Introduction

Obstructive sleep apnea (OSA) is defined by repetitive episodes of upper airway obstruction during sleep accompanied by oxygen desaturations. The prevalence of OSA in children is estimated to be 1-6% and much higher, at >50%, in obese children.1 Adenotonsillar hypertrophy (AT) is the surgical treatment of choice for children with OSA and is curative in approximately 90% of cases.2 Interestingly, it has also been shown that the presence of SALs is not predictive for failure of tonsillectomy in children less than 3 years of age.3

Laryngomalacia (LM) is defined as a collapse of supraglottic structures during inspiration and is most common in laryngeal disease of infancy.4 Most cases will resolve spontaneously by 18 months of age, but approximately 10% of cases will require surgical intervention.5 Patients classically present with inspiratory stridor within the first 2 weeks of life which is better when sleeping, worse when supine or when the child cries and may be accompanied by coughing, choking, or regurgitation with feedings.6 Supraglottopathy is the surgical treatment of choice for laryngomalacia and is successful in a majority of cases.6

Sleep dependent laryngomalacia (SDL), also called state dependent laryngomalacia, was first described in the literature by Amin and Isaacs.7 SDL is a variant of LM which is later in onset than congenital LM and is characterized by airway obstruction predominantly during sleep. Affected patients may be asymptomatic while awake.7

Methods

After approval was received from our institutional review board, patients were identified by a database query. Children with OSA without evidence of adenotonsillar hypertrophy on physical examination that underwent direct laryngoscopy (DL) at the time of AT at the Hershey Medical Center were included for analysis. Data was collected for procedures during the 01/01/2004 through 01/01/2015 timeframe. Patients with incomplete or inadequate documentation in the medical record were excluded. Success of AT for the treatment of OSA was defined in this study as subjective improvement in sleep symptoms. Patients were classified as underweight if their body mass index (BMI) was ≤ 5th percentile, overweight if their BMI was ≥ 85th percentile but < 95th percentile, and obese if their BMI was ≥ 95th percentile. Patients apnea-hypopnea index (AHI) was classified as normal if they were ≤ 1 event/hour, mild OSA if 2-5 events/hour but ≤ 5 events/hour, moderate OSA if 5-15 events/hour and severe OSA if ≥ 10 events/hour.1

Table 1: Patient characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number of Subjects</th>
<th>Percentage of Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>18</td>
<td>26.4%</td>
</tr>
<tr>
<td>Female</td>
<td>49</td>
<td>73.6%</td>
</tr>
<tr>
<td>Underweight</td>
<td>9</td>
<td>12.5%</td>
</tr>
<tr>
<td>Overweight</td>
<td>10</td>
<td>14.4%</td>
</tr>
<tr>
<td>Obese</td>
<td>22</td>
<td>30.6%</td>
</tr>
</tbody>
</table>

Adenotonsillar hypertrophy

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Direct Laryngoscopy Findings in Pediatric Patients with Obstructive Sleep Apnea

Without Adenotonsillar Hypertrophy

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Abstract

Objectives: Describe the direct laryngoscopy (DL) findings for pediatric patients with obstructive sleep apnea (OSA) that do not have adenotonsillar hypertrophy. Analyze the relationship between DL findings and OSA comorbid conditions, polysomnography data, DL findings, comorbidities and postoperative outcomes.

Subjects and Methods: Seventy-two pediatric patients with OSA without obvious adenotonsillar hypertrophy undergoing DL at the time of adenotonsillectomy (AT) from 2004 to 2015. Data collected include demographic and polysomnography data, DL findings, comorbidities and postoperative outcomes.

Results: Of the patients studied, 53 (73.6%) were male, 19 (26.4%) were female. 9 (12.5%) were underweight and 22 (30.6%) were obese. Sixty-four (88.9%) had DL findings consistent with laryngomalacia. Direct laryngoscopy findings included a retropositioned epiglottis in 46 (63.9%) patients, short aryepiglottic folds in 59 (81.1%) and redundant arytenoid muscosa in 8 (11.1%). Forty-one (56.9%) patients had both short aryepiglottic folds and a retropositioned epiglottis. Forty-six (63.9%) had vocal cord edema and 14 (19.4%) had vocal cord nodules.

Conclusion: A large proportion of pediatric patients with OSA without evidence of obvious adenotonsillar hypertrophy were found to have findings consistent with laryngomalacia by DL performed at the time of AT. This is much greater than the 3.9% prevalence of LM in all children presenting for evaluation of sleep-disordered breathing was found by Thevasagayam, et al.9 Despite the presence of laryngomalacia, symptomatic improvement was achieved after AT in 43 out of 57 patients (75.4%) that followed up postoperatively. Polysomnography preoperatively and postoperatively has objectively demonstrated that apnea-hypopnea index (AHI) improves after supraglottoplasty (SGP).12 Sleep dependent laryngomalacia (SDL), a variant of LM, which is later in onset than congenital LM and is characterized by airway obstruction predominantly during sleep. SGP appears effective in treating SDL.14 A recent case series of 9 patients with SDL and OSA showed that SGP reduces AHI in such patients. Several papers have suggested that LM can contribute to OSA, and that SGP is an effective treatment for OSA in patients with coexisting LM.15-16 It has been shown in patients undergoing SGP for treatment of LM, that there is significant improvement in their polysomnographic parameters.12,14 The findings presented here suggest that in children with OSA, without adenotonsillar hypertrophy on physical examination, LM is likely to be present and that AT appears to be effective in these patients despite the presence of LM. Nonetheless, SGP may be an appropriate intervention in these patients if their OSA fails to resolve after AT.