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A COMPARATIVE STUDY OF EARLY AND LATE TRACHEOSTOMY IN PATIENTS ON MECHANICAL VENTILATION IN TERTIARY CARE HOSPITAL

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ABSTRACT:
Background:
Aim of the Study: To determine the optimal timing for performing elective Tracheostomy in intensive care unit (ICU) patients. To evaluate the impact of Tracheostomy on clinical outcomes, particularly in reducing the duration of mechanical ventilation and length of hospital stay. To assess the incidence and nature of both early and late complications associated with the procedure.
Materials: 50 patients on mechanical ventilation for varying period ranging from 7 to 25 days were included in the study. The GCS score, indication for Tracheostomy, complications, mean days for decanulation, factors for failed spigotting, one month follow up, hospital stay and duration of stay in ICU were observed and analysed.
Results: Among the 50 patients 52% were operated within 07 days followed by 34% between 08 and 14 days, 12% between 15 and 21 days in 12%. Majority were males and they over represented the study population. The mean GCS on day 3 data was 07 in all the categories except the patients who had undergone Tracheostomy between 15 and 21 days. In the early Tracheostomy group, majority had indication as prolonged ventilation. But majority from the group undergoing procedure between 15 and 21 days had the indication of respiratory failure.
Conclusions: Tracheostomy can be carried out as soon as the need for a prolonged Mechanical ventilator support is anticipated. Hence by day 6 to 7 if the patient could not be weaned off from the mechanical ventilator support and extubated, based on the daily weaning assessment and patient's clinical diagnosis an early elective surgical Tracheostomy for the purpose of Mechanical ventilator support can be planned which will result in a better clinical utcome of the patient undergoing intensive care treatment.

Introduction:

Tracheostomy is one of the oldest known surgical procedures, with early references found in ancient texts. Historically, it was deemed highly risky until the late 19th century, when advancements in aseptic techniques and anesthesia improved its safety. (1) The modern principles

of the procedure were standardized by Chevalier Jackson in the early 20th century. (2) A tracheotomy refers to creating an opening in the trachea, while a Tracheostomy involves forming a stoma that connects the trachea to the skin surface. In ICUs, Tracheostomy is often performed in patients needing prolonged mechanical ventilation to facilitate weaning and reduce complications linked with extended intubation—such as ventilator-associated pneumonia, tracheal stenosis, and sinusitis. Early Tracheostomy has been associated with several benefits including improved pulmonary function, reduced sedation needs, better oral care, and communication. (3) Numerous studies comparing early versus late Tracheostomy have shown that early intervention often results in shorter durations of mechanical ventilation, ICU stay, and hospital stay, along with lower ICU mortality and complication rates such as pneumonia. (4) However, findings on mortality outcomes and other long-term effects remain mixed, with some studies showing no significant differences. Tracheostomy has been suggested as a means to reduce ICU stay duration, shorten the period of mechanical ventilation, and lower the risk of ventilator-associated pneumonia (VAP). Compared to endotracheal intubation, Tracheostomy is often seen as a more comfortable option for patients, offering a more stable airway and requiring less sedation. Despite these advantages, Tracheostomy can still be associated with complications. (5) Prolonged use may compromise laryngeal defenses, increasing the chance of oro-pharyngeal contamination and raising the risk of VAP. (6) Though Tracheostomy is typically viewed as a life-saving intervention, studies have noted that airway colonization, trachea-bronchitis, and pneumonia can still occur in patients who undergo the procedure. The optimal timing for Tracheostomy remains a subject of ongoing debate in critical care. (7) Traditionally, Tracheostomy performed within 10 days of intubation is classified as early, whereas procedures done after this period are considered late. Early Tracheostomy is linked to several potential benefits, including reduced incidence of VAP, shorter ICU stays, and improved patient comfort. It may be particularly beneficial for patients who, despite requiring limited ventilator support, still need airway protection or pulmonary toileting. Individuals with trauma or neurological conditions such as stroke, head injuries, or spinal cord injuries are examples of patients who may benefit significantly from early intervention. (8) In contrast, late Tracheostomy is sometimes preferred to allow clinicians time to evaluate the potential for extubation, potentially avoiding unnecessary surgery. (9) However, postponing the procedure may increase the risk of complications due to prolonged intubation and extended ventilator dependency. The decision regarding timing is influenced by a range of factors, including disease severity, clinician judgment, hospital resources, established treatment protocols, and patient prognosis. (10) Numerous studies have attempted to compare early versus late Tracheostomy and their effects on clinical outcomes, but the findings remain inconclusive. The present study aims to evaluate these outcomes—specifically focusing on duration of ventilation, ICU stay, complication rates, and mortality—in patients requiring mechanical ventilation. Through this analysis, the study seeks to provide evidence-based recommendations to optimize Tracheostomy timing and enhance decision-making in critical care settings.

MATERIALS

50 patients were included in the study after obtaining the institution ethics committee approval and obtaining appropriate consent from the patients or their attendants. The study period was between September 2022 and August 2024 in the Department of ENT of Mahatma Gandhi Medical College and General Hospital, Warnagal, Telangana. A detailed case sheet was written and appropriate diagnostic methods such as Radiological investigations and Video-laryngoscope evaluation were done and analysed. The proforma contained the details of date of Tracheostomy, Endotracheal intubation prior to the procedure; Indications for Endotracheal intubation and then the Tracheostomy were noted. The day of discharge from the ICU, time taken for weaning and the date of weaning, and from the Hospital and follow up notes were noted. Immediate and intermediate complications Day of Weaning after Tracheostomy, Late complications were also noted. These patients were assessed on various parameters like GCS, Reason for Tracheostomy, total duration of

mechanical ventilation, length of ICU stay, complications associated with Tracheostomy, total duration of hospital stay and follow visit assessment with video Laryngoscope findings by one month and six months after discharge.

Inclusion Criteria: Patients aged above 18 years age of patients, which included male, female and trans-genders were included. Patients on mechanical ventilation with endo-tracheal intubation requiring Tracheostomy depending on the timing of Tracheostomy as below and above 07 days were included.

Exclusion Criteria: Patients of age less than 18 years, uncooperative patients were excluded. Patients not willing to complete treatment were excluded. Patients not willing for the study were excluded. Patients with pre existing laryngeal and tracheal trauma were excluded. Patients with huge neck swellings and soft tissue infection of neck were excluded. Patients requiring emergency were excluded. Patients with anatomical anomalies of the neck that would impair the Tracheostomy procedure were excluded. Patients with previous history of Tracheostomy were excluded.

Groups of Patients: The patients were grouped as Early Tracheostomy where the procedure was done within 07 days after endo-tracheal intubation. Late Tracheostomy group were considered where the procedure was done after one week (≤7 were included) post intubation. Late Tracheostomy group was further sub divided based on the day of Tracheotomy i.e., (8 to 14 days), (15 to 21 days) and (> 21 days) after endo-tracheal intubation. Patients with poor cough, increased upper airway resistance, respiratory weakness masked by pressure support, emergence of any new pathology, copious secretions and poor airway reflexes leading to aspiration were included.

Postoperative Protocol: For the first 4 hours, the cuff was deflated for 5 minutes once per hour, then 5 minutes every fourth hourly for the following 24 hours, after which the cuff may be deflated if not contraindicated. Proper Humidification was provided in the room with suctioning on a necessity and at frequent intervals: The most crucial measures to remember when suctioning are to only do it for 30 to 60 seconds at a time. Suction catheter diameter is one-third or less than one-third of the inner diameter of an adult Tracheostomy tube inserted which not more than 15 cm. Suction pressure should be kept between 8 and 15 mm Hg. The patient is weaned off the ventilator and the decannulation process begins after their overall condition has improved and they meet the following criteria. Stable arterial blood gases, a PaCO2 of less than 60 mmHg, no respiratory distress, haemodynamic stability, the presence of a gag reflex, and the capacity to expectorate are the requirements.

Procedure for Weaning of Tracheostomy: The Portex Tracheostomy tube was replaced with a Fuller's bi-flanged metallic Tracheostomy tube when decanulation was decided. The number of days from Tracheostomy to ICU discharge was then calculated, and the early Tracheostomy group is compared to the late Tracheostomy group.

Spigotting: Spigotting was done for an entire 24 hours after a metallic tube replacement, but if the patient exhibits respiratory distress, it should be withdrawn. Tracheostomy stoma strapping was done when Spigotting was tolerated well. The day of decannulation is noted within two weeks, the stoma wound will heal. From the day of admission until the day of discharge, the average number of days spent in the hospital is determined and compared across two study groups. The patients' immediate outcomes were analysed, and they are subjected to Videolaryngoscopy (VDL) within one month following discharge, with the procedure repeated after six months Thus the final outcome of patients are assessed at the end of 6 months.

STUDY DESIGN: Prospective Observational study

STUDY PERIOD: September 2022 to August 2024 ETHICAL CLEARANCE: Obtained.

Conflict Of Interest**: Nil**

Financial Support: Nil **Inclusion Criteria:**

BENEFIT TO THE COMMUNITY: To emphasize the need of early Tracheostomy for a shorter period of mechanical ventilation and eventually decreased length of ICU and hospital stay.

RESULTS

Among the 50 study participants, majority (52%) had the timing of Tracheostomy ≤7 days followed by 8 – 14 days in 34%, 15 – 21 days in 12%. Only one participant had the timing of Tracheostomy >21 days. The mean age of the study participants was increasing, as the days when the Tracheostomy was done were increasing. There is a dip in the age of the participant for the category of >21 days. The difference found in the mean age was found to be statistically significant. Among the study participants, majority were males and they over represented the study population. But the difference in proportion found was not statistically significant. The mean GCS of the patients has been shown in the **Table 1** which presented the differences found between the mean GCS on day 1 and the Tracheostomy done and on the day 3. In day 3 data he mean was 07 in all the categories except the patients who had undergone Tracheostomy during 15 – 21 days. There was no significant difference between the mean GCS score and the Tracheostomy done in days. **(Table 1)** Re intubation was performed in 11 participants. Out of them, majority of the patients were in the category of ≤7 days and 8 – 14 days. But the difference in proportion was not statistically significant. The mean days of Tracheostomy done for all the 4 groups was mentioned in the **table 1** above. The reason for Tracheostomy was prolonged ventilation in 34 patients followed by respiratory failure in 15 patients. In the early Tracheostomy group, majority had reason as prolonged ventilation. But majority from the group 15 – 21 days had the reason as respiratory failure. But these differences were not statistically significant. Among the study participants, 45 patients had no complications at all. 03 participants had complication of tube block of which 02 were from early group and 01 patient had complication of intra OP bleeding and tube displacement. The association found between the Tracheostomy done in days and the complication was found to be statistically significant. The mean day of weaning after Tracheostomy increases with the increase in the Tracheostomy done in days and the difference found was statistically significant. The mean days of metallic tube change increases with the increase in the Tracheostomy done in days. The difference found between them was statistically significant. The mean days of transfer out of patients increased with the increase in the Tracheostomy done in days and the difference found between them was statistically significant. **(Table 1)**

Observation	**Group ≤ 7 days**	**Group ≥ 7 Days**			**P value**
	Less than 07 days	**08 to 14**	**15 to 21**	**≥ 21 days**	
Total Number	**26- 52%**	**17- 34%**	**06- 12%**	**01- 02%**	**0.002**
Mean Age ; SD	**38.54; 10.99**	**49.12; 12.21**	**57.70; 10.23**	**48; 0**	**0.002**
Gender **Male** **Female**	**21** **05**	**10** **07**	**05** **01**	**00** **01**	**0.144**
Diagnosis **Medical causes** **Neurological** **RTA**	**06** **02** **05** **13**	**06** **02** **07** **02**	**04** **00** **02** **06**	**01** **00** **00** **00**	**0.105**

Toxicology					
Day 1- mean GCS	**07.46; 0.85**	**07.76; 0.43**	**06.83; 1.47**	**07.0;00**	**0.134**
Day 3- mean GCS	**07.23; 1.50**	**07.24; 0.75**	**05.83; 1.83**	**070; 00**	**0.140**
Re-intubation	**04 -08%**	**05- 10%**	**02-04%**	**0-0**	**0.585**
Mean days before Tracheostomy	**04.76**	**09.76**	**16.16**	**22.00**	**0.011**
Reason for Tracheostomy					
Prolonged ventilation	**22**	**10**	**02**	**01**	**0.203**
Respiratory failure	**04**	**07**	**04**	**00**	
Complications					
NIL	**25**	**15**	**05**	**00**	**0.002**
Intra-OP bleeding	**0**	**00**	**01**	**0**	
Tubal block	**01**	**01**	**00**	**01**	
Tube displacement	**0**	**01**	**00**	**00**	
Mean days after Tracheostomy	**04.56; 01.59**	**06.21; 04.22**	**09.25; 04.71**	**15.00;00**	**0.002**
Mean day of change to metallic tube	**15.47; 02.25**	**16.85; 03.46**	**17.50; 04.72**	**6.00; 00**	**0.008**
Mean transfer out days	**09.04; 02.68**	**10.50; 03.71**	**13.25; 04.78**	**17.00; 0**	**0.022**
Mean discharge days	**15.95; 02.21**	**18.57; 3.10**	**21.0; 02.70**	**21.00;0**	**0.001**

Table 1: Showing the Distribution of study participants according to the timing of Tracheostomy, Gender distribution, GCS on day 1, and 3, Re-intubation among the study participants, Reason for Tracheostomy, complications, mean Days of weaning, mean days to change to metallic tube change , and the mean days of transfer out among the study participants (N=50)

The mean days of discharge after Tracheostomy increased with the increase in the Tracheostomy done in days. Also the difference found between the days of discharge and the Tracheostomy done in days was statistically significant. Among the study participants, 38 improved, 4 had complication and 8 expired. The patients who had complication have been equally distributed among all the groups. The association found between the Tracheostomy done in days and the outcome of the patient was found to be statistically significant. While following up the patient for the first time, majority were normal. Sub-glottic stenosis and supra glottic mucosal injury was seen in 2 patients each. The difference found was not statistically significant. In the 2nd follow up of the patients, One (01) patient was found with the sub-glottic stenosis and 4 recovered from the above mentioned complications. The one patient with sub-glottic stenosis was from the early group. But the difference was not statistically significant. The mean duration of stay in hospital increases with the increase in the Tracheostomy done in days except the last group of >21 days. The difference found in the mean days of stay in hospital and the Tracheostomy done in days was statistically significant. **(Table 2)**

Observation	Group ≤ 7 days	Group ≥ 7 Days			P value
	Less than 07 days	08 to 14	15 to 21	≥ 21 days	
Outcome of the study Improved Complication developed Expired	22 01 03	13 01 03	03 01 02	00 01 00	0.020
Follow up for 1 month Normal Sub-glottic stenosis Supra-glottic mucosal injury Tracheal stenosis Expired	 22 01 00 00 03	 11 00 02 01 03	 03 01 00 00 00	 01 00 00 00 00	 0.466
Total mean days spent in the Hospital	18.96	25.05	29.50	22.0	0.007

Table 2: Showed the Outcome among the study participants, Results of follow up of 2 groups and the duration spent in hospital among the study participants (N=50)

DATA ANALYSIS: The collected data were numerically coded and then data were entered using Microsoft Excel version 2016. The data was then exported to Statistical Package for Social Sciences software version 20 for analysis. Descriptive statistics like frequencies and percentages were done to study the baseline demographic characteristics. Continuous data were expressed as mean ± SD. Categorical data were expressed as percentage. ANOVA test was used for normally distributed continuous data. Chi-Square test was used for categorical data. Statistical significance was fixed at P value of <0.05. Microsoft Excel and Microsoft Word were used to obtain various types of graphs.

DISCUSSION

With improvements and advancement in critical care medicine, many patients subsist the initial periods of critical illness, like trauma, acute respiratory failure, extensive surgeries and are in need of prolonged mechanical ventilation. Hence, many patients are requiring Tracheostomy to replace the endo laryngeal intubation in ICU. The present study was done with the objective to define optimum time to carry out elective Tracheostomy, to assess the incidence, indications, timing of the procedure complications and Tracheotomy's impact on patients in intensive care units. To study the effectiveness of Tracheostomy in reducing the duration of mechanical ventilation and hospital stay and to study the complications (early and late) associated with Tracheostomy. The present study has shown that mean age of the study participants was 44.60 ± 12.97 years and majority of the study participants contributing to the study were males. 52%, 34%, 12% and 2% of the study participants had Tracheostomy at ≤7, 8 to 14, 15-21 and >21 days respectively. Majority of the study participants were male participants. 36 male and 14 female participants were present in the study. Similarly in a study done by Sanabria A et al (11), it was shown that majority of the study participants were males, with median age of 59 years. Correspondingly in a study by Mahafza T et al (12) , among the 106 patients, 70% were males with the mean age of 46.5 years. Likewise in a study done by Charra B et al (13), the mean age of the study participants in ICU was 41 years. The present study has shown that the mean GCS on day 1 was 7.46, 7.76, 6.83 and 7.00 among those who had Tracheostomy at ≤7, 8 to 14, 15-21 and >21 days respectively. Similarly the mean GCS on day 3 was 7.23, 7.24, 5.83 and 7.00 among those who had Tracheostomy at ≤7, 8 to 14, 15-21 and >21 days respectively. In a study done by Lanza DC et al (14) did a study to examine the GCS predictive value for Tracheostomy. They stated that in patients with GCS less than or equal to 7, the probability of Tracheostomy is significantly greater. The present study has shown that among those

with medical diagnosis, 35% had early Tracheostomy and 35%, 23% had Tracheostomy at 8 to 14 and 15-21 days respectively. If a patient's ventilation is anticipated to be prolonged, an early Tracheostomy should be performed because it offers the advantages of reducing dead space ventilation, decreasing airway resistance, and reducing breathing effort thus promoting the weaning of mechanical ventilation at the earliest allowing the patient to talk, swallow, and reduce the danger of aspiration, a gentle withdrawal from the ventilator is recommended. Among those with neurological diagnosis, 50% had early Tracheostomy and 50% had Tracheostomy at 8 to 14, 15-21 and >21 days. Among those with RTA 36% had early Tracheostomy and 50% and 14%, had Tracheostomy at 8 to 14, 15-21 days respectively. Among those with Toxicology diagnosis, 87% had early Tracheostomy and 13%, had late Tracheostomy done at 8 to 14 days. Similarly a study done by McWhorter AJ (15) concluded that intoxication was the most common cause for ICU admission. Among those who had Tracheostomy during lesser than or equal to 7 days, majority 85% had prolonged ventilation as a reason. In late Tracheostomy group among those who had Tracheostomy on 8 to 14 days, majority had prolonged ventilation. Among those with Tracheostomy on day 15 to 21, majority had respiratory failure as the reason for Tracheostomy. Among those with Tracheostomy > 21 days prolonged intubation was the reason for Tracheostomy. Similarly in correlation to our study, a study by Mohammad Waheed El- Anwar et al (16) in 2017 observed that prolonged endo-tracheal intubation is the main indication of Tracheostomy being performed. The re-intubation was higher among those who had late Tracheostomy than those with early Tracheostomy. Early Tracheostomy had 15.3 % and late Tracheostomy had 29.16% of re-intubation incidence. Similarly in a study done by Koh WH et al (17), it was shown that the re-intubation rate was approximately 22% in spite of meeting the criteria of weaning. The present study has shown that an immediate and intermediate complication was higher among those patients with late Tracheostomy. The noted common complications were Tracheostomy tube obstruction, Tracheostomy tube displacement and Intra-operative bleeding. A retrospective study done by Hsu CL et al (18), it was shown that the most common immediate complication was moderate bleeding in 6.7% and minor bleeding in 28.2%, followed by subcutaneous emphysema in 1.8% and 2 patients had this with bleeding and Tube obstruction was seen in 1.8%. The present study showed that the day of weaning was earlier among those who had early Tracheostomy than those with late Tracheostomy and they are statistically significant. The mean day of weaning was 5.73, 6.21, 8.00 and 13 days among those who had Tracheostomy at ≤7, 8 to 14, 15-21 and >21 days respectively. Similarly in a study done by Zheng Y et al (19), it was shown that successful weaning (74.1% versus 55.7%) was significantly higher in early Tracheostomy group than in late Tracheostomy group. The present study showed that the day of metallic tube change was earlier among those who had early Tracheostomy than those with late Tracheostomy and they are statistically significant. The mean day of metallic tube change was 15.47, 16.85, 17.5 and 26 among those who had Tracheostomy at ≤7, 8 to 14, 15-21 and >21 days respectively. The day of transfer out from ICU was earlier among those who had early Tracheostomy than those with late Tracheostomy and they are statistically significant. The mean day of transfer out was 9.09, 17.37, 21 and 25 among those who had Tracheostomy at ≤7, 8 to 14, 15-21 and >21 days respectively. The total duration of hospital stay was lower among those who had early Tracheostomy than those with late Tracheostomy and they are statistically significant. The mean duration of hospital stay was 16.77, 18.57, 20.00 and 21 days among those who had Tracheostomy at ≤7, 8 to 14, 15-21 and >21 days respectively. Similarly in a study done by Rumbak MJ et al (20), it was shown that duration of ICU was 4.8 and 16.2 days among the early and late group respectively. A study done by Bickenbach J et al (21), showed that length of ICU stay was significantly lower among the early group. Likewise Jeon YT et al (22), has shown that length of stay in ICU (31.1 versus 19.9) were significantly higher in late Tracheostomy than the early Tracheostomy group. Correspondingly, Mohamed KA et al (23), has shown that the mean ICU length of stay was 21 versus 40.14 among the early and late Tracheostomy group respectively. The mean hospital stay was also lesser among the early than the late group (34.6 versus

55.6). Heffner JE (24) in a study concluded that Early Tracheostomy i.e., done on or before day 7 of MV in ICU patients is associated with earlier ICU discharge, shorter duration of mechanical ventilation, and decreased length of overall hospital stay without affecting mortality. The present study has shown that the improvement was higher among those who had early Tracheostomy. Out of the 8 patients who had died, 3 patients had early Tracheostomy and 5 patients had late Tracheostomy. All the 8 patients had died during ICU admission while on Mechanical ventilator support as a consequence of the underlying illness of the patient that had required ICU admission and the patient' co-morbidities. Similarly a study done by Bouderka MA, Fakhir B, et al in 2012 (25) observed that in-hospital mortality is usually due to the underlying illness rather than the tracheotomy. The major complication seen was glottic injury resulting in sub-glottic and tracheal stenosis, among those had late Tracheostomy after a period of prolonged intubation. The present study based that video laryngoscope findings showed that the complication rate was higher among those who had late Tracheostomy. The incidence of supra-glottic mucosal injury was Nil with the early Tracheostomy group whereas it was noted among the late Tracheostomy and re-intubation patients group. Similarly, Rumbak MJ et al (20) did a prospective randomized study with 120 patients with the objective to assess the outcome in patients with early Tracheostomy when compared to late Tracheostomy. The results showed that the hospital mortality was 31.7% and 61.7% among the early and late group respectively. Similarly in a study done by Bickenbach J et al (21), ICU mortality was higher among the late group than the early and intermediate group (40.7% versus 24.8%). Wheeler AP, Rice TW (26) did a trial among critically ill patients with the aim to compare the early versus late Tracheostomy in the outcome of the patients. The results showed that 30 days all-cause mortality was 30.8% and 31.5% among the early and late Tracheostomy group respectively. 2-year mortality was 51.0% and 53.7% in the early and late Tracheostomy group respectively. The study thereby conveys that the performance of a late Tracheostomy was associated with lengthy weaning periods, increased duration of hospital stay and increased incidence of complications. The early Tracheostomy group had few complications than late Tracheostomy group. Hence Tracheostomy can be done as soon as possible for those who are in need of an anticipated of prolonged mechanical ventilator support. The main limitations of the study are the treating physician's bias and the patient's or their caretaker's consent for undergoing Tracheostomy allied with the pre-existing co- morbidities of patient, which further confound the decisions regarding the exact timing of Tracheostomy.

SUMMARY & CONCLUSION: GCS of less than or equal 7 was observed to be an indicator for patients requiring endo-tracheal intubation and prolonged mechanical ventilation. Re-intubation attempts was observed to be common among those patients who were on prolonged endo-tracheal intubation and had undergone late Tracheostomy i.e., after 07 days of intubation and it was least among the early Tracheostomy group. Sudden de-saturation, tube block excessive tracheal secretions and a deteriorating GCS level were found to be the common causes for repeated re-intubation with endo-tracheal tubes. This in turn provokes airway injury like supra-glottic laryngeal mucosal injury resulting mucosal congestion, supra-glottic stenosis, mucosal ulceration and oedema of epiglottis, glottic injury resulting in intubation granuloma, ulceration, sub-glottic stenosis and tracheal stenosis. Hence the reason for endo-tracheal tube re-intubation should be individualized and staff nurses should be enlightened about the need of frequent trachea-bronchial toileting and maintaining a proper position of the endo-tracheal tube and Tracheostomy tube by properly securing it. In the event of immediate complications intra-operative bleeding has been the single most common complication noted. Tracheostomy tube block, tube displacement have been noted in the post-operative period. This can be avoided by imparting adequate knowledge and skill about the management of the complications. Adequate tube suctioning and proper Tracheostomy stoma care with regular dressing plays a vital role in the prevention of these complications. Patients on prolonged intubation who had undergone late Tracheostomy i.e., after 7

days of intubation were more prone for airway injuries such as supra-glottic mucosal congestion and edema as a consequence of re-intubation attempts. They also ended up in long term complications like tracheal stenosis and sub-glottic stenosis. Cuffed tubes should be of appropriate size and the cuff pressure to be maintained within or at 20 mmHg. There are cuff pressure monitors available (Cuff manometer), which can be suggested to be used routinely in order to avoid these complications. From our study it has been analysed that Tracheostomy performed within 7 days after intubation was associated with shortened duration of mechanical ventilation, reduced duration of ICU admission and hospital stay than those among the late Tracheostomy group. Early Tracheostomy (≤ 7 days) is observed to have resulted in earlier weaning off from the Mechanical Ventilation, a finding suggested by more number of ventilator-free days. The possibility of earlier weaning off from Mechanical ventilation, thereby decreasing the exposure of patients to its associated risks, can be attributed as a prime factor responsible for the lesser complications and long-term survival among the patients undergoing early Tracheostomy. Tracheostomy can be carried out as soon as the need for a prolonged Mechanical ventilator support is anticipated. Hence by day 6 to 7 if the patient could not be weaned off from the mechanical ventilator support and extubated, based on the daily weaning assessment and patient's clinical diagnosis an early elective surgical Tracheostomy for the purpose of Mechanical ventilator support can be planned which will result in a better clinical utcome of the patient undergoing intensive care treatment.

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