A Comparison of Pediatric Tracheostomies Performed for Anatomic and Respiratory Pathologies

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Introduction

Tracheostomies are common procedures in pediatric hospitals, performed for a wide range of indications, including airway obstruction, inadequate airway protection, chronic lung disease, neuromuscular weakness, and central hypoventilation (1). A recent analysis of over 13,000 pediatric intensive care unit admissions showed that 6.6% of all patients received a tracheostomy during that hospitalization (2). There is great variation in duration of hospital stays and eventual disposition for children after tracheostomy placement (1). Additionally, there are a wide range of medical comorbidities that can affect hospital stay, dispositions, postoperative complications, and overall morbidity and mortality (3). Few studies have been performed examining the multitude of preoperative and postoperative complications in the hospitalizations of pediatric patients undergoing tracheostomies. The objective of our study was to identify and describe the indications, comorbidities, complications, length of stay, and disposition of pediatric tracheostomy patients.

Methods

This study was performed at Kosair Children’s Hospital in Louisville, KY. After approval was obtained from the University of Louisville Institutional Review Board and the Norton Healthcare Office of Research Administration (NHORA), all patients with tracheostomies performed between January 1, 2007 and December 31, 2012 were reviewed. After exclusions, a retrospective chart review was performed on the remaining 136 patients by two authors (CA and SA). All statistical analysis was performed using SPSS (IBM).

Results

Anatomic Indications (n=42)

- Bronchomalacia 2%
- Subglottic Stenosis 19%
- Craniofacial Abnormalities 22%
- Supraglottic Obstruction 36%
- Other 7%

Respiratory Indications (n=94)

- Respiratory Failure after Traumatic Brain Injury 20%
- Respiratory Failure after Cardiac Arrest 9%
- Central Apnea 12%
- Chronic Lung Disease 48%
- Severe Cardiac Abnormality 4%
- Other 2%

Comparison of Main Groups

<table>
<thead>
<tr>
<th></th>
<th>Anatomic</th>
<th>Respiratory</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Preoperative Comorbidities</td>
<td>3.36</td>
<td>3.30</td>
<td>0.86</td>
</tr>
<tr>
<td>Postoperative Complications</td>
<td>33.3%</td>
<td>26.6%</td>
<td>0.42</td>
</tr>
<tr>
<td>Length of Hospital Stay</td>
<td>60.6 days</td>
<td>148.4 days</td>
<td>&lt;0.001</td>
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<tr>
<td>Discharged Home</td>
<td>73.80%</td>
<td>48.90%</td>
<td>0.026</td>
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<tr>
<td>Rate of Decannulation</td>
<td>40.6%</td>
<td>35.2%</td>
<td>0.59</td>
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</tbody>
</table>

Discussion

- Children with more comorbidities had tracheostomies performed at an earlier age, possibly because of earlier consultation for a tracheostomy.
- A low rate of decannulation among patients with subglottic stenosis (20%) was unexpected, as multiple endoscopic and surgical treatment options exist. If these patients were followed longer duration, we would expect the decannulation rate to increase.
- The mortality rate was statistically higher in the respiratory group, despite similar numbers of preoperative comorbidities and postoperative complications. This may be partially due to ventilator dependence in these patients and the primary disease process itself.

Conclusions

- The anatomic and respiratory groups had similar outcomes in rate of comorbidities, complications, and decannulation.
- The major differences in outcomes between the groups were shorter length of stays and higher rate of being discharged home in the anatomic group.
- Patients with anatomic abnormalities often had symptoms resolve after the tracheostomy, leading to shorter postoperative hospitalizations.
- Increased number of comorbidities was associated with longer length of hospital stays and the need for long-term acute care or rehabilitation after discharge.
- These data can be used to help counsel and educate both families and other members or the healthcare team preoperatively in order to attain realistic expectations and goals of care.
- Future directions for research include long term prospective analysis of pediatric tracheostomies performed at our hospital.

References