

COMPLICATIONS OF TRACHEOSTOMY

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ABSTRACT

Objective: To determine the rate of complications associated with tracheostomy and to study it in relation with age, type of tracheostomy (emergency: elective) and type of tracheostomy tube (metallic: portex).

Material and Methods: 50 patients, aged 4-80 years undergoing tracheostomy in a tertiary care hospital and fulfilling inclusion and exclusion criteria, were selected. It included both elective and emergency tracheostomy. Open surgical technique was adopted. Metallic or portex tube was used. A preformed Performa was used to document any complication occurring pre operatively or post operatively.

Results: Our study included 28 males and 22 females. Age range was 4-80 years with mean age of 39.2 years (SD \pm 23.05). Elective tracheostomy was done in 72% and emergency tracheostomy in 28%. Metallic tube was used in 74% and portex tube in 26% patients. Total complication rate of 56% was recorded. These were 32% immediate, 14% intermediate and 10% late complications. Complication rate was higher in children. Infection (12%) was the commonest complication followed by emphysema, dysphagia, aspiration (6% each). Forty four percent complications occurred in emergency and 22% in elective tracheostomy. Portex tube was associated with 32% and metallic tube with 24% complications.

Conclusion: Complication rate is much higher in emergency tracheostomy and in children than older age groups. Portex tube was also associated with higher rate as compared to metallic tube.

Key words: Tracheostomy, complications.

INTRODUCTION

Attempts to save man's life from suffocation have been made from ancient time. Portrait

of tracheostomy has been found on Egyptian tablet. Homer around 1000 B.C reported that Alexander the great saved the life of his soldier from suffocation in the trachea using the tip of his sword. Asclepiades, Aretaeus

and Gallen are all recorded as having used this operation. The results of early tracheostomy were very bad. In 13th century it was described as "semislaughter and scandal of surgery". The process has evolved over the years and undergone revolutionary changes in methodology, instrumentation and indications¹.

Early tracheostomies were done for respiratory obstruction but later the spectrum of indications expanded to include other R's namely respiratory failure, respiratory paralysis, removal of retained secretion and reduction of dead space².

Many tracheostomies are performed as emergency procedure but some may be performed electively. The open surgical technique is commonly used though Percutaneous Dilatational Tracheostomy is gaining popularity.

Tracheostomy is associated with a number of complications, which are usually divided into immediate, intermediate and late complications. Few studies have been performed regarding tracheostomy complications in Pakistan, though world literature is full of such studies. This study was carried out to determine the rate of complications in our setup and to compare it with other such studies. A secondary objective was to study complication rate in relation to age, type of tracheostomy (elective or emergency) and type of tracheostomy tube (portex or metallic).

MATERIAL AND METHODS

Our study includes 50 patients undergoing tracheostomy for a variety of pathological conditions in ENT department of K.T.H.

Inclusion criteria: Patients of all ages and both sexes undergoing tracheostomy for any indications.

Exclusion criteria: Patients in whom follow up was not possible due to any reason. Critically ill patients with serious medical problems.

Procedure: Patients were either admitted through OPD or casualty or were referred from other units or hospital, for tracheostomy. Thorough assessment was done pre-operatively in non emergency cases. This included detailed history and examination, and routine investigations like Full Blood Count, Bleeding Time, Clotting time, X ray chest and neck.

Tracheostomy was done in operation theatre using open surgical technique. It involves local or general Anesthesia, positioning of patients skin incision and localization, incision and cannulation of the trachea. After tracheostomy metallic or portex tube was used.

Postoperatively, patients were kept in the ward. X ray chest and neck were done routinely within first 24 hours. Post-operative care was the combined task of the doctor, nurse, attendant of the patients and in older patients, the patient himself. Post-operative care included regular suctioning, humidification with wet gauze. Patients were observed for development of any complication. They were entered on to an already prepared Performa.

Decanulation was done in standard way i.e. corking or downsizing of the tube followed by extubation. Decanulation was not tried in some cases because of the incurable nature of primary disease. Patients discharged with tracheostomy tube were also followed through regular follow up.

Data collected was analysed using SPSS for statistical analysis.

RESULTS

Out of 50 cases 28 were male and 22 were female with age ranging from 4-80 years. Mean age was 39.2 years and standard deviation was +/- 23.05. L.A was given to 42 (84%) and G.A to 8(16%) patients.

COMPLICATIONS OF TRACHEOSTOMY

Complication	Frequency	%
Infection	6	12%
Dysphagia	3	6%
Emphysema	3	6%
Immediate Hemorrhage	2	4%
Aspiration	3	6%
Tube Obstruction	2	4%
Difficult Decannulation	2	4%
Intermediate Hemorrhage	1	2%
Tube Displacement	1	2%
T.E Fistula	1	2%
Cardiac Arrest	1	2%
Aerophagia	1	2%
Tracheal Stenosis	1	2%
Tracheo-Cutaneous Fistula	1	2%
Total	28	56%

TABLE-1

Elective tracheostomy was done in 36 patient (72%) while emergency tracheostomy was done in 14 (28%) patients.

Metallic tube was used in 37 (74%) and portex in 13 (26%) patients. Total complications rate was 56%.

Among these, immediate complications were 32% (n=16) and intermediate and late complications were 14% (n=7) and 10% (n=5) respectively.

Among the individual complications, infection was commonest (12%) followed by emphysema, dysphagia and immediate hemorrhage (6% each).

The frequency of aspiration, tube obstruction and difficult decannulation was 4% each. Other complication like cardiac arrest, intermediate hemorrhage, tube displacement, tracheo-esophageal fistula, aerophagia, tracheal stenosis and tracheo-cutaneous fistula were rare (2% each).

Complications were common in emergency (44%) than elective (12%) and in

pediatric age group (group I, 12.5 %) than older groups.

In our study portex tube was associated with higher complication rate (32%) than metallic (24%).

DISCUSSION

Total complication rate was comparable to that observed by Mehta et al (48.4%). However it was significantly higher than those of Manzoor³ (27.2%) and Zaidi⁴ (24%) series. Zaitouni⁵ in a study of 281 tracheostomies demonstrated a complication rate of 24%.

The reason attributed by Manzoor⁵ to the low complication rate was the experience of the surgeon.

However a more important factor seems to be post-operative care because the bulk of complication is formed by the intermediate complications, which are so closely related to post operative care. This factor becomes even more pronounced in pediatric patients.

Other reasons may be difference in size of sample, technique of sampling and criteria of patient selection. Immediate complications are more influenced by surgical skill, operation theatre facilities, type of tracheostomy (time available) and condition of the patients. Higher complication rate was recorded in children. This is also met with in dubey⁶ and oliver⁷ studies.

FREQUENCY OF IMMEDIATE, INTERMEDIATE AND LATE COMPLICATIONS

Complications	Frequency	%
Immediate	16	32
Intermediate	7	14
Late	5	10
Total	28	56%

TABLE-2

COMPLICATIONS IN RELATION TO TYPE OF TRACHEOSTOMY TUBE.

Complications	Metallic (x = 37) (%)	Portex (x = 13) (%)	P Value
Infection	1 (10.8%)	2 (15.3%)	< 0.05
Emphysema	1 (2.7%)	2 (15.3%)	< 0.05
Dysphagia	1 (2.7%)	2 (15.3%)	< 0.05
Aspiration	0 (0.0%)	2 (15.3%)	< 0.05
Immediate hemorrhage	1 (2.7%)	2 (15.3%)	< 0.05
Difficult Decannulation	0 (0.0%)	2 (15.3%)	< 0.05
Tube Obstruction	0 (0.0%)	1 (7.7%)	< 0.05
Immediate Hemorrhage	0 (0.0%)	0 (0.0%)	< 0.05
Tube Displacement	1 (2.7%)	1 (7.7%)	< 0.05
T.E.Fistula	0 (0.0%)	0 (0.0%)	< 0.05
Tracheal Stenosis	1 (2.7%)	0 (0.0%)	< 0.05
Cardiac Arrest	1 (2.7%)	0 (0.0%)	< 0.05
Aerophagia	1 (2.7%)	0 (0.0%)	< 0.05
T.C.Fistula	1 (2.7%)	0 (0.0%)	< 0.05

TABLE-3

Infection was the most common complication (12%) which is similar to that in Mehta series. Most were stomal infection. However one patient developed Pneumonia. In Manzoor series infection was found in 4.5% cases. This lower infection rate may be due to better post-operative care. Infection can be lessened by meticulous asepsis, aseptic suctioning and proper anti-biotics.

Dysphagia and aspiration occurs due to the presence of tube and due to faulty kinetics of vocal cord closure during deglutition.

Emphysema is usually due to extensive dissection and light closure of wound of the wound. These factors may be responsible for higher rate in Mehta series (14%).

Hemorrhage: Immediate hemorrhage occurred in 6% while intermediate hemorrhage was due to bleeding disorder in one and injury to thyroid isthmus in remaining tow

COMPLICATION IN RELATION TO AGE GROUPS

Age Group (Years)	Frequency of complication	%
4-12	7	12.5%
13-20	1	1.8%
21-30	2	3.6%
31-40	1	1.8%
41-50	4	7.1%
51-60	4	7.1%
61-70	5	8.9%
71-80	4	7.1%

TABLE-4

COMPLICATIONS Vs TYPE OF TRACHEOSTOMY

Variable	No. of patients	Frequency of of compli- tion (% in 56%)	P value
Elective Tracheostomy	36	6(12%)	< 0.05
Emergency Tracheostomy	14	22(44%)	

TABLE-5

COMPLICATIONS Vs TYPE OF TRACHEOSTOMY TUBE

Variable	No. of patients	Frequency of complication (% in 56%)	P value
Metallic	37	12(24%)	< 0.05
Portex	13	16(32%)	

TABLE-6

patients. Stomal granulation tissue was the cause of intermediate hemorrhage which occurred during tube change.

Some degree of *tube obstruction* is common but significant obstruction occurred due to plugging of the tracheostomy tube by crusts and thick secretion. It is imperative that high humidity be provided. Humidification and frequent irrigation of the tube prevents crusting and tube obstruction⁸.

Aerophagia is an uncommon complication (2% in our study) which can be relieved by deflation through Nasogastric tube.

Tracheal stenosis occurred in one patient due to cicatrization following surgery. It was relieved by repeated bouginage. Law reports Tracheal stenosis in 14% cases¹⁰.

Difficult decannulation is a significant problem in pediatric patients. The cause was psychological dependence in one and granulation tissue in other patient. One patient developed *tracheo cutaneous fistula*. It was due to epithelization of the tract following prolonged use of the stoma. It was treated by tracheoplasty. Cardiac arrest occurred in one patient it occurs due to excessive adrenalin production in stressed patient and hyperkalemia consequent upon respiratory alkalosis. Cardiac arrhythmia from intratracheal suctioning has also been reported by Dugan¹¹.

Emergency Vs Elective Tracheostomy: An important aspect of the study was comparison of complication rate in emergency and

elective tracheostomy. The rate was much higher in emergency (44%) as compared to elective tracheostomy (12%) with significant P value (< 0.05). Thus almost two fifth complications (78.5%) occurred in emergency tracheostomy. In Mehta series frequency of complications in emergency tracheostomy was 80%.

The factors responsible may be haste during procedure, condition of the patient (struggling for breathing) and inadequate O.T facilities during emergency.

Metallic Vs Portex tube: Reasons for high complication rate with portex tube may be non-availability of proper range of different sizes, effect of cuff, difficulty in cleaning and sterilizing the tube. Significant difference (P value < 0.05) in complication rate was found in case of dysphagia aspiration tube obstruction and difficult decannulation.

CONCLUSION

Tracheostomy is relatively easy operation performed in all ages which is usually performed under L.A. Overall complication rate, although is not very low most of the complications are minor and easily treatable. Complication rate is higher in elective than emergency and in children than elders.

Following suggestions may be given to lessen complication of tracheostomy.

- Proper selection of patients for tracheostomy and use of safer alternative methods of airway management where feasible⁹.
- Meticulous operative technique.
- Controlled operating conditions.
- Proper post-operative care.
- Proper teaching of the principles of tracheostomy care to all acute care unit personnel.

- Improvement in parental teaching contributes to decrease in tracheostomy related mortality¹².

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