

Percutaneous Tracheostomy in ICU of Lahore General Hospital. A Cross-Sectional Study

Muhammad Saqib,¹ Anjana Kafle,² Umm-e-Rubab,³ Muhammad Hamza,⁴ Afzal Jodat,⁵ Jodat Saleem⁶

Abstract

Objective: To determine the frequency of complications associated with percutaneous tracheostomy in ICU of Lahore general hospital.

Material and Methods: It was an observational cross-sectional study conducted in surgical ICU of Lahore general hospital, Lahore, Pakistan. It was conducted over the time period of 2 years starting from July, 2019 to June, 2021. Patients above 18 years and who underwent percutaneous tracheostomy during this time were included. After proper sedation and paralysis, percutaneous dilatational tracheostomy is performed using Smiths medical protex commercial tracheostomy set with Seldinger technique. Patient's characteristics along with complications of tracheostomy including blood loss, pneumothorax, sub cutaneous emphysema, infection and mortality were recorded and analyzed. Complications were expressed in frequency and percentage.

Results: Total 72 patients were included in this study. Acute respiratory distress syndrome (ARDS) was found in 38.9% patients being most frequent diagnosis at time of PDT. Severe bleeding >250 ml was observed in only one case at the time of procedure. One patient developed pneumothorax after 3 hours of procedure. 5.6% of the patients had developed stoma infection within 7 days. 23.6 % of the patients had mortality within 7 days due to other complications.

Conclusion: Percutaneous dilatational tracheostomy is a safe procedure for critically ill patients in ICU and holds low complications rate.

Keywords: Percutaneous, Tracheostomy, Infection, Bleeding, Complications

How to cite: Saqib M, Kafle A, Rubab U, Hamza M, Jodat A, Saleem J. Percutaneous Tracheostomy in ICU of Lahore General Hospital. A Cross-Sectional Study. *Esculapio - JSIMS* 2023;19(04):487-490.

DOI: <https://doi.org/10.51273/esc23.251319421>

Introduction

Tracheostomy is done to maintain the airway patency and to avoid the complications related to prolonged placement of endo-tracheal tube (ETT).¹ With development of recent advances in intensive care unit (ICU), number of patients with mechanical venti-

lation has increased, along with number of tracheostomies. Around 7% of patients who require mechanical ventilation require tracheostomy. Most common cause of tracheostomy is acute respiratory failure. Some of the other causes are: obstructed upper airway, anticipated prolong need of mechanical ventilation, failure of intubation and major traumas. Increasing number of tracheostomies is a potential economic burden for the health care system and cost effective method for tracheostomy should be evaluated and applied.²

Surgical tracheostomy (ST) and percutaneous dilatational tracheostomy (PDT) are two commonly practiced methods. ST are generally performed by surgical team in operating theater. In this method pretracheal tissue is dissected and tracheostomy tube is inserted inside trachea under direct vision.³ In PDT pretracheal tissue

1. Department of Anesthesia, Critical Care and Pain Management, Lahore general hospital, Lahore, Pakistan
2. Department of Obstetrics and Gynecology, Lahore General Hospital, Lahore, Pakistan
3. Department of Pediatrics Surgery, Mayo Hospital, Lahore, Pakistan
4. Medical officer, Rural Health Center, Ghaziabad, Chichawatni
5. Medical Officer, National Defence Hospital, Lahore, Pakistan

Correspondence:

Muhammad Saqib, Department of Anesthesia and Intensive Care, Lahore General Hospital, Lahore, Pakistan ; Email: saqibresearch2022@gmail.com

Submission Date: 28-08-2023
1st Revision Date: 15-09-2023
Acceptance Date: 10-12-2023

is bluntly dissected with commercially available kits and tracheostomy tube is inserted in trachea using seldinger's technique. This methods are generally performed bedside in ICU by intensivist.⁴

Along with indications there are some contraindications for performing tracheostomy. Unstable patients, infection on the site of surgery, bleeding diatheses are some of them.⁵ Early complication of tracheostomy includes bleeding, pneumothorax, hypoxia, subcutaneous emphysema, posterior tracheal wall puncture. Late complications includes surgical site infection, tracheal erosion to nearby structure, tracheal stenosis, dysphagia and hoarseness of voice.^{6,7} Performing percutaneous tracheostomy need expertise and complications rate also differs among ICU's. Still majority of tracheostomies are performed by ENT surgeon in the operating room. Percutaneous tracheostomy is being recently performed in our hospital, we need to identify the incidence of possible complications to reduce morbidity and mortality. So, with this study we want to evaluate the safety of percutaneous tracheostomy in our ICU with available resource and expertise.

Materials and Methods

This cross-sectional study was conducted over 2 year's duration, starting from July, 2019 to June, 202 in surgical ICU of Lahore general hospital, Lahore, Pakistan. Permission from institutional ethical committee (IRB no: 00/077/2019) was taken prior conduction of this study. Proper written consent was taken from the immediate guardian or caregiver of patients.

Patients aged > 18 years, intubated and expected the need of prolonged mechanical ventilation were included. Those patients with deformities of anterior neck, who had previously undergone tracheostomy, patients having bleeding disorder, patients with platelets less than 75000/ml and having INR ≥ 1.5 were excluded.

All the tracheostomy were performed at bedside by intensivist. It was performed using Smiths medical protex commercial tracheostomy set. Before the procedure, patients were sedated and paralyzed with propofol and atracurium. Nalbuphine 0.1mg/kg was given for analgesia. Patients were made to lie on supine position with neck extended. Endo-tracheal tube was repositioned slight upward from the site of tracheostomy to be performed. Following all aseptic measures needle was inserted between 1st and 2nd tracheal ring which was confirmed with bronchoscope. Serial dilatation was made using dilators to widened stoma. Tracheostomy tube was

inserted and fixed with suture and silicon band. After tracheostomy patients were attached with ventilator and routine treatments were provided.

Patients data including age, sex, weight, diagnosis, procedure time, complications like: intraprocedural bleed, pneumothorax, subcutaneous emphysema, mortality up to 7 days and infection of stoma were recorded. Bleeding from 30ml-100 ml was considered as mild, 100ml-250ml as moderate and greater than 250ml as severe. Any pus discharge or erytherama > 1cm around the stoma was considered as stomal infection. All data were analyzed using SPSS ver.23.

Results

Total 72, percutaneous dilatational tracheostomy (PDT) were performed during this time period. Out of 72 patients, 42 (58.3%) were male and 30 (41.7%) were females. Minimum age of patient was 19 years and maximum was 74 years. Mean age of patients was 46.20 ± 13.24 years. Acute respiratory distress syndrome (ARDS) was the most common diagnosis at the time of tracheostomy comprising 28 (38.9%) and trauma was second commonest diagnosis 17(23.6%). Mean procedure time from skin incision to placement of

Table 1: Patients characteristics

	Male (n, %)	42	58.3%
Female (n,%)		30	41.7%
Age (mean ± SD)		46.20 ± 13.24 years	
Procedure time (mean±SD)		17.26 ± 2.71 minutes	
Diagnosis			
Acute respiratory distress syndrome (ARDS) (n,%)		28	38.9%
Guillain barre syndrome (GBS) (n,%)		8	11.1%
Trauma (n,%)		17	23.6%
Meningio-encephlitis (n,%)		4	5.6%
Others (n,%)		15	20.8%

Table 2: Observations related to tracheostomy (N= 72)

		Numbers	Percentage
Blood loss	Mild (up to 100) ml	68	94.4 %
	Moderate (100-250) ml	3	4.2 %
	Severe (>250ml)	1	1.4 %
Pneumothorax		1	1.4 %
Surgical emphysema		0	0 %
Infection		4	5.6 %
7 days mortality (not related to PDT)		17	23.6 %

tracheostomy tube was 17.26 ± 2.71 minutes.

Out of 72 patients, moderate bleeding was observed in

3 (4.2%) and severe bleed was seen in 1 (1.4%) of patients. No patients developed surgical emphysema, but unfortunately one patient developed pneumothorax after tracheostomy. Infection of the stoma was noticed in 4 patients, which was 5.6 % of total patients who underwent PDT. Seventeen patients died within 7 day of tracheostomy. Death of the patients was due to other complications, not due to tracheostomy.

Discussion

Our study was conducted to look the safety of percutaneous tracheostomy performed by intensivist in intensive care unit. Many studies are conducted in this topic and investigators are sharing their experiences from many countries. They are evaluating the safety of the procedure in different population.^{8,9} We found that percutaneous tracheostomy is a safe procedure when done by an intensivist in ICU among critically ill patients. Only one patient (1.4%), had bleeding which was greater than 250 ml. Bleeding was manageable and not life threatening. Incidence of pneumothorax was also observed in one patient, which was managed with chest tube insertion. Four patients 95 (5.6%) of patients had infection at the site of surgical tracheostomy which was not severe and managed with local dressing and antibiotics. Mean time for the procedure time was around 17.26 ± 2.71 minutes.

Similar articles also observed low complication rates in percutaneous tracheostomy, is less expensive and needs less time to perform. It is generally performed by an intensivist inside ICU, so risk of transferring the critically ill patients to operating room can be nullified⁽⁹⁻¹¹⁾. Study by Vipin et.al. found similar incidence of bleeding among 4% of patients who underwent percutaneous tracheostomy.¹² Incidence of bleeding was 2.4 % in another study.¹³ Another study found slight higher percentage of bleeding ranges from 7.8% of the patients undergone PDT which was higher than that of our findings.¹⁴ The difference in bleeding may be due to difference in expertise and equipment's used. In an observational cohort study, patients who had PDT had low incidence of complications which were bleeding 0.8%, pneumothorax 0.8% and mortality of 13.7%, which were comparable to our results.¹⁵ Time taken from the skin incision to placement of tube was 17.26 ± 2.71 minutes, which was comparatively higher than the other literature findings.¹⁶ It may be due to expertise of

performer and procedural delay. Study by Silvester et.al found rate of infection in PDT to be 4.44% which was similar to our findings 5.6%.¹⁷ Mortality within 7 days from the date of procedure was 23.6 %. Mortality was due to various other reasons and was not related to tracheostomy procedure.

On the basis of findings of our study along with other similar studies, we could say that PDT is safe procedure and holds low complications. It could be beneficial to those patients who are not in the to transfer to operating room from ICU for surgical tracheostomy. This study had small sample size and results are the outcome of only one center. So, more similar studies should be conducted in other ICUs of Pakistan to draw generalized opinion.

Conclusion

With the findings of our study and evidence of literature, we could conclude that performing percutaneous dilatational tracheostomy at bedside by an intensivist is a safe procedure.

Conflict of Interest

None

Funding Source

None

References

1. Lewith H, Athanassoglou V. Update on management of tracheostomy. *BJA education*. 2019;19(11):370-6.
2. Yang A, Gray ML, McKee S, Kidwai SM, Doucette J, Sobotka S, et al. Percutaneous versus surgical tracheostomy: timing, outcomes, and charges. *The Laryngoscope*. 2018;128(12):2844-51.
3. Wahla AS, Mallat J, Zoumot Z, Shafiq I, De Oliveira B, Uzbek M, et al. Complications of surgical and percutaneous tracheostomies, and factors leading to decannulation success in a unique Middle Eastern population. 2020;15(7):e0236093.
4. Khaja M, Haider A, Alapati A, Qureshi ZA, Yapor LJC. Percutaneous tracheostomy: A bedside procedure. 2022; 14(4).
5. Lee M, Wilson H. Complications of tracheostomy. *Shanghai Chest*. 2021;5:42.
6. Bathula SS, Srikantha L, Patrick T, Stern NA. Immediate postoperative complications in adult tracheostomy. *Cureus*. 2020;12(12).

7. Woods L, Lobe TE, Russell JJPSD, Management. Tracheostomy. 2023;373-83.
8. Khawaja Kamal Nasir KKN, Faraz Mansoor FM, Shahzad Hussain Waqar SHW, Shahab Zahid Ahmed Khan SZAK, Rakhshanda Jabeen RJ. Percutaneous dilatational tracheostomy: A prospective analysis among ICU patients. *Journal of Rawalpindi Medical College*. 2020;24(1).
9. Ali Naqvi SM, Bashir MJ, Hussain M, Rao H. PERCUTANEOUS Dilatational Tracheostomy: A Prospective Analysis About The Safety Of Procedure Among Icu Patients. *JPMI: Journal of Postgraduate Medical Institute*. 2017; 31(1).
10. Suzuki Y, Suzuki T, Yamamoto Y, Teshigawara A, Okuda J, Suhara T, et al. Evaluation of the Safety of Percutaneous Dilatational Tracheostomy Compared with Surgical Tracheostomy in the Intensive Care Unit. *Critical Care Research and Practice*. 2019;2019:2054846.
11. Shin H-I, Jang K-I, Kim K-M, Nam I-C. Comparison of Surgical Tracheostomy and Percutaneous Dilatational Tracheostomy in Intensive Care Unit Patients. *kJorl*. 2019;62(5):288-93.
12. Gupta VK, Malhotra A, Mamik HK, Latawa A, Kalra G, Gupta S. Percutaneous Dilatational Tracheostomy: Experience of 100 Cases at a Tertiary Care Centre. *Indian Journal of Surgery*. 2021;83:91-5.
13. Takhar A, Tornari C, Amin N, Wyncoll D, Tricklebank S, Arora A, et al. Safety and outcomes of percutaneous tracheostomy in coronavirus disease 2019 pneumonitis patients requiring prolonged mechanical ventilation. *The Journal of Laryngology & Otology*. 2020; 134(11): 961-70.
14. Öncül S, Yılmaz M, Gaygusuz EA, Oysu DA, Esen O, Şimşek T, et al. Our experience in percutaneous tracheostomy which performed by Griggs method: 38 cases. 2014;3(2):1-4.
15. Rovira A, Tricklebank S, Surda P, Whebell S, Zhang J, Takhar A, et al. Open versus percutaneous tracheostomy in COVID-19: a multicentre comparison and recommendation for future resource utilisation. *European archives of oto-rhino-laryngology: official journal of the European Federation of Oto-Rhino-Laryngological Societies (EUFOS) : affiliated with the German Society for Oto-Rhino-Laryngology - Head and Neck Surgery*. 2021; 278(6):2107-14.
16. Gupta S, Tomar DS, Dixit S, Zirpe K, Choudhry D, Govil D, et al. Dilatational Percutaneous vs Surgical Tracheostomy in Intensive Care Unit: A Practice Pattern Observational Multicenter Study (DISSECT). *Indian journal of critical care medicine: peer-reviewed, official publication of Indian Society of Critical Care Medicine*. 2020;24(7):514-26.
17. Silvester W, Goldsmith D, Uchino S, Bellomo R, Knight S, Seevanayagam S, et al. Percutaneous versus surgical tracheostomy: A randomized controlled study with long-term follow-up*. *Critical Care Medicine*. 2006;34(8).

Authors Contribution

MS: Conceptualization of Project

UR: Data Collection

AK: Literature Search

AJ: Statistical Analysis

AJ, MH: Drafting, Revision

MH: Writing of Manuscript