Comparison of early and late percutaneous tracheotomies in adult intensive care unit

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KEYWORDS
Percutaneous tracheotomy; Early tracheotomy; Late tracheotomy

Abstract

Background and objectives: Percutaneous tracheotomy has become a good alternative for patients thought to have prolonged intubation in intensive care units. The most important benefits of tracheotomy are early discharge of the patient from the intensive care unit and shortening of the time spent in the hospital. Prolonged endotracheal intubation has complications such as laryngeal damage, vocal cord paralysis, glottic and subglottic stenosis, infection and tracheal damage. The objective of our study was to evaluate potential advantages of early percutaneous tracheotomy over late percutaneous tracheotomy in intensive care unit.

Methods: Percutaneous tracheotomies applied to 158 patients in adult intensive care unit have been analyzed retrospectively. Patients were divided into two groups as early and late tracheotomy according to their endotracheal intubation time before percutaneous tracheotomy. Tracheotomies at the 0–7th days of endotracheal intubation were grouped as early and after the 7th day of endotracheal intubation as late tracheotomies. Patients having infection at the site of tracheotomy, patients with difficult or potential difficult intubation, those under 18 years old, patients with positive end-expiratory pressure above 10 cmH\textsubscript{2}O and those with bleeding diathesis or platelet count under 50,000/dL\textsuperscript{-1} were not included in the study. Durations of mechanical ventilation and intensive care stay were noted.

Results: There was no statistical difference among the demographic data of the patients. Mechanical ventilation time and time spent in intensive care unit in the group with early tracheotomy was shorter and the difference was statistically significant ($p<0.05$).

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Conclusion: Early tracheotomy shortens mechanical ventilation duration and intensive care unit stay. For that reason we suggest early tracheotomy in patients thought to have prolonged intubation.

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Introduction

Tracheotomy is one of the procedures frequently applied in intensive care units (ICUs). The most important advantages of tracheotomy are early discharge from ICU and shortening of the hospital stay of the patient. Tracheotomy is advisable for the patients who are intubated and predicted to have been on mechanical ventilation for a long period of time.\(^1,2\) Prolonged endotracheal intubation has complications including laryngeal damage, vocal cord paralysis, glottic and subglottic stenosis, infection, tracheal damage (tracheomalacia, tracheal dilatation and tracheal stenosis), etc.\(^3,4\)

While surgical tracheotomy was the single alternative until 1969, percutaneous tracheotomy (PT) has been a new alternative after the first half of 80th. Tracheotomy having a lot of advantages is a good alternative for endotracheal intubation in ICUs.\(^5\)

The main concern is when and to which patients apply the tracheotomy. In 1998 a review notified weak proof about the effect of timing of tracheotomy on mechanical ventilation time and preventing the airway damage in critical patients.\(^6\) Some studies show that early tracheotomy shortens mechanical ventilation time, ICU and hospital stay times and results in less damage to the airways.\(^7,8\)

Old references propose tracheotomy to patients thought to be intubated for more than 21 days. But today it is advisable to evaluate the patient between the second and tenth days of intubation and consider tracheotomy for them who will require intubation for more than 14 days. Early tracheotomy is beneficial for some special circumstances such as patients with polytrauma, head trauma and low Glaskow Coma Scale (GCS). Ear Nose Throat specialists also advise early tracheotomy for prevention of laryngeal damage.\(^9\)

We aimed to evaluate the effect of early application of PT in our study and see the advantages, if any, over late PT regarding mechanical ventilator and hospital length of stay of the patient.

Methods

Patients hospitalized in Vakif Gureba Research Hospital Intensive Care Unit between May 2007 and August 2010 who were undergone elective tracheotomy because of prolonged endotracheal intubation were included in the study and were
Table 1  Sex distribution of patients with early and late tracheotomy.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Early tracheotomy n (%)</th>
<th>Late tracheotomy n (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>74 (64.3)</td>
<td>27 (62.8)</td>
<td>0.375</td>
</tr>
<tr>
<td>Female</td>
<td>41 (35.7)</td>
<td>16 (37.2)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>115 (100)</td>
<td>43 (100)</td>
<td></td>
</tr>
</tbody>
</table>

examined retrospectively. Total number of the patients was 158, with the age range of 18–98 years. The First-degree relative of each patient was informed about the procedure and informed consent had been taken from them. Patients were divided into two groups. The patients undergone early tracheotomy (tracheotomy between the 0 and 7th days of endotracheal intubation) named as Group I and those undergone late tracheotomy (tracheotomy after the 7th day of endotracheal intubation) as Group II. Patients with infection on the site of tracheotomy, bleeding diathesis or platelet count less than 50,000·dL⁻¹, those with known or suspected difficult airway, patients under 18 years old and those with PEEP more than 10 cm H₂O were excluded from the study.

Demographic data such as age, sex, body mass and height were noted, as well as ICU hospitalization reason, the day of tracheotomy, average mechanical ventilation time after tracheotomy and total mechanical ventilation duration.

All the patients had been routinely monitored with ECG, NIBP and pulse oximetry. All patients had received propofol 3 mg·kg⁻¹, fentanyl 2 µg·kg⁻¹, midazolam 0.03 mg·kg⁻¹ and vecuronium 0.1 mg·kg⁻¹ iv for sedation. The patients were pre-oxygenized for 15 min and during the procedure with 100% oxygen.

Percutaneous tracheotomy kit (Portex®) tracheotomy canula with internal diameter of 8 mm had been used for the patients of both groups. The site of tracheotomy had been controlled for any haemorrhage, infection, decannulation during the hospital stay.

Statistical analysis was made via SPSS 15.0 program. Kolmogorov–Smirnov test was used for assessment of normal distribution. Regarding the comparison of quantitative data between the groups Independent Samples t-test was used for evaluation of data with normal distribution and Mann Whitney U test for data without normal distribution. Paired Samples t-test was used for evaluation of the data with normal distribution and Wilcoxon test for the data without normal distribution. χ² test was used for comparison of qualitative data. The results in confidence interval of 95% and with p < 0.05 were considered statistically significant.

Results

158 patients were included in the study. 101 of them were males and 57 females. Males and female ratios with

Table 2  Age and BMI distribution of tracheotomies.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Early tracheotomy</th>
<th>Late tracheotomy</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>Mean 59.591</td>
<td>62.628</td>
<td>0.375</td>
</tr>
<tr>
<td>BMI (kg·m⁻²)</td>
<td>Mean 29.174</td>
<td>28.279</td>
<td>0.395</td>
</tr>
</tbody>
</table>

Table 3  Distribution of tracheotomy according to ICU acceptance indication.

<table>
<thead>
<tr>
<th>ICU acceptance indication</th>
<th>Early tracheotomy n (%)</th>
<th>Late tracheotomy n (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerebrovascular accident</td>
<td>41 (35.7)</td>
<td>16 (37.2)</td>
<td>0.827</td>
</tr>
<tr>
<td>Cardiac pathology</td>
<td>21 (18.3)</td>
<td>8 (18.6)</td>
<td></td>
</tr>
<tr>
<td>Pulmonary pathology</td>
<td>28 (24.3)</td>
<td>9 (20.9)</td>
<td></td>
</tr>
<tr>
<td>Sepsis</td>
<td>15 (13.0)</td>
<td>4 (9.3)</td>
<td></td>
</tr>
<tr>
<td>Trauma</td>
<td>7 (6.1)</td>
<td>3 (7.0)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>3 (2.6)</td>
<td>3 (7.0)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4  Mechanical ventilation time and ICU stay duration after early and late tracheotomy.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Early tracheotomy</th>
<th>Late tracheotomy</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total mechanical ventilation duration (days)</td>
<td>11.27 (13.122)</td>
<td>16.40 (16.377)</td>
<td>0.043*</td>
</tr>
<tr>
<td>ICU stay duration (days)</td>
<td>17.38 (14.561)</td>
<td>30.95 (19.166)</td>
<td>&lt;0.001*</td>
</tr>
</tbody>
</table>

* p < 0.05.
Early and late percutaneous tracheotomies in adult ICU

...have displayed complication rates for percutaneous and surgical tracheotomies as 12% and 42% respectively. As a result of these data PT has gradually become more preferable method. Compared with surgical tracheotomy, PT reduces expenditure because of shortening of time spent in operation room and sparing operation room crew need.

Conclusions

Early PT shortens mechanical ventilation duration time and ICU length of stay.

Conflicts of interest

The authors declare no conflicts of interest.

References

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