Predictive Factors for Decannulation and In-Hospital Mortality following Open Bedside Tracheotomy

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Abstract

Objectives: To determine predictive factors for decannulation and in-hospital mortality following open bedside tracheotomy.

Study Design: Retrospective chart review of 218 patients who underwent open bedside tracheotomy between January 2005 and April 2011. Perioperative variables including demographics, comorbidities, laboratory values, and time to tracheotomy were collected and analyzed in relation to the endpoints of in-hospital mortality and time to decannulation.

Results: The decannulation rate was 26.1%. In-hospital mortality was 24.2% and unrelated to the tracheotomy in all cases. Decannulation rate was significantly decreased in the presence of cardiac, respiratory or oncologic comorbidities. The admitting diagnosis and laboratory values were not predictive of decannulation.

Conclusions: Comorbidities had a significant impact on in-hospital mortality and eventual decannulation rates and should be considered in development of algorithms for tracheotomy.

Introduction

Tracheotomy requires individualized clinical decision-making. Although many clinical trials have investigated the timing and indications for tracheotomy few have had sufficient power to reach substantial conclusions.

Open bedside tracheotomy (OBT) procedures are carried out in the Intensive Care Unit (ICU) setting as a safe and cost effective alternative to the operating room (OR) [1,2].

Despite these savings, OBT does have a significant cost and most of the patients are critically ill with poor prognoses and extended ICU stays. The objective of this study is to determine predictive factors for post-operative outcomes.

Methods & Materials

The medical charts of all patients who underwent tracheotomy at the Cleveland Clinic by the otolaryngology service from January 2005 until April 2011 were reviewed. Only the patients who had an OBT and were above the age of 18 were included. Patients with upper aerodigestive tract malignancy were excluded.

Of the 330 charts reviewed, 218 patients qualified for inclusion. The charts were reviewed for admitting diagnosis, a variety of laboratory values and the presence of an extensive list of co-morbidities divided by system. The central nervous system 1 category (CNS1) encompassed vascular pathology of the CNS, most commonly stroke. The patients in the gastrointestinal group had complications following general surgery.

Results

218 patient were included in the study, of which 50% were male. The mean age was 67 years (range 22-91). The most common admitting diagnoses were gastrointestinal and CNS1 which comprised 25.6% and 23.8% of the patients respectively (table 1).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>67</td>
<td>71</td>
<td>14</td>
</tr>
<tr>
<td>Fraction Male</td>
<td>0.8</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Hospital Length of stay (days)</td>
<td>36.3</td>
<td>30</td>
<td>21.2</td>
</tr>
<tr>
<td>Albumin g/dl</td>
<td>2.36</td>
<td>2.3</td>
<td>0.54</td>
</tr>
<tr>
<td>BMI</td>
<td>29.31</td>
<td>27.68</td>
<td>9.41</td>
</tr>
<tr>
<td>BUN mg/dl</td>
<td>43.9</td>
<td>34</td>
<td>29.1</td>
</tr>
<tr>
<td>Creatinine mg/dl</td>
<td>1.44</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Average number of Cardiac comorbidities per person</td>
<td>0.97</td>
<td>1</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Inpatient mortality: Inpatient mortality was 24%, with a mean age at expiration of 70 years. The cardiac comorbidity count and the presence of renal, gastrointestinal and oncologic comorbidities were found to significantly correlate with inpatient mortality.

Decannulation rate: The decannulation rate was 26.1%, with a mean patient age at decannulation of 61 years. The odds of decannulation decreased with increasing cardiac comorbidity count. Patients without pulmonary or oncologic comorbidities were, respectively 2.4 and 3.1 times more likely to be decannulated.

Discussion

ICU medical expenditures account for a significant portion of US medical expenses [3-5]. With an aging population, the number of ICU admissions and people who are mechanically ventilated is expected to increase; as will presumably the number of patients undergoing tracheotomy. Therefore, physicians will face an increased number of challenging decisions regarding tracheotomy.

Inpatient mortality was 24%. None of these deaths were procedure-related. The presence of an existing or prior malignancy was most strongly associated with inpatient mortality. The most common malignancies were colon cancer, breast cancer and prostate cancer.

The decannulation rate was only 26%. Impaired pulmonary function was associated with a decreased likelihood of decannulation. Other studies analyzing factors predictive of duration of mechanical ventilation corroborated this finding [6].

Conclusion

The factors most predictive of patient outcome following OBT include number of cardiac comorbidities, renal functional status and presence of pulmonary compromise. There were no gathered demographic or laboratory values which correlated significantly with in hospital mortality or decannulation.

References