

EVALUATION OF THE INDICATIONS AND OUTCOMES OF TRACHEOSTOMY DONE IN ICU: A CLINICO-OBSERVATION STUDY

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Date of submission: 10 July 2021

Date of Acceptance: 02 August 2021

Date of publication: 21 August 2021

Type of study: Original Research Paper

Conflicts of Interest: Nil

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ABSTRACT

Background:One of the safe procedures routinely carried out in ICU is Tracheostomy. However, it has been associated with various complications that can be life-threatening including hypoxia, stoma infection, incision site bleeding, hemothorax, pneumothorax, injury to structures near the trachea, and cardiac arrest was seen intra and postoperatively.

Aim: The present study was conducted to evaluate different underlying disease aspects of outcomes and indications of tracheostomy done in the ICU (intensive care unit).

Methods: The present cross-sectional study was conducted on 120 subjects admitted to ICU where elective open tracheostomy was done for various indications. For all the subjects, detailed demographics including gender and age were assessed along with detailed history concerning complications, timings, tracheostomy indication, and prolonged intubation causes were recorded and assessed for results formation.

Results: The most common indication of tracheostomy was head injury with RTA (road traffic accident) as seen in 25.83% (n=31) study subjects followed by Postoperative intra-cranial space-occupying lesion (ICSOL) in 24.16% (n=29) study subjects, Guillain-Barre syndrome in 20.83% (n=25) subjects, cardiovascular accident in 10.83% (n=13) study subjects, RTA with injury to the spinal cord in 6.66% (n=8) subjects, maxillofacial trauma, and postoperative pneumonia in 5.83% (n=7) study subjects. Concerning the complications of tracheostomy as assessed in the study subjects, it was seen that the most common complication seen in the study subjects was surgical emphysema which was seen in 5.83% (n=7) of study subjects. Another complication seen was hemorrhage as seen in 4.16% (n=5) of study subjects. Also, tube displacement was seen in 3.33% (n=4) study subjects, and wound infection was seen in 3.33% (n=4) study subjects among the total of 120 study subjects

Conclusion: The present study concluded that tracheostomy performed in the ICU is a safe and vital procedure in cases with prolonged endotracheal intubation needed for different underlying causes.

Keywords: Endotracheal intubation, Intensive care unit, intubation, Tracheostomy.

INTRODUCTION

Tracheostomy is a procedure where a stoma is created at the skin surface leading to the trachea. Tracheostomy was first performed in ancient Egypt and is also mentioned in medical texts of ancient times including Rig Veda of 2000 to 1000 BC. Tracheostomy procedure is done in nearly 25% of the subjects admitted to ICU (intensive care unit). It has various advantages over endotracheal intubation conducted in ICU including upper airway and larynx protection caused by the prolonged endotracheal intubation that can lead to tracheal stenosis, reduced pneumonia incidence caused by the ventilator, reduced hospital stays, reduced ICU stay, less need for sedation, earlier weaning, and better patient comfort.¹

The main indications of tracheostomy are upper airway obstruction, brain injury, poor cardio-respiratory reserve, and chronic/acute neuromuscular diseases. The tracheostomy timings differ for all mentioned indications and are only considered only in cases where, in prolonged cases, extubation is not done in 21 days. However, in a few cases, with low GCS (Glasgow coma score, severe head injury, and multi-trauma, tracheostomy is advocated early within 3-4 days. It is considered a vital and safe procedure to be performed in ICU. However, it has been associated with various complications that can be life-threatening including hypoxia, stoma infection, incision site bleeding, hemothorax, pneumothorax, injury to structures near the trachea, and cardiac arrest was seen intra and postoperatively.²

Tracheostomy techniques include percutaneous dilatational tracheostomy (PDT) and open surgical techniques which are done routinely. Percutaneous dilatational tracheostomy (PDT) is favored recently to be performed in the ICU owing to various associated advantages over conventional open surgical methods, still, it is not performed routinely. Owing to the speech issues and cosmetic concerns, the families of various critically ill subjects are hesitant for giving consent to perform a tracheostomy on the subjects needing it.³

Recently, the majority of airway concerns are treated with the percutaneous endoscopically guided tracheostomy or endotracheal intubation. However, percutaneous endoscopically guided tracheostomy is not routinely performed in various countries where still conventional tracheostomy is been widely done in the ICU, especially in developing countries like India.⁴ Hence, the present study was conducted to evaluate different underlying disease aspects of outcomes and indications of tracheostomy done in the ICU (intensive care unit).

MATERIALS AND METHODS

The present cross-sectional study was conducted to evaluate different underlying disease aspects of outcomes and indications of tracheostomy done in the ICU (intensive care unit). The study was conducted at ACSR Government Medical College and Hospital, Nellore, Andhra Pradesh. The study population was comprised of the subjects admitted to the ICU of the Institute.

The inclusion criteria for the study were subjects who underwent tracheostomy in the ICU of the institute, subjects with a preoperative and planned tracheostomy, subjects having postoperative ICU stay, and subjects that were already intubated in the ICU, and subjects requiring prolonged intubation. The exclusion criteria for the study were subjects where tracheostomy was done at some other place, subjects that did not come for follow-up, and subjects who were not willing to participate in the study. After explaining the detailed study design, informed consent was taken from all the study subjects.

After final inclusion, detailed history was recorded for all the study subjects followed by the general examination. The study included a total of 120 subjects from both genders who underwent open tracheostomy in the ICU owing to the various indications. The data recorded for all the subjects were demographics including gender and age, clinical history concerning prolonged intubation cause, tracheostomy indication, timings, and tracheostomy complications.

The collected data were subjected to the statistical evaluation using SPSS software version 21 (Chicago, IL, USA) and one-way ANOVA and t-test for results formulation. The data were expressed in percentage and number, and mean and standard deviation. The level of significance was kept at $p < 0.05$.

RESULTS

The present cross-sectional study was conducted to evaluate different underlying disease aspects of outcomes and indications of tracheostomy done in the ICU (intensive care unit). The study included a total of 120 subjects from both genders who underwent open tracheostomy in the ICU owing to the various indications. The demographic characteristics of the study subjects are listed in Table 1. The mean age of the study subjects was 34.6 ± 6.48 years and the age range was 16-68 years. Majority of the study subjects were in the age range of 21-30 years with 30.83% (n=37) study subjects followed by 41-50 years with 22.5% (n=27) subjects, 20.83% (n=25) subjects in the age of >60 years, 18.33% (n=22) subjects in the age range of 31-40 years, 14.16% (n=17) subjects in the age range of 51-60 years, and 8.33% (n=10) subjects in the age of <20 years. There were 68.33% (n=82) males and 31.66% (n=38) females in the present study (Table 1).

Characteristics	Percentage (%)	Number (n=120)
Mean age (years)	34.6±6.48	
Age range (years)		
<20	8.33	10
21-30	30.83	37
31-40	18.33	22
41-50	22.5	27
51-60	14.16	17
>60	20.83	25
Gender		
Males	68.33	82
Females	31.66	38

Table 1: Demographic characteristics of the study subjects

On assessing the indications of tracheostomy in the study subjects, it was seen that the most common indication of tracheostomy was head injury with RTA (road traffic accident) as seen in 25.83% (n=31) study subjects followed by Postoperative intra-cranial space-occupying lesion (ICSOL) in 24.16% (n=29) study subjects, Guillain-Barre syndrome in 20.83% (n=25) subjects, cardiovascular accident in 10.83% (n=13) study subjects, RTA with injury to the spinal cord in 6.66% (n=8) subjects, maxillofacial trauma and postoperative pneumonia in 5.83% (n=7) study subjects each as shown in Table 2.

Tracheostomy indications	Percentage (%)	Number (n=120)
Post-operative pneumonia	5.83	7
RTA with injury to the spinal cord	6.66	8
Maxillofacial trauma	5.83	7
Cardiovascular accident	10.8	13
Guillain-Barre syndrome	20.83	25
Postoperative intra-cranial space-occupying lesion (ICSOL)	24.16	29
Head injury with RTA	25.83	31

Table 2: Indications of Tracheostomy in the study subjects

Concerning the complications of tracheostomy as assessed in the study subjects, it was seen that the most common complication seen in the study subjects was surgical emphysema which was seen in 5.83% (n=7) of study subjects. Another complication seen was hemorrhage as seen in 4.16% (n=5) of study subjects. Also, tube displacement was seen in 3.33% (n=4) study subjects, and wound infection was seen in 3.33% (n=4) study subjects among the total of 120 study subjects as depicted in Table 3.

Complications	Percentage (%)	Number (n=120)
Wound infection	3.33	4
Tube displacement	3.33	4
Hemorrhage	4.16	5
Surgical emphysema	5.83	7

Table 3: Tracheostomy complications seen in the study subjects

DISCUSSION

The present cross-sectional study was conducted to evaluate different underlying disease aspects of outcomes and indications of tracheostomy done in the ICU (intensive care unit). The study included a total of 120 subjects from both genders who underwent open tracheostomy in the ICU owing to the various indications. The mean age of the study subjects was 34.6 ± 6.48 years and the age range was 16-68 years. Majority of the study subjects were in the age range of 21-30 years with 30.83% (n=37) study subjects followed by 41-50 years with 22.5% (n=27) subjects, 20.83% (n=25) subjects in the age of >60 years, 18.33% (n=22) subjects in the age range of 31-40 years, 14.16% (n=17) subjects in the age range of 51-60 years, and 8.33% (n=10) subjects in the age of <20 years. There were 68.33% (n=82) males and 31.66% (n=38) females in the present study. These demographics were comparable to the studies of Chowdhury AA et al⁵ in 2008 and Manuel L et al⁶ in 2010 where authors assessed subjects with comparable demographics as in the present study.

Concerning the assessment of the indications of tracheostomy in the study subjects, it was seen that the most common indication of tracheostomy was head injury with RTA (road traffic accident) as seen in 25.83% (n=31) study subjects followed by Postoperative intra-cranial space-occupying lesion (ICSOL) in 24.16% (n=29) study subjects, Guillain-Barre syndrome in 20.83% (n=25) subjects, cardiovascular accident in 10.83% (n=13) study subjects, RTA with injury to the spinal cord in 6.66% (n=8) subjects, maxillofacial trauma, and postoperative pneumonia in 5.83% (n=7) study subjects each. These results were consistent with the findings of Ashwin MA et al⁷ in 2017 and Mohmud M et al⁸ in 2015 where authors reported the indications of tracheostomy similar to the present study.

On assessing the complications of tracheostomy as assessed in the study subjects, it was seen that the most common complication seen in the study subjects was surgical emphysema which was seen in 5.83% (n=7) study subjects. Another complication seen was hemorrhage as seen in 4.16% (n=5) of study subjects. Also, tube displacement was seen in 3.33% (n=4) study subjects, and wound infection was seen in 3.33% (n=4) study subjects among the total of 120 study subjects. These results were in agreement with the studies of Perfeito JAJ et al⁹ in 2008 and Shekar CY et al¹⁰ in 2016 where complications similar to the present study were reported by the authors in their studies.

CONCLUSION

Within its limitations, the present study concludes that tracheostomy performed in the ICU is a safe and vital procedure in cases with prolonged endotracheal intubation needed for

different underlying causes. The present study had a few limitations including a small sample size, shorter monitoring period, and geographical area biases. Hence, more longitudinal studies with larger sample size and longer monitoring period will help reach a definitive conclusion.

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