeal fibrosis was subjected to minitracheostomy to secure the airway before taking biopsy from soft palate, since the airway was already compromised and post operative palatal oedema would have further aggravated the situation.

The mean oxygen saturation recorded by pulse oximeter improved from 81.66% to 96.67% after minitracheostomy which was highly significant. Similar findings were obtained by J Pederson et al [6] and Andrivet et al [7] too showed an increase in saturation of arterial oxygen from 79.7% to 93.7% after starting intratracheal oxygen through minitracheostomy.

The mean duration of cannulation was 4.83 days with a range of one to seven days.

Because of thick viscid secretions and rapid drying effect it was difficult to maintain the patency of narrow minitrach cannula for long. In six patients the minitracheostomy was converted to standard tracheostomy because these patients were discharged with advice to undergo radiotherapy for their malignancy.

The only complication associated with the procedure was surgical emphysema in one case in immediate postoperative period which improved within a few days and haemorrhage in another patient which responded to local pressure. The cannula was otherwise well tolerated because the patients could cough and speak. These complications occurred with Minitrach II kit and not when Seldinger technique was used.

The most common complications associated with minitracheostomy in literature are surgical em-

physema as reported by Wagstaff et al [8], haemorrhage as reported by Terny [9], misplacement reported by Claffey [10] and oesophageal perforation and pneumothorax as reported by Silk [11].

Our series did not encounter many complications. Decannulation was simple and postoperative period was quiet.

The following conclusions are drawn from this study :-

1. Minitracheostomy provides fast less traumatic access to the airway.
2. It preserves the function of the glottis and is thus far more comfortable for the patient.
3. Minitracheostomy is a safe and effective method for managing upper airway obstructions to tide away the initial crises.

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