

An Analysis of Indications of Tracheostomy in Medical Intensive Care Unit of a Tertiary Teaching Hospital of Telangana

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Abstract

Background: Tracheostomy is a commonly performed ear, nose and throat procedure in Medical Intensive Care Unit (MICU). The utility of tracheostomy in intensive care units is the subject of debate. The potential advantages of tracheostomy in patients with respiratory obstruction are to be weighed against its risks which are rare but sometimes serious. Even though the indications of tracheostomy are universal, its timing remains a point of controversy.

Aim of the Study: This study aims to analyze the various indications of tracheostomy in MICU and to observe the role of timing the procedure on patient's status and recovery.

Materials and Methods: Seventy-eight patients underwent tracheostomy in MICU of a tertiary teaching hospital; Kakatiya Medical College and Mahatma Gandhi Memorial Hospital, Warangal. The time intervals between admission and tracheostomy and between endotracheal intubation and tracheostomy were noted. Time taken for extubation was recorded. All the patients were monitored for blood pressure, ECG, and pulse oximetry. Propofol 1–2 mg/kg, fentanyl 1–2 mcg/kg, and cisatracurium 0.1 mg/kg were used for induction. Lungs were mechanically ventilated to maintain end-tidal CO₂ tension between 30 and 35mmHg. Isoflurane 1–1.5% in 50% oxygen air was used for maintenance. 1% Xylocaine with 1:100000 concentration of adrenaline as local anaesthesia was used to infiltrate anterior part of neck for Tracheostomy.

Procedure: Conventional tracheostomy was performed in all the patients with a midline incision and tracheostoma making a hole in the anterior wall of the 2nd and 3rd tracheal rings. All the data were analyzed using standard statistical methods. The indications for tracheostomies were recorded.

Observation and Results: Seventy-eight patients of MICU undergoing tracheostomy were included. Surgery was tracheostomy was performed in MICU only. Fifty-four males and 24 females with a male-to-female ratio of 2.25:1 were included in the study. The mean age was 41.65 ± 2.35 years. In 35 patients (44.87%), tracheostomy was performed within 24 h and in 43 patients (55.12%), tracheostomy was performed after 24 h. Among the latter group, 22/43 (51.16%) patients were subjected to tracheostomy between 24 h and 7 days, and the remaining 21/43 (48.83%) patients were subjected to tracheostomy after 7 days.

Conclusions: Irrespective of the etiology of respiratory compromise requiring tracheostomy, the most common indication was prolonged endotracheal intubation, especially after 2 weeks in all cases. There was a statistical significance of longer durations of MICU stay in tracheostomy patients undergoing it after 7 days.

Key words: Endotracheal intubation, Intensive care units, Mechanical ventilation, Tracheostomy

INTRODUCTION

Tracheostomy is a commonly performed ear, nose and throat (ENT) procedure in Medical Intensive Care Unit

(MICU).^[1,2] Tracheostomy is the most common surgical procedure in intensive care units (ICUs) (MICUs).^[1,3] The main four general indications for tracheostomy are upper airway obstruction, requirement of long-term mechanical ventilation, airway protection from aspiration, and respiratory center failure due to head injuries.^[4] Tracheostomies in MICU are usually performed for patients with prolonged mechanical ventilation.^[5] The benefits of tracheostomy include providing stable airway, facilitate pulmonary toilet, decrease the direct laryngeal injury of endotracheal intubation, and improve patient comfort and

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daily living activity such as mobility, speech, and eating.^{16,71} Furthermore, early tracheostomy decreases the ventilator time, the incidence of ventilator-associated pneumonia, length of ICU stay, and overall length of hospital stay.¹⁸ In MICU, patients require tracheostomy for different diseases and reasons. Blockage of endotracheal tube (ET) or tracheal tube blockage is a common airway accident encountered in MICU¹⁹ which is usually due to a large plug of inspissated mucus or a piece of crusted secretion and presents as an airway emergency. In few situations, patients are required to be discharged either to their homes or recovery wards with tracheostomy tube *in situ*. Sometimes, sudden blockage of tracheostomy tube can lead to cardiac arrest and death of the patient. The present study was conducted to analyze the various indications of tracheostomy in MICU and to observe the role of timing the procedure on patient's status and recovery.

Type of Study

This was a cross-sectional prospective analytical study.

Duration of Study

This study was from March 2015 to February 2017.

Institute of Study

This study was conducted at Kakatiya Medical College and Mahatma Gandhi Medical College Hospital, Warangal, Telangana.

MATERIALS AND METHODS

Between March 2015 and February 2017, 78 patients underwent tracheostomy in MICU of a tertiary teaching hospital; Kakatiya Medical College and Mahatma Gandhi Memorial Hospital, Warangal. An ethical committee clearance was obtained before the commencement of the study. An ethical committee cleared consent form was used for the study.

Inclusion Criteria

(1) Patients of all age groups were included. (2) Patients with medical diseases requiring tracheostomy were included. (3) Patients with acute poisoning of different substances were included. (4) Patients who are already intubated for ventilation were also included.

Exclusion Criteria

(1) Patients with surgical indications such as head injury, neck trauma, and motor vehicle accidents were excluded. (2) Those patients who have undergone tracheostomies outside the hospital were excluded. (3) Patients with a history of strangulation were excluded. The time interval between the admission of the patient to MICU and performance of tracheostomy and time interval between endotracheal

intubation and actual performance of tracheostomy were recorded. Furthermore, the time period before actual commencement of the extubation was recorded. All the tracheostomies were performed by the ENT surgeons of the ENT department of the same hospital. Tracheostomy was performed in the MICU only without shifting the patient to operation theater. All the patients were monitored with a non-invasive blood pressure monitoring, ECG leads, and pulse oximetry. Anesthesia was induced with propofol 1–2 mg/kg, fentanyl 1–2 mg/kg, and cisatracurium 0.1 mg/kg. Then, the lungs were mechanically ventilated to maintain end-tidal CO₂ tension between 30 and 35 mmHg. Anesthesia was maintained with isoflurane 1–1.5% in 50% oxygen air. A local infiltration of anterior part of the neck with 1% xylocaine with 1:100000 concentration of adrenaline was used by the ENT surgeons who performed all the tracheostomies. At the end of the procedure, the surgeon introduced the tracheostomy tube with gradual withdrawal of the ET. Then, the patients were reassessed and connected to the mechanical ventilator. In the MICU, the immediate post-operative priorities of care for a patient with a new tracheostomy to avoid extubation or immediate blockage by blood clots or mucus plugs. The patency of the tracheostomy tube was checked at regular intervals.

Procedure

Conventional tracheostomy was performed in all the patients with a midline incision and tracheostoma making a hole in the anterior wall of the 2nd and 3rd tracheal rings. All the data were analyzed using standard statistical methods.

OBSERVATION AND RESULTS

In this prospective cross-sectional analytical study, 78 patients of MICU who were subjected to tracheostomy were included. In all the patients, conventional tracheostomy was performed in MICU only without shifting them to an operation theater. There were 54 males and 24 females with a male-to-female ratio of 2.25:1. The youngest patient was aged 27 years and the eldest patient was 73 years with a mean age of 41.65 ± 2.35 years. In 35 patients (44.87%), tracheostomy was performed within 24 h and in 43 patients (55.12%), tracheostomy was performed after 24 h. Among the latter group, 22/43 (51.16%) patients were subjected to tracheostomy between 24 h and 7 days, and the remaining 21/43 (48.83%) patients were subjected to tracheostomy after 7 days [Table 1].

During the period, following tracheostomy surgical emphysema was seen in 11/78 (%) patients which was attributed to small tracheostomy tube size and resolved spontaneously. Accidental extrusion of tube was seen in 8/78 (%) patients. Wound infection was seen in 10/78 (%) patients. Difficulty in

decannulation was observed in 6 (7.69%) patients. Subglottic stenosis was seen in 4 (5.12%) and tracheal stenosis was seen in 3 (3.84%) of the patients. Lower respiratory infection was observed in 7 (8.97%) patients [Table 2].

The duration between endotracheal intubation and tracheostomy in patients who underwent the procedure after 7 days was 8–25 days with a mean of 14.3 ± 9.20 days. The total stay in the MICU ranged between 4 and 68 days with a mean of 9 ± 4.75 days for patients undergoing tracheostomy within 7 days and 22.35 ± 4.15 days in patients who have undergone tracheostomy after 7 days. There was a statistical significance of longer durations of MICU stay in tracheostomy patients undergoing it after 7 days ($t=3.129$ and $P=0.017$) (P significant at <0.05).

DISCUSSION

The present study was conducted to analyze the incidence of different indications of tracheostomy in MICU and

at the same time analyze the prognostic value of early tracheostomy. In chronic respiratory failure, inability to maintain unassisted respiratory function or failed weaning from ventilatory support could be overcome with the help of tracheostomy.^[10] Diaz-Prieto *et al.*^[11] estimated that 2–11% of MICU patients who require mechanical ventilation would receive a tracheostomy (11%). In an exhaustive study by Fischler *et al.*^[12] from Switzerland found that the prevalence of tracheostomy was 10% in the long-term ventilated patients (defined as >24 h) or 1.3% of all patients. Most tracheostomies were performed during the 2nd week of ventilation. Tracheostomies were done by either conventional surgical tracheostomy (69%) or percutaneous procedures (57%). The decision to undertake a tracheostomy was made mostly by the intensivist. The procedure was more often performed in the ICU (65%) than in the operating theater (35%). An overall complication rate of 13% was reported by them. In comparison, the present study results match with the study of Lukas Fischler. The optimal period between oral intubation and tracheostomy differs in different populations and in patients with distinctive comorbid conditions because requirement of long-term mechanical ventilation varies according to the indication.^[10,13] The American intensive care programmers recommend consideration of tracheostomy for patients who require an ET for more than 21 days.^[14] Other benefits of performing tracheostomy at an early opportunity instead of continuing ET orally were to decrease the chances of direct laryngeal injury as well as improved comfort and daily activities of living such as mobility, speech, and eating.^[6] In India, percutaneous tracheostomy is practiced only few centers and conventional tracheostomy is widely used.^[15] Percutaneous dilatational tracheotomy (PDT) is practiced in most of the centers, especially in the developed countries. In a study of ICU tracheostomy in the United Kingdom, PDT is preferred over the surgical technique.^[16] In Italy, it accounted for 89% of cases,^[17] in Germany, 86% of cases,^[11] in Spain, 72% of cases,^[18] and in the Netherlands, 62% of cases.^[19] In the present study, all the tracheostomies were performed by conventional methods without shifting the patient to the operation theater. The results of the present study showed that prolonged endotracheal intubation was the main indication of tracheostomy. The conventional open surgical method performed in the MICU only was practiced in our institutional hospitals. Endotracheal intubation should be converted to tracheostomy as soon as possible to avoid laryngeal trauma and subglottic stenosis. Sudden mucus plug or blood clot blockage of the oral ET could be avoided and frequent tracheobronchial lavage can be undertaken with tracheostomy. The prevalence of complications with tracheostomy is few when compared to oral endotracheal intubation. In the present study, the duration between endotracheal intubation and tracheostomy in patients who underwent the procedure

Table 1: The age incidence, timing of tracheostomy, and its indications (n=78)

Observation	Male – 54	Female – 24
Age		
20–30	11	8
31–40	16	10
41–50	10	8
51–60	8	6
61–70	9	12
Before 24 h – 35	21	14
After 24 h before 7 days – 22	15	7
After 7 days – 21	13	8
Indications – 78		
To facilitate weaning from positive pressure ventilation in acute respiratory failure or prolonged ventilation	10	4
To secure and clear an airway in the upper respiratory tract where obstruction is a risk	13	5
To facilitate the removal of respiratory secretions	20	8
To protect/minimize risk of aspiration in the patient with poor or absent cough reflex	6	4
Diaphragmatic paralysis	5	3

Table 2: Complications observed in the study (n=78)

Complication	Incidence	Percentage
Surgical emphysema	11	14.10
Accidental extrusion of tube	8	10.25
Wound infection	10	12.82
Difficulty in extubation	6	7.69
Subglottic stenosis	4	5.12
Tracheal stenosis	3	3.84
Lower respiratory infection	7	8.97

after 7 days was 8–25 days with a mean of 14.3 ± 9.20 days. The total stay in the MICU ranged between 4 and 68 days with a mean of 9 ± 4.75 days for patients undergoing tracheostomy within 7 days and 22.35 ± 4.15 days in patients who have undergone tracheostomy after 7 days. There was a statistical significance of longer durations of MICU stay in tracheostomy patients undergoing it after 7 days ($t=3.129$ and $P = 0.017$) (P significant at <0.05). Review of literature shows that international surveys report that the most practical timing of tracheostomy was between 7 and 15 days.^[10-17,20] However, certain studies consider early tracheostomy means within 4 days of intubation and late tracheostomy means after 10 days.

CONCLUSIONS

Irrespective of the etiology of respiratory compromise requiring tracheostomy, the most common indication was prolonged endotracheal intubation, especially after 2 weeks in all cases. There was a statistical significance of longer durations of MICU stay in tracheostomy patients undergoing it after 7 days. Although tracheostomy was not associated with early complications, laryngotracheal stenosis was still an unresolved sequel to tracheostomy that needs to be further investigated so it can be prevented.

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