

EARLY COMPLICATIONS OF TRACHEOSTOMY AND FUTURE STRATEGY

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ABSTRACT

Objectives: To evaluate the early complications of tracheostomy and formulate the future strategy for avoiding complications and effective management of tracheostomy.

Material and Methods: This study was conducted at the department of ENT, Khyber Teaching Hospital, Peshawar, Pakistan from November 2016 to October 2017. In this study, a total 34 patients included for which elective/emergency tracheostomy was planned. All the demographic data was collected on a predesigned proforma and written informed consent was taken.

Results: In this study of 34 patients, the age ranged from 1 year to 80 years comprising of mostly in the age limit of 1-20 years (61.7%). The male to female ratio was 1:1. After the initial assessment of all the patients, the procedure was explained to all the participants. Baseline investigations were done to assess the fitness for anesthesia. In 23.5% of patients the procedure was performed due to presence of Respiratory distress followed by road traffic accident/head injury in 28% of cases. Rest of the causes included laryngeal carcinoma with dyspnea, parapharyngeal carcinoma, Multi Nodular Goitre (MNG), Gullian Barre Syndrome (GBS), diphtheria, tetanus, poisoning, respiratory papilloma and post thyroidectomy with bilateral vocal cord paralysis.

Conclusion: The tracheostomy in the operation theater is a simple and safe procedure that offers many advantages in term of safety and efficacy.

Key Words: Tracheostomy, complications, neck, trachea.

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INTRODUCTION

Tracheostomy is generally defined as a procedure that involves opening of the trachea and making it exteriorize to the cervical skin^{1,2}. It is a life-saving procedure when it is performed for an appropriate indication. It is performed for relieving upper airway obstruction, lung toileting and for intermittent positive pressure ventilation.³ Tracheostomy is frequently performed therapeutically as an elective procedure.⁴ It is commonly performed in critically ill patients in the intensive care units.^{5,6} Tracheostomy is the standard procedure for management of long term ventilator dependent patients.

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Advantages of tracheostomy over endotracheal intubation include smaller dead space, lesser movement of the tube within the trachea, greater patient comfort and more efficient suction.⁷ Currently tracheostomy is an established procedure for managing airway in critically ill patients who require longterm mechanical ventilator support. It has advantages over oral or nasal endotracheal intubation but it may cause very serious complications.⁸

Tracheostomy may be performed by open surgery or percutaneously as an elective procedure for variety of procedures. There is no evidence to justify recommending surgical or percutaneous technique over the other.^{9,10} Percutaneous dilatation tracheostomy is considered a safer procedure as compared to surgical tracheostomy because it has lower rate of complications postoperatively.¹⁴ Tracheostomy is ideally performed in the operation theater or in emergency cases can be performed at bed side in Surgical Intensive Care/ Medical Intensive Care Unit.¹⁵ Tracheostomy involve a sub-thyroid incision of the trachea between the 3rd and 4th tracheal rings.

It has been concluded from many articles that percutaneous tracheostomy is as safe as standard surgical procedure when considering early postoperative complications. Early complications of tracheostomy include bleeding, subcutaneous emphysema, wound infection, tube displacement, and tube obstruction. Rare complications of tracheostomy include pneumomediastinum, tracheo esophageal fistula, pneumothorax, and recurrent laryngeal nerve injury. The objective of my study was to help us in formulating the future strategy for avoiding complications and effective management of tracheostomy.

MATERIAL AND METHODS

This study was conducted at department of ENT, Khyber Teaching Hospital, Peshawar, Pakistan from November 2016 to October 2017. Patients admitted through Out Patient Department, Intensive Care Unit, casualty or referred from other departments of KTH for tracheostomy included in the study. The data collection was done after the approval from ethical review board. Inclusion criteria were patients of either sex with history of prolonged intubation, patients with head and neck tumors, patients with coma due to any cause to reduce dead space and facilitate tracheal toilet, tetanus, diphtheria, Guillain Barre Syndrome, maxillofacial and head injuries causing airway obstruction. Those patients who were admitted for emergency tracheostomy, huge thyroid pressing over trachea, bleeding disorders, subglottic stenosis were excluded from the study.

All the demographic data entered in a pre-designed proforma. The procedure was explained to the patients and written informed consent was taken. These patients were either referred from ICU, admitted patients or referred from other units for tracheostomy and possible complications were explained. Tracheostomy was performed in OT, Surgical Intensive Care Unit / Medical Intensive Care Unit (SICU/MICU) using conventional open surgical technique. This procedure involved injectable 2% Xylocaine and adrenaline in a dose of 7mg/Kg bodyweight with proper positioning of the trachea, transverse skin incision, dissection of underlying structure and cannulation of trachea. In all procedure portex tube of 7 or 7.5 mm internal diameter was used. Postop patients were retained in the ENT unit or surgical intensive care units. Bleeding was considered significant if it was more than 20 ml as measured in suction bottle. Recurrent laryngeal nerve palsy assessed by hoarseness of voice and indirect laryngoscopy. Neck X-ray lateral view was performed within six hours postoperatively to look for complications that included hemomediastinum,

subcutaneous emphysema and pneumothorax. Tube dislodgement was observed after surgery for 24 hours. Tracheo esophageal fistula was confirmed by giving some fluids orally which was leaked through the stoma. Tube obstruction and wound infection were observed after surgery for 7 days. These early complications were labelled as Yes or No if present or absent respectively in the proforma already designed for this purpose. Data were collected using the approved proforma designed for the purpose and were analyzed using SPSS-20.

RESULTS

The results of thirty four elective/emergency patients were analyzed from stand point of age, sex, disease pattern, operative procedure and post-operative complications associated with tracheostomy. Age and gender distribution is described in Table 1. Male were equal to female patients and hence tracheostomy was approximately equal in both genders. PT and APTT were done in all patients as a part of bleeding diathesis; Neck X-ray lateral view was done in all patients within 6 hours postoperatively for complications such as subcutaneous emphysema, pneumomediastinum and pneumothorax. Post operatively X-rays neck lateral view findings are shown in Table 2.

The indications for tracheostomy were different from each other due to nature of the different diseases. In 23.5% patients underwent tracheostomy due to Respiratory distress and in 20.5% patients' tracheostomy was done for road traffic accident. In only 14.7% of

Table 1: Age and gender of the patients

Age in years	Frequency & %age
1-20	21(61.7%)
21-40	9(26.4%)
41-60	3(8.8%)
>60	1(2.9%)
Total	34 (100%)
Gender	
Male	17 (50.0%)
Female	17(50.0%)
Total	34 (100%)

Table 2: Postoperative X-ray findings

Neck Lateral view X-ray	Frequency with %age
Normal	32 (96.0%)
Radiolucent striations in the neck	2 (4.0%)
Total	34 (100.0%)

Early complications of tracheostomy and future strategy

patients' tracheostomy was done laryngeal or parapharyngeal carcinoma. In 11.7% of patients tracheostomy was done for diphtheria. Only for one patient each tracheostomy was done for tetanus, poisoning, respiratory papilloma and MNG. The relative percentages are given in the Table 3. In this study 21(61.7%) patients were without complications. Bleeding occurred in total of 3 patients. While subcutaneous emphysema occurred in 2

Table 3: Indications of tracheostomy

Indications	Frequency with %age
Respiratory Distress	8(23.5%)
Road traffic accident/ Head Injury	7 (20.5%)
Laryngeal/parapharyngealCa	5(14.7%)
Diphtheria	4(11.7%)
GBS	3(8.8%)
MNG	1(2.9%)
C/Section	2(5.8%)
Poisoning	1(2.9%)
Tetanus	1(2.9%)
Respiratory Papilloma	1(2.9%)
Dropping of oxygen	0
Prolong intubation	0
Maxillectomy	0
Chest toileting	0
Ludwig's angina	0
Angiofibroma	0
Maxillofacial trauma	0
Bomb blast injury with airway obstruction	0
DM with fits and dyspnea	0
Postcraniotomy with fits and dyspnea	0
Others	0

Table 4: Complications of tracheostomy

Complications	Frequency with %age
Normal	21 (61.7%)
Bleeding	3 (8.8%)
Subcutaneous emphysema	2 (5.8%)
Pneumothorax	0
Tube obstruction	0
Tube dislodgement	5 (14.7%)
Wound infection	3 (8.8%)
Total	34 (100.0%)

patients. Tube dislodgement occurred only in 5 patients. A total of 3 patients had post-operative wound infection (Table 4).

DISCUSSION

Tracheostomy is generally described as a procedure that involves opening the trachea and exteriorizing it to the cervical skin. Attempts to save man's life through tracheostomy have been made from ancient time. Portrait of tracheostomy has been found on Egyptian tablet.¹⁷

A number of techniques have been described to limit the morbidity associated with tracheostomy. Percutaneous dilational tracheostomy is simple, saves operating room burden and carries lower complication rate but the only hindrance to accept this in our setup is its high cost and surgical expertise. By comparison, conventional surgical tracheostomy carries higher incidence of postoperative complications.¹⁸ Many tracheostomies are performed electively but sometimes it can be on emergency basis.¹⁹ Elective tracheostomy is commonly performed in critically ill and prolonged ventilator dependent patients to provide long term airway access and tracheal toileting^{20,21}.

Early complications of tracheostomy include bleeding, subcutaneous emphysema, wound infection, tube displacement and tube obstruction. Pneumomediastinum, tracheoesophageal fistula, pneumothorax, and recurrent laryngeal nerve injury are amongst rare complications.

In a randomized controlled study conducted by Patel A²²; he defined the types of hemorrhage i.e. major and minor, but we mentioned only significant bleeding that was more than 20 ml in suction bottle. In his study hemorrhage occurred in 142 patients out of 10000 patients (1%). In my study bleeding occurred in 3 patients out of 50 (3%).

In retrospective study conducted by Siranovic²³ in 150 patients, in which hemorrhage occurred in one elective patient out of 112 (0.8%). The haemorrhage in elective patients in my study was 3% which is higher compared to that of international studies. If we compare the rate of hemorrhage with national studies conducted by Isteraj and Asmatullah¹⁶, it's lower as compared to their study i.e. 6%. In KarwandianK et al²⁴ study pneumothorax occurred in one patient (0.6%) which is higher in comparison with my study.

Comparison of recent surgical and percutaneous tracheostomy trials shows that perioperative complications are more frequent with the percutaneous technique (10% versus 3%), whereas postoperative complications occur more often with

surgical tracheotomy. This means that percutaneous tracheostomy is associated with a higher prevalence of perioperative complications and, especially, perioperative deaths and cardiorespiratory arrests. Postoperative complication rates are higher with surgical tracheostomy.²⁵

A nationwide study conducted by Fischler²⁶ in which complication rate of 13% was reported, bleeding and infections being at the top of the scale. Only 27% of the units performed late follow-up protocols. Despite its frequency, tracheostomy in Swiss ICUs is far from being standardized with regard to indication, timing and choice of technique.²⁷ In my study wound infection occurred in 8% of patients. In a study which shows that pneumothorax occurred in 2 patients, with open surgical technique²⁷. This rate is higher if compared to this study in which pneumothorax did not occur in any patient.

In another study conducted by Durbin GC²⁵ shows that pneumothorax occurred in four (1.7%) patients out of 236 patients²⁵. This is also higher than my study. According to him, the decision to place a tracheostomy should be made by considering the balance between benefits versus risks of the procedure. Probably the best understood factors that should be taken into account are the acute risks of tracheostomy.

CONCLUSION

If the procedure is carried out in a well monitored and aseptic environment, the associated complications can be reduced to a greater extent. Elective tracheostomy has lesser complications than emergency tracheostomy.

REFERENCES

1. Lee ST, Kim MG, Jeon JH, Min SK, Park JY, Choh SW. Analysis of morbidity, Mortality and risk factors of tracheostomy related complications in patients with oral and maxillofacial cancer. *Maxillofacial Plast Reconstr Surg*; 2016 38(1), p.32.
2. Muhammad, R., Khan, F., Rehman, F., Iqbal, J., Khan, M. and Ullah, G. Early complications of elective and emergency tracheostomy. *J Ayub Med Coll Abbotabad*, 2012 24(1):44-47.
3. Santosh, U.P., Patil, B.S., Bhat, V. and Pai, S. Elective open tracheostomy for patients under prolonged mechanical ventilation—a study. *Indian Journal of Otolaryngology and Head & Neck Surgery*, 2009. 61:44-46.
4. Jain, S., Kumar, S., Deshmukh, P. and Gaurkar, S. Bilateral pneumothorax: Perils of emergency tracheostomy. *Journal of Laryngology and Voice*, 2014 4(1):36-39.
5. Snell RS. The thoracic cavity. In: Kelly PJ, editors. *Clinical anatomy*. Philadelphia: Lippincott Williams And Wilkins; 2000:82.
6. McMinn RMH. Thorax. In: Last's anatomy regional and applied. Churchill: Livingstone; 1994:260.
7. Husein OF, Massick DD. Cricoid palpability as a selection criterion for bedside tracheostomy. *Otolaryngol Head Neck Surg*. 2005;133:839-44.
8. Scales DC, Thiruchelvam D, Kiss A, Redelmeier DA. The effect of tracheostomy timing during critical illness on long-term survival. *Crit Care Med*. 2008;36(9):2547-57.
9. Panajaroen, P. and Tangjaturonrasme, N. Pneumothorax after tracheostomy: A prospective study. The Polish. *Otolaryngol*, 2014; 69(3):26-30.
10. Young B, Lowe JS. Functional Histology. A text and Colour Atlas. Heath J.W Churchill: Livingstone; 2006:234-38.
11. Harris AT, Morell D, Bajaj Y, Martin-Hirsch DP (2010) A discussion of airway and respiratory complications along with general considerations in obese patients. *Int J Clin Pract* 64:802-06.
12. Karvandian K, Mahmoodpoor A, Beigmohammadi M, Sanaie S. Complications and safety of percutaneous dilatational tracheostomy with Griggs method versus surgical tracheostomy: a prospective trial with six months follow-up. *Pak J Med Sci* 2009;25(1):12-17.
13. Ferlito, Alfio. Percutaneous Tracheotomy. *Acta Otolaryngol*. 2003;123:1008-12.
14. Tokur M, Kurkcuoglu IC, KurulC, DemircanS. Synchronous bilateral pneumothorax as a complication of tracheostomy. *Turk Resp J*. 2008;7(2):84-85.
15. Delany A, Bagshaw SM, Nalos M. Percutaneous dilatational tracheostomy versus surgical tracheostomy in critically ill patients: a systemic review and meta-analysis. *Crit Care*. 2006;10(2):1-13.
16. Shahabi I, Zada B, Imad, Ali M. Complications of conventional tracheostomy. *J Postgrad Med Inst* 2009;19(2):187-91.
17. Brandt L, Goerig M. The history of tracheotomy. *Anaesthesist*. 1986;35(5):279-83.
18. Heffner JE. The role of tracheotomy in weaning. *Chest*. 2001;120(6):477-81.
19. Neema PK, Manikandan S. Tracheostomy and its variants. *Indian J Anaesth*. 2005;49:323-27.
20. Padia SA, Borja MC, Orens JB, Yang SC, Jhaveri RM, Conte JV. Tracheostomy following Lung Transplantation Predictors and Outcomes. *Am Transplant*. 2003;3:891-94.
21. Hsu CL, Chen KY, Chang CH, Jerng JS, Yu CJ, Yang. Timing of tracheostomy as a determinant of weaning success in CI patients. *Crit Care*. 2005;9:46-52.

Early complications of tracheostomy and future strategy

22. Patel A, Swan P, Dunning J. Does a percutaneous tracheostomy has a lower incidence of complications compared to an open surgical technique? *Interact CardiovascThorac Surg.* 2005;4:563-68.
23. Siranovic M, Gopcevic S, Kelecic M, Kovac N, Kriksic V, Rode B, et al. Early complications of percutaneous tracheostomy using the Griggs metho. *Signa Vitae.* 2007;2(2):18-20.
24. Durbin GC. Early complications of tracheostomy. *Respir Care.* 2005;50(4):511-15.
25. Fischler L, Erhart S, Kieger GR, Frutiger A. Prevalence of tracheotomy in ICU patients. A nationwide survey in Switzerland. *Intens Care Med.* 2000;26:1428-33.
26. Durbin CG. Techniques for performing tracheostomy. *Respir Care* 2005;50:488-96.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

- Rehman F:** Main idea.
Khan AR: Critical review & finalizing.
Nawaz G: Statistics.
Arif A: Data collection, bibliography.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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