Tracheostomy in Bronchopulmonary Dysplasia

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Abstract

Objective: To characterize pediatric patients undergoing tracheostomy for bronchopulmonary dysplasia (BPD), and to examine the effect of tracheomalacia (TM) on tracheostomy outcomes in these patients.

Methods: The medical records of 85 patients with BPD who underwent tracheostomy under the age of one year in an academic tertiary care children's hospital over nine years were evaluated for gestational age, birthweight, ethnicity, gender, genetic counseling performed, duration of ventilator support, duration of hospitalization, number of failed intubations, age at tracheostomy, and age at decannulation. The average gestational age was 28.8 weeks and the average postnatal age at tracheostomy was 5.1 months after having failed an average of 1.7 intubation attempts. The patients averaged 6.5 months of hospitalization with 40% requiring ventilator support and 30% requiring tracheostomy. The mean time to decannulation among patients with TM was 835 days and without TM, 712 days. Decreased gestational age correlated with increased time to decannulation (Regression analysis, p<0.01). Of patients with genetic anomalies, 15.8% were eventually decannulated versus 48.6% of patients without genetic anomalies, p = 0.004, OR 0.35 (95% CI 0.18 – 0.67).

Results:

Eighty-nine patients were included in the study. Basic patient characteristics are presented in Table 1. The average gestational age was 28.8 weeks and the average postnatal age at tracheostomy was 5.1 months after having failed an average of 1.7 intubation attempts. The patients averaged 6.5 months of hospitalization with 40% requiring ventilator support and 30% requiring tracheostomy. The mean time to decannulation among patients with TM was 835 days and without TM, 712 days. Decreased gestational age correlated with increased time to decannulation (Regression analysis, p<0.01). Of patients with genetic anomalies, 15.8% were eventually decannulated versus 48.6% of patients without genetic anomalies, p = 0.004, OR 0.35 (95% CI 0.18 – 0.67).

Discussion

The pathophysiology of TM is still well understood. The decreased likelihood of decannulation in the presence of TM suggests that resolution of TM is distinct from resolution of BPD. But, this does not clarify whether or not acquired TM is part of the same pathophysiologic spectrum as BPD. The trend toward earlier gestational age correlating with increased time to decannulation, but no increased likelihood of decannulation, warrants further investigation. Indeed, this observation may be due to older neonates being relatively sicker in order to require tracheostomy or due to systematic differential in management between the gestational ages. For example, in the past artificial surfactant was routinely given to patients <27 weeks gestational age and on a case-by-case basis to older patients. This could explain the differences in survival and outcomes observed in Table 2. The difference in the rate of genetic anomalies was not seen in the tracheomalacia and non-tracheomalacia subgroups. This was a trend toward lower birth weight and gestational age correlating with decreased likelihood of decanulation, but does not significantly affect time to decanulation. As such, tracheomalacia may be an independent risk factor for worse tracheostomy outcomes in BPD patients.

Conclusion

The presence of either tracheomalacia or genetic diseases decreases the likelihood of decanulation among patients who undergo tracheostomy for BPD. As such, TM is an independent risk factor for poor tracheostomy outcomes. This study also characterizes the BPD population receiving tracheostomy.

References


Table 1: Basic characteristics of patient population

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<thead>
<tr>
<th>Birth Weight (grams)</th>
<th>Gestational Age (weeks)</th>
<th>Fetal anomalies (n)</th>
<th>Postnatal age at tract (months)</th>
<th>Hospital stay (days)</th>
<th>Discharge PEEP</th>
<th>Discharge FIO2</th>
<th>Discharge Pressure</th>
<th>Nerves Damage</th>
<th>Genetic Disease</th>
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