The effect of polysomnography on pediatric adenotonsillectomy postoperative management

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OBJECTIVE: **We retrospectively investigated the effect and predictability of preoperative polysomnography (PSG) on the postoperative course of younger pediatric patients undergoing adenotonsillectomy.**

STUDY DESIGN AND SETTING: **A retrospective chart review was performed for patients 3 years of age and younger who had undergone adenotonsillectomy between July 1997 and July 2002 at the Children's Hospital of Wisconsin.**

RESULTS: **Two hundred eighty-two patients were identified. Forty-three patients had preoperative PSG. No correlation between the severity of PSG results and postoperative course was identified.**

CONCLUSIONS: **The role of PSG in upper airway obstruction and OSA remains controversial. This study suggests that although the complication rate may be higher in this younger population, these complications do not appear to have a large impact on their length of stay.**

SIGNIFICANCE: **This study suggests that the 3-years-and-younger group, in the absence of other comorbidities, can safely undergo adenotonsillectomy without undergoing preoperative PSG. EBM raing: C.** (Otolaryngol Head Neck Surg 2005;132: 263-7.)

Sleep-disordered breathing is a common diagnosis in the pediatric population. Patients generally present with symptoms such as loud snoring, respiratory pauses, and mouth breathing. Physical examination often shows enlarged tonsil or adenoid tissue. In these children, adenotonsillectomy is often curative. In most cases, the decision for surgery is established on the basis of clinical history and physical exam. The gold standard for diagnosis of sleep-disordered breathing is polysomnography (PSG). However, PSG is costly, time limiting, and often not readily available.[1] Furthermore, its value as a preoperative tool is controversial with regard to which patient groups require or benefit from preoperative PSG.[2]

Several studies have addressed adenotonsillectomy and have identified populations at high risk for postoperative complications. These populations include children with craniofacial disorders, failure to thrive, neurological impairment, Down syndrome, obstructive sleep apnea, and aged 3 years or younger.[3-7] Preoperative PSG and postoperative overnight observation has been recommended for these patients. Polysomnography has also been recommended for differentiating primary snoring from obstructive sleep apnea.[8,9] In addition, tonsillectomy is often postponed in children aged 3 or younger because of reported increases in risks. Some authors believe that polysomnographic results are predictive of postoperative complications and postoperative course.[3-5,7] This study attempts to retrospectively review the postoperative course in children 3 years of age and younger and to correlate this course with the severity of obstruction by diagnosis on preoperative PSG. We hypothesize that the severity of sleep-disordered breathing or upper airway obstruction (UAO) identified by PSG does not correlate well with the severity of postoperative complications and postoperative course.

MATERIALS AND METHODS

A search by procedure code identified all children who underwent tonsillectomy or adenotonsillectomy at The Children's Hospital of Wisconsin between July 1997 and July 2002. This data set was then limited to those children 3 years of age and younger who had procedures performed by attending surgeons or by a resident with attending supervision. The Children's Hospital Institutional Review Board granted approval for this study.

Data were extracted from each patient's medical chart and included the following: preoperative PSG results, admitting diagnosis, surgeon, medical comorbidities, length of stay (LOS), postoperative complications, and associated interventions. In addition, postoperative progress notes were reviewed to identify the general postoperative course for each patient as well as any information that could be attributed to the medical decision-making process. Patients were grouped on the

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Table 1. Age distribution

Age (mo)	Total study group	Sleep study	No sleep study
0-24	67	18	49
25-36	141	20	121
37-47	74	5	69
Total	282	43	239
Average age (mo)	30.2	25.9	31.1

basis of whether or not they had undergone preoperative PSG. The average LOS was used as an objective indicator for evaluating the postoperative course in subject groups.

RESULTS

During the 5-year period described, there were 4,057 adenotonsillectomy or tonsillectomy-alone procedures performed. The charts for 305 children aged 3 years or younger were reviewed. Of these, 23 children were excluded from the study for the following reasons: incomplete chart (n = 8), procedure miscoded (n = 2), additional procedures performed (n = 5), or procedure performed during period of acute illness (n = 8). The remaining 282 sets of patient data were included in the statistical analysis. The average age was 30 months. Table 1 summarizes the age distribution. UAO was identified as the primary indication for surgery in 271 of the patients.

Sleep studies, including complete 16-channel (n = 38), 4-channel (n = 3), or hardcopy pulse-oximetry (n = 2), were performed preoperatively in 43 patients. The average age of patients who had a preoperative PSG was 25.9 months, compared with 31.1 months in the non-PSG group ($P < 0.0001$). Twenty-seven patients were identified as having obstructive sleep apnea (OSA) with a respiratory disturbance index (RDI) that ranged from 1 to 52. There was no statistical difference in the average LOS for patients with OSA when the subjects were grouped by using their RDI as a measure of OSA severity. The average LOS for patients with OSA was 1.57 days. The discharge criteria for patients typically requires that the patient not require any supplemental oxygen and be able to maintain oxygen saturations of >90% without periods of sustained desaturation attributed to UAO. Upper airway resistance syndrome (UARS) was identified in 11 patients. UARS is abnormally increased upper airway resistance during sleep that leads to increased respiratory effort and sleep fragmentation without classically defined apneic or hypopneic episodes or notable declines in oxygen saturation.[10] The average LOS for patients with UARS (2.2 days) was longer when compared with the average LOS stay (1.57 days) for patients with OSA ($P = 0.0448$). The remaining sleep studies without a calculated RDI or UARS were classified as normal, mildly abnormal, or significantly abnormal by the pulmonologist reading the study.

The average LOS for each age distribution was also calculated for each age group in both the non-PSG and PSG groups. The average LOS for all comparable age groups was less in the non-PSG group, with the shortest average LOS occurring in the 37- to 47-month age distribution in both the non-PSG and PSG groups. The average LOS for the non-PSG group was 1.06 days, compared with 1.98 days in the PSG group ($P < 0.0001$). The age distribution and average LOS for both groups are listed in Table 2.

Complications were identified in 62 patients (21.9%). For this study, a complication was defined as any documented desaturation event (regardless of SaO_2 nadir) or any other event or complication that required medical intervention or readmission or that prolonged the patient's length of hospital stay. Comparisons were made between patients without PSG (n = 239) and those with PSG results (n = 43). Complications occurred in 43 patients (17.9%) in the non-PSG group and in 19 patients (44.2%) in the PSG group. The most common complication identified was oxygen desaturation in both groups, representing 65.1% of the total complications in the non-PSG group and 57.9% in the PSG group. Overall, desaturation events represented a 13.8% complication rate (n = 39) for the entire study population. Complications for each group are listed in Table 3. Additionally, Table 4 lists the total number of complications for the 62 patients identified with respect to the age distribution of the complication. The highest complication rate (32.8%) was found in the 24-months-and-younger age group, with the lowest complication rate (8.1%) occurring in the 37- to 47-month age group. There was no statistical difference in the mean age of the patients who had complications in the PSG group (26.5 months) compared with the case of the non-PSG group (27.2 months), with a P value equal to 0.7279.

The average LOS for patients with complications in each group was also calculated and listed in Table 4. The average LOS for patients with complications in the non-PSG group was 1.74 days, compared with 2.63 days in the PSG group. A trend toward a longer average LOS in the PSG group was identified but the difference did not reach statistical significance ($P = 0.0997$).

Comorbidities and associated medical conditions were present in 88 patients. The most common conditions are listed in Table 5. Fifty-seven (23.8%) of the patients who did not have a preoperative sleep study were found to have comorbidities, compared with 31