Pediatric Obstructive Sleep Apnea

Tonsillectomy and/or adenoidectomy: Impact on polysomnogram

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METHODS

A computerized Ovid search of MEDLINE from 1966 to September 2005 was performed. The term “obstructive sleep apnea” was searched and the resulting articles were cross-referenced with those obtained by exploding “tonsillectomy” or “adenoidectomy.” The results were cross-referenced with the phrases “sleep study or respiratory distress index,” or “polysomnogram” or “sleep study.” A manual search of the bibliographies yielded no additional articles. Articles were identified that met the following inclusion criteria: 1) children <18 years old with at least a clinical history of sleep-disordered breathing (SDB), 2) treatment with a tonsillectomy, adenoidectomy, or both, and 3) evaluation with both pre- and posttreatment nocturnal polysomnogram. Exclusion criteria were preexisting craniofacial abnormalities, history of Down syndrome, retrospective studies, and children who had other surgical procedures than adenotonsillectomy. Six studies that met these inclusion/exclusion criteria were included in the subsequent review [1-6].

RESULTS

Outcome Measures. The outcome measured was posttreatment change in apnea-hypopnea index (AHI) or respiratory distress index (RDI). The AHI is defined as the total number of obstructive apneas and hypopneas per hour of total sleep time. The RDI is equivalent to the AHI score. Each study defined obstructive sleep apnea (OSA) differently based on their interpretation of an abnormal polysomnogram. The criteria used for each are listed in the subsequent summary tables. These values were obtained from a standard overnight polysomnogram.

Potential Confounders. Results may potentially be biased by: 1) attrition as a result of several studies losing a large proportion of their study patients to follow-up, 2) there was a selection bias in that only children of caregivers who were concerned about their child’s breathing were included, and 3) some studies only included children with an AHI >1 which would fail to include those who could still have significant sleep fragmentation from SDB. Once again, most studies lacked an internal control, and therefore it is difficult to conclude a direct cause and effect relationship.

Study Designs. There was one prospective trial that compared a group who had surgical intervention with a group who had no surgery [3] and five prospective cohort studies that compared preoperative data with postoperative data [1, 2, 4-6]. Nieminen et al. [3] had an OSA group, a primary snorer group, and a group of healthy children as controls. The remaining studies were prospective cohort studies that used preoperative data as control data [1, 2, 4-6].

Highest Level of Evidence. All six of these level 2 studies concluded that children diagnosed with OSA based on overnight polysomnogram typically show improvement on their postoperative study. However, each study had significant limitations. Suen et al. [1] and Tal et al. [5] had the largest groups of patients who completed a postoperative PSG (26 and 36, respectively), but both had a significant patient dropout rate. Interestingly, both studies revealed that nearly half of patients with symptoms suggestive of OSA will have normal PSGs. Shintani et al. [2] had the largest study group overall (134 patients), but they included all patients in their study regardless if they had a preoperative normal PSG. Interestingly, one might conclude that their results would have even been better had they excluded patients with a normal sleep study. Nieminen et al. [3] had the only study with a separate control group, but 16 of 21 patients in their study group had previously had an adenoidectomy. They found that the study group had an improvement in PSG scores and the control group remained unchanged. Furthermore, through regression analysis, they concluded that tonsil size was larger in the study group. Jain and Sahni [4] had 30 patients in their study group; however, 19 had only an adenoidectomy performed. They found that adenoid size (not tonsil size) correlated to grade of OSA. This seems somewhat contrary to the results from Nieminen et al. Finally, Stewart et al. [6] examined quality of life and PSG data for a group of patients. Unfortunately, only 17 of 47 patients completed a postoperative PSG 1 year after surgery.
Applicability. The conclusions from these studies may be applied to healthy children <18 years old. They should not be applied to children with craniofacial abnormalities or Down syndrome.

Morbidity/Complications. There were no reported morbidities or complications in the studies included in this review.

CLINICAL SIGNIFICANCE AND FUTURE RESEARCH

There are six prospective controlled trials that address the impact of tonsillectomy and adenoidectomy on pediatric OSA. The implications of these results are that clinical history alone may not be sufficient to determine if a child has significant OSA. However, once diagnosed with OSA by PSG, most will have significant improvement after tonsillectomy, adenoidectomy, or both.

Although most of these studies were of adequate sample size to obtain a power of 80% and an alpha of 0.05 (based on their \textit{a priori} calculations), the individual studies often had a large attrition rate that could affect their conclusions. Also, several studies included a combination of treatments for their study group, which could confound their stated results. In addition, the definition of what constituted OSA on PSG was varied among the studies.

Future studies should make an effort to standardize what constitutes an “abnormal” PSG result. Children with abnormal results should then be treated in a standard manner (i.e., adenotonsillectomy). Children with “normal” pretreatment PSGs can serve as a comparison group. Nieminen et al. [3] used this method in their study. Future studies may also focus on the impact on quality of life, especially in this group with “normal” PSGs.