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Tracheostomy: Our Experience

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Abstract Tracheostomy remains a very important lifesaving surgical procedure worldwide and particularly in developing countries where patients present late in upper airway obstruction. The aim of this study is to describe our own experiences with tracheostomy, outlining the common indications and outcome of tracheostomized patients in our setting. Fifty consecutive cases comprising of varying age groups with different indications were included in this study. The data of operated patients were collected and analysed.

Keywords Tracheostomy, Airway obstruction

1. Introduction

Tracheostomy is a lifesaving procedure which has stood the test of time [1]. Before the birth of Christ, until the early part of the nineteenth century, the procedure was considered hazardous and was rarely performed [2, 3]. Only during past three decades, the operation has assumed its rightful place as a safe, simple procedure with wide range of usefulness. Today the tracheostomy has extended the collaboration of otolaryngologists with all phases of medicine and Surgery [3].

In recent years there has been a considerable shift in emphasis regarding the indications for tracheostomy with recognition of the more physiologic and functional indications in addition to those of a strictly obstructive nature. Tracheostomy is being performed with ease, with better knowledge of anatomy and by adopting the classical technique advocated by Jackson during the early years after 1900 [1].

In the modern era of the operation, Jackson and others have stressed the importance of a clear airway following tracheostomy, and have recognized that the tracheostomy is not the objective in treatment, but only aims at securing proper ventilation [4]. During recent years, the complications and deaths due to trancheostomy are reduced because of refinement of techniques and better post-operative care. But still the problems like difficult decannulation are not solved.

Tracheostomy may be elective or emergency. In the former there is enough time for preparation and done in a well planned way under ideal operating conditions. Tracheostomy may be either temporary or permanent.

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The purpose of this study is,

- To study the evolution and different aspects of tracheostomy, a valuable procedure with a wide range of applicability and usefulness in many fields of medicine and surgery.
- To present an analysis of indications, symptoms, technique, management and complications encountered in tracheostomized patients.

Tracheostomy is an incision into the trachea (windpipe) to form a temporary or permanent opening. The opening or hole is called stoma [5, 6].

- Sometimes the terms tracheotomy and tracheostomy are used interchangeably.
- The tracheal opening is made either in the second, third, fourth or fifth tracheal ring and a tube is inserted through the opening to allow passage of air which also helps in removal of secretions.

Role of Tracheostomy:

In addition to its role of bypassing an upper airway obstruction, its other functions Include:

- It reduces the amount of dead space in the respiratory tract. The normal tidal volume is about 500 ml; the dead space is about 200ml. Half of this dead space is in the nose, throat and pharynx. The decrease in dead space may vary from 10% to 50% depending upon the individual's physiological dead space. This apparently small amount of air becomes of crucial importance when the respiratory function is impaired and the tidal volume is reduced [2].
- It reduces the resistance to the airflow as it bypasses an incompetent larynx and pharynx and the effect of glottic narrowing. The working load of respiration is thus reduced. This will result in increased total compliance and more effective alveolar ventilation, provided the tracheostomy stoma is large enough [3, 6].
- It bypasses the pool of saliva in the pharynx and in case

of ineffective laryngeal reflexes, a cuffed tube protects the air passage against aspirations.

- Permits deglutition without reflex apnoea which is an important factor in the respiratory disease patient [2].
- Permits removal of crust and secretions blocked airway causes increased capillary permeability, which further increases anoxia. Tracheostomy with aspiration of secretions and exudates promotes ventilation of the lungs [7].
- It provides pathway to deliver medications and humidification to the tracheo bronchial tree.
- It provides simple, convenient and reliable pathway for the administration of artificial respiration as in poliomyelitis, respiratory muscle paralyses, etc with impaired respiratory mechanism till the spontaneous respiration is resumed [6, 7].
- It provides a pathway to deliver medication and humidification to the tracheobronchial tree, with or without intermittent positive pressure breathing.

Provides a simple route for administration of anaesthesia. A high flow of oxygen and light planes of anaesthesia are maintained. Patient recovery will be uneventful and will be able to take nourishment almost immediately as the hazards of aspiration are greatly reduced with tracheostomy. This method can be adopted for both initial and follow-up of surgical management of patients with burns, maxillo facial injuries, head injuries, and head and neck tumours.

The Advantages of tracheostomy:

- Anatomical dead space is reduced by approximately 50% [7].
- The work of breathing is reduced.
- Instead of breathing through the nose and mouth, the patient now breathes through the tracheostomy tube.
- Alveolar ventilation is increased.
- Level of sedation needed for patient comfort is decreased.
- Patient able to talk and eat with tracheostomy tube in place (unlike in endotracheal intubation).

The disadvantages of tracheostomy:

- Mainly the normal speech has to be compromised and others like loss of heat & moisture exchange performed in the upper respiratory tract [7, 8].
- Desiccation of tracheal epithelium, loss of ciliated cells and metaplasia of squamous epithelium [9].
- Presence of foreign body in the trachea stimulates mucous production, where no cilia are present their mucociliary stream is arrested [10, 11].
- Mucus causes drying resulting in crust formation and tube block particularly in small calibre tube used in children [8].

2. Materials and Methods

In this study, 50 cases of tracheostomy were studied. These are consecutive cases comprising of varying age groups with different indications. The data was collected from the patients who had undergone either elective or emergency tracheostomy.

Selected patients were subjected to investigations, pre-operatively and post-operatively for:

– X-Ray Soft Tissue Neck, lateral view,
– X-Ray Chest PA view.
– Routine blood and urine investigations.

All the selected patients who underwent standard tracheostomy procedure were given intensive care for the first 48 hours post-operatively. Problems encountered during surgery were documented in the operative notes. The immediate post-operative problems were seen in post-operative ward. Intermediate and late post-operative complications were assessed when patient came for regular follow up.

Regular follow-up of the patients was done for both elective and emergency tracheostomy. Follow-up was done twice a week for first month. Once a week for second month. Monthly twice in the third month and finally whenever patient has any problems, he/she was asked to come for follow up [10].

3. Results and Discussions

In a study by Crysdale et.al. [9] in 1976-1985 and Zetonni & Manoukian in 1993, where 319 and 44 cases were taken up respectively. In Crysdale et.al. study, 222 cases (70%) were of airway obstruction, 65 cases (20%) were of tracheobronchial toilet and 32 cases (10%) were of continued assisted ventilation. In Zetonni & Manoukian, 25 cases (57%) were of airway obstruction.

In the present study 50 patients who underwent tracheostomy in two years period. In this group 44 cases (88%) were of airway obstruction, 5 cases (10%) were of laryngeal trauma and 1 Case was (2%) of Gillian Barrie syndrome [G.B. Syndrome]. The study also revealed the age incidence varying from 5 years to 75 years. In this study there were 40 males (80%) and 10 females (20%), with a ratio of 4:1 [figure.1].

Maximum cases were reported in the 4^{th} to 6^{th} decade, where most of the cases were for mechanical airway obstruction secondary to malignancy of larynx / hypopharynx. In Crysdale et.al study also more male patients underwent tracheostomy than female patients.

The sex incidence of malignant condition was more in male. Out of the 33 cases of malignancy 28 patients were male and 5 patients were female, with the ratio of 5.6:1 [Table 1].

It is observed that out of 5 cases in the younger age group, 3 were for acute infections (2 females and 1 male), 1 each for post intubation stenosis and G.B. syndrome. There were 5 cases of trauma and 2 cases of bilateral abductor palsy.

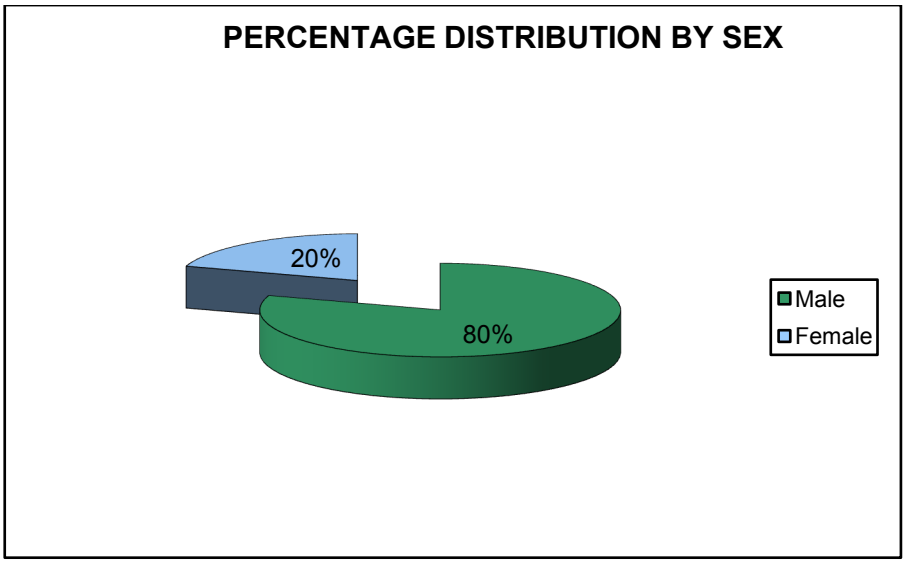

Figure 1. Showing gender distribution of patients

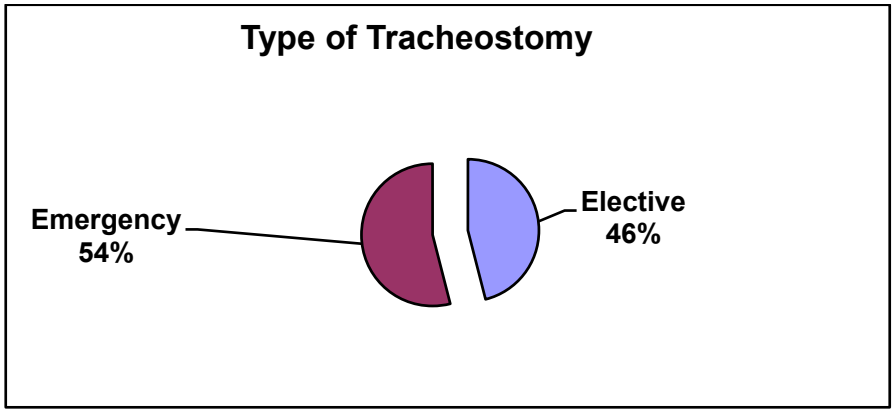

Figure 2. Showing types of tracheostomy

Table 1. Showing male: female ratio in various conditions

CONDITION	MALE	FEMALE	RATIO
Malignancy	28	5	5.6:1
Infections	1	2	1:2
Post Intubation Stenosis	5	0	5:0
Trauma	5	0	5:0
Bilateral Abductor palsy	0	2	0:2
G.B. Syndrome	0	1	0:1

In this study the indications for tracheostomy are broadly divided into elective and emergency groups. In this study there were 23 elective cases (46%) and 27 emergency cases (54%) [Figure 2].

The elective group includes patients who were planned for major surgical procedures (laryngectomy and composite resections) and G.B. Syndrome. The emergency group includes patient with stridor due to malignancy larynx / hypopharynx, acute infections of larynx, post intubation stenosis and cut throat injuries. Malignancy causing upper airway obstruction was found to be most common indication in this study, which accounted for 33 out of 50 cases (66%) [Figure 3].

Most of the tracheostomy done during the study was for upper airway obstruction on emergency basis. During this study the tracheostomy were done both under general anaesthesia [29] and local anaesthesia [21] [Figure 4]

The type of skin incision during tracheostomy was horizontal and vertical (64% & 36%). Emergency tracheostomy was done by putting vertical incision. The tracheostomy in patients who were planned for major surgical procedures (laryngectomy and composite resection) was done by using horizontal skin incision [Figure 5].

In this study 68% were mid tracheostomies and 32% were low tracheostomies [Figure 6].

Out of 50 cases of tracheostomy performed 24 cases presented with complications. Intra operative bleeding was the commonest complication noted in 10 cases (20%) during both elective and emergency procedure, 5 cases (10%) had surgical emphysema, 4 cases (8%) had tubal occlusion, one case (2%) had wound infection and 2 deaths (4%) were noted during emergency tracheostomy [Figure 7].

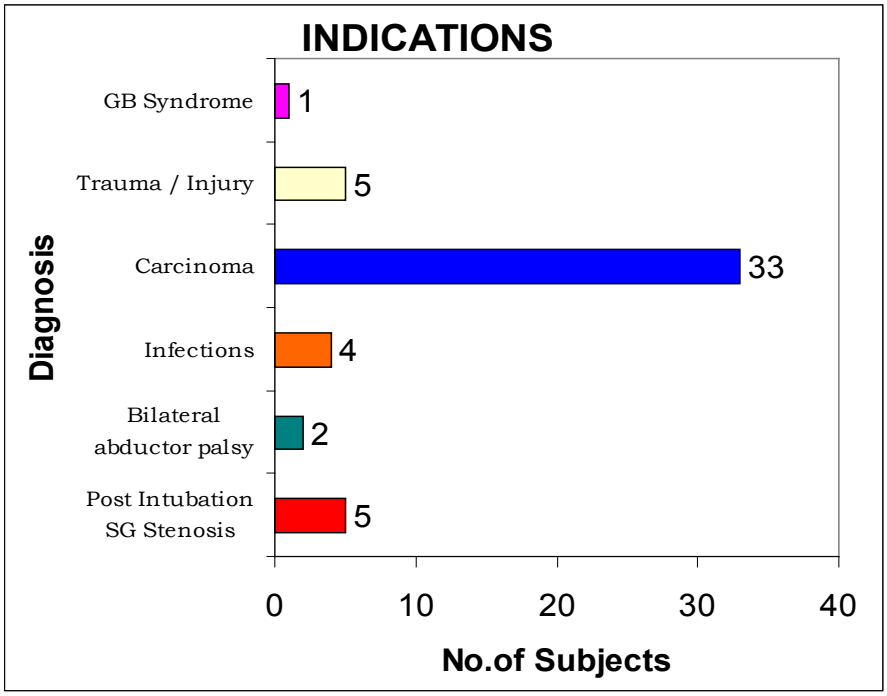

Figure 3. Showing indications for tracheostomy

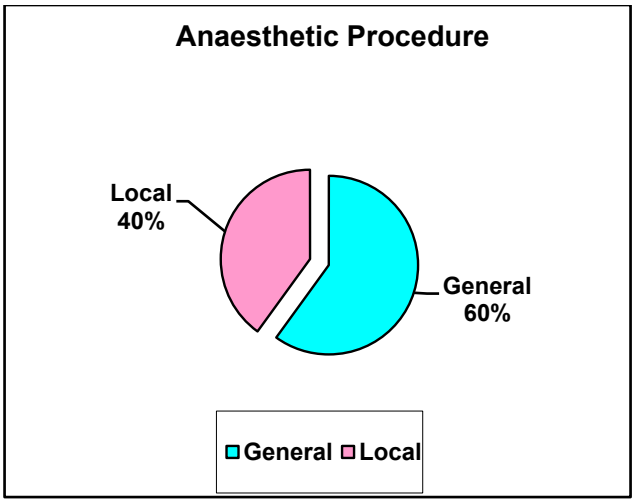

Figure 4. Showing types of anaesthesia used for tracheostomy

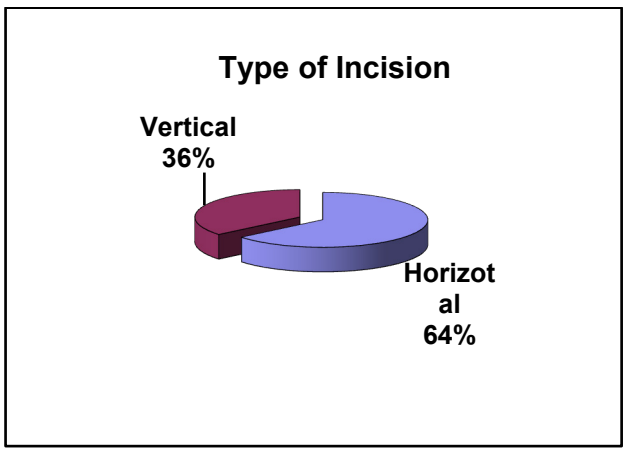

Figure 5. Showing type of incision used for tracheostomy

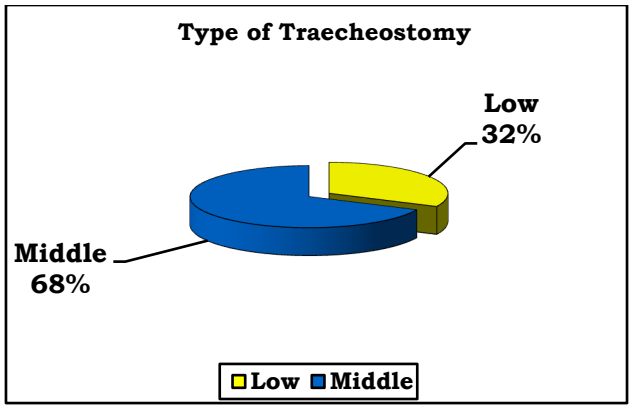

Figure 6. Showing type of tracheostomy

Incidence of complications varies in different author's series. In the similar studies by Crysdale et.al. [9] in 1976-85 and Zetonni & Manoukian, in 1993 the incidences of complications were 54% and 27% respectively. In this study complications were encountered in 24 patients (48%), it was more during the emergency procedure [Figure 8].

In the intermediate complications, tubal occlusion was encountered in 4 cases (8%), managed by proper humidification and $NaHCO_3$ instillation and regular suctioning. Wound infection was noticed in 2% and was managed with broad spectrum antibiotic after culture sensitivity test.

Intra-operative bleeding was the commonest problem encountered during the study and was effectively managed with cautery and ligation. Two deaths occurred during the present study. First case was of severe stridor, secondary to bilateral abductor palsy and second case was Diphtheria, referred from a peripheral centre, in a toxic state.

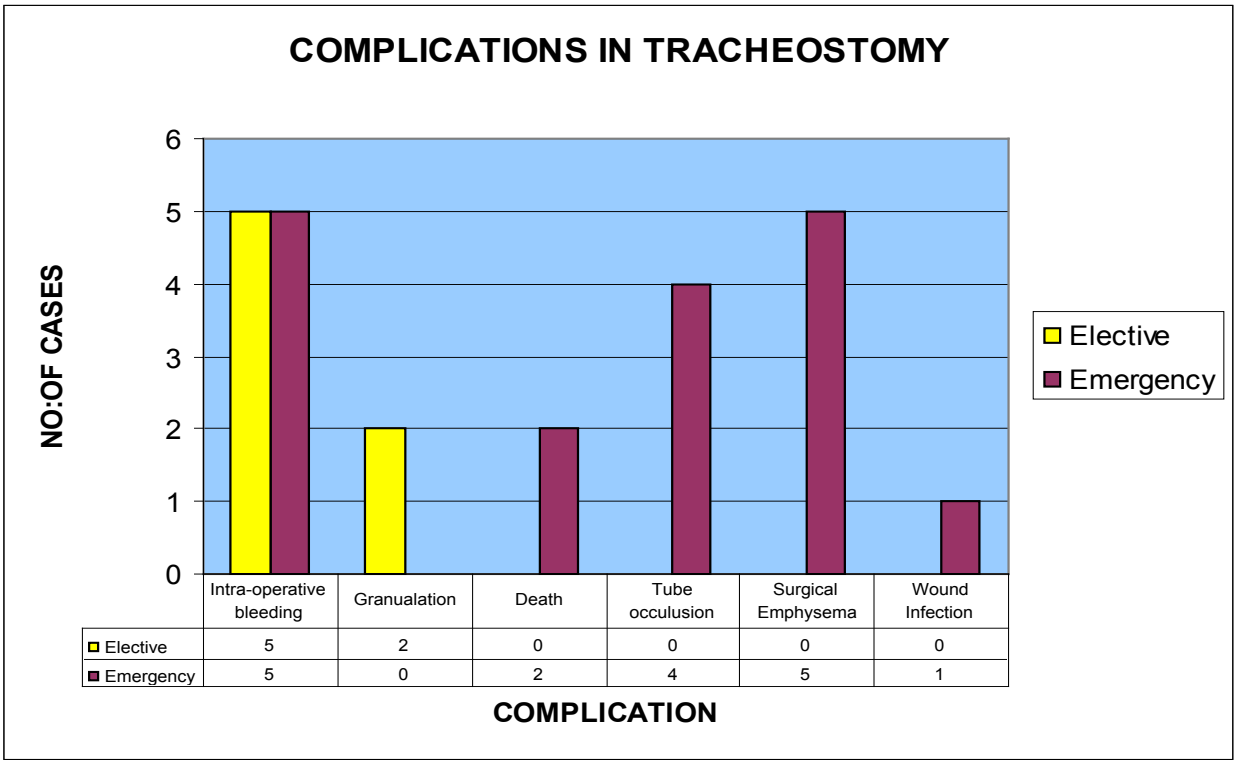

Figure 7. Showing complications of tracheostomy

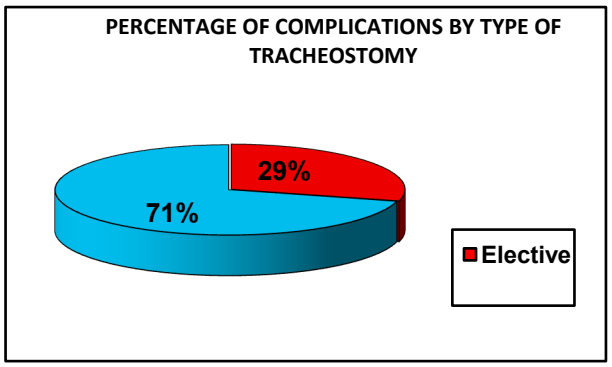

Figure 8. Showing percentage of complications of tracheostomy

4. Conclusions

This study also confirms the low mortality and morbidity when the best post-operative nursing care is instituted. This is evidenced by low post operative morbidity in present study, which again emphasizes the need for meticulous post-operative tracheostomy care. Finally even today tracheostomy remains as a life saving procedure.

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