

Polysomnography Should Be Required Both Before and After Adenotonsillectomy for Childhood Sleep Disordered Breathing

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Adenotonsillectomy (AT) represents one of the most common surgical procedures in children, with over 400,000 surgeries performed yearly in the United States for children under 15 years of age.¹ Although suspected sleep disordered breathing (SDB) is one of the most frequent pediatric indications for this surgery, surveys of otolaryngology practice patterns have reported that fewer than 10% of children undergo polysomnography (PSG) to confirm this diagnosis prior to surgery.^{2,3} The issue of whether PSG should be performed on a routine basis prior to AT has been the subject of vigorous debate.⁴ Practice guidelines published by the American Academy of Pediatrics and the American Thoracic Society advocate routine use of polysomnography prior to AT,^{5,6} whereas otolaryngology textbooks and guidelines issued by the American Academy of Otolaryngology–Head and Neck Surgery suggest that preoperative PSG is optional or should be performed only under select circumstances.^{7,8}

This article will examine the data and arguments supporting routine use of PSG before and after childhood AT with focus upon three areas: accuracy of diagnosis, patient safety, and necessity of screening for residual SDB.

PREOPERATIVE PSG IS NECESSARY TO ESTABLISH A DEFINITIVE DIAGNOSIS IN CHILDREN WITH SUSPECTED SDB

For most children undergoing AT for suspected SDB, a clinical diagnosis of SDB is established and recommendations are made regarding necessity of surgery based on the history and physical exam alone, with fewer than 10% of children receiving preoperative PSG.^{2,3} This pattern of practice has persisted despite increasing evidence that neither symptoms nor findings on examination can reliably distinguish when obstructive sleep apnea (OSA) is truly present. Adenotonsillar size has not been found to consistently correlate with the presence or severity of OSA in

children.^{9,10} A recent evidence-based review of medical literature assessing the accuracy of the history and physical exam for the diagnosis of childhood OSA reported that 11 of 12 articles concluded that the clinical evaluation was not reliable for diagnosis of OSA compared to standard PSG.¹¹ Although a variety of alternative screening tools for the diagnosis of childhood OSA have been investigated—including questionnaires, oximetry, and home audio/video recording—none have been found to be as reliable as standard PSG for diagnosis of OSA in children.¹²⁻¹⁴

Given the unreliability of the clinical evaluation for the diagnosis of childhood OSA, and the small proportion of children who undergo PSG preoperatively, it is likely—and perhaps common—that some children undergoing AT for suspected SDB in fact do not have OSA. In the Washtenaw County Adenotonsillectomy Cohort, only 51% of children undergoing clinically indicated AT for any reason were found to have OSA upon preoperative PSG.¹⁵ Although non-SDB indications for childhood AT exist (e.g., recurrent infections), they are less commonly cited than obstructed breathing as a reason for performing surgery.² Performing AT only for suspected SDB, without confirming the diagnosis with PSG, therefore results in risk of undertaking surgery that may not be necessary or clinically beneficial in many cases.

Finally, the role of PSG for the diagnosis and treatment of SDB in children should be considered in light of standards of practice presently used for the adult population. In adults, treatment of OSA is virtually never undertaken until a baseline PSG is performed to verify the presence and severity of upper airway obstruction. Absent evidence-based data to the contrary, it is difficult to justify a different standard of care for children, particularly when treatment entails greater risk (related to surgery and anesthesia) compared to adults, who more typically receive nonsurgical treatment.

PREOPERATIVE PSG IMPROVES PATIENT SAFETY AND HELPS IDENTIFY PATIENTS AT INCREASED RISK FOR TREATMENT FAILURE

In addition to establishing a definitive diagnosis of SDB, preoperative PSG also helps identify children who are at increased risk for operative complications. Multiple case series have reported that children demonstrating low nadir oxygen saturation or high apnea-hypopnea index (AHI) on preoperative PSG are at increased risk for postoperative respiratory compromise.¹⁶⁻²¹ When considered in conjunction with clinical risk factors such as younger age, concu-

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rent medical disorders, and craniofacial deformity, the results of preoperative PSG are invaluable in identifying children who are at increased risk for postoperative complications and who require extended or overnight respiratory monitoring following their surgery.

Preoperative PSG also helps identify which children are at greatest risk for persistent OSA following AT. Among 26 children reported by Suen and colleagues and 110 children reported by Tauman and colleagues, high preoperative AHI was associated with increased risk for residual SDB following surgery.^{22,23} Use of preoperative PSG to identify these high-risk patients is clinically important in several ways. Firstly, knowledge that a child may be at increased risk for persistent SDB after adenotonsillectomy should impact how the treating physicians communicate likelihood of surgical success or failure to the child's parents in advance of the procedure. Secondly, this knowledge also identifies the children who have the greatest need for follow-up clinical and PSG evaluation after their surgery.

POSTOPERATIVE ASSESSMENT FOLLOWING ADENOTONSILLECTOMY IS INDICATED DUE TO RELATIVELY HIGH PREVALENCE OF RESIDUAL SDB FOLLOWING CHILDHOOD AT

Until recently, limited data were available regarding how often clinically significant childhood SDB persists following AT. Most earlier studies concluded that AT resulted in polysomnographic resolution of OSA in 75% to 100% of otherwise healthy children, however, use of widely variable methodologies and definitions of OSA represented a significant limitation to these data.^{5,22,24-27} More recently, several large pediatric case series have reported substantially lower success rates for AT. In a prospective study of 199 children with OSA reassessed following AT, 92 (46%) continued to demonstrate an elevated AHI upon follow-up PSG performed 3 to 5 months after surgery.²⁸ In a cohort of 110 children assessed before and after AT, complete normalization of the PSG was observed in only 25% of subjects.²³

In addition to these case series documenting frequent persistence of childhood OSA following AT, delayed recurrence of OSA following successful treatment in early childhood has also been reported.^{29,30}

Considered collectively, these data suggest that considerable numbers of children continue to suffer from SDB despite adenotonsillectomy. Unfortunately, follow-up screening for residual SDB is only rarely undertaken, with fewer than 5% of children undergoing AT being referred for postoperative PSG by their otolaryngologists.³ Although the American Academy of Pediatrics has recommended clinical follow-up for all children following surgical treatment of OSA,⁵ clinical evaluation alone is insufficient for the reasons already discussed.¹¹ Present evidence documenting relatively high rates of residual SDB following childhood AT suggests that more liberal and frequent use of postoperative PSG is warranted as well.

CONCLUSIONS

Debate regarding the medical necessity of PSG before and after childhood AT continues to be contentious and will not be resolved until outcome-based studies are performed to objectively define which clinical strategy provides the optimum balance of clinical utility, safety, and cost-effectiveness. Until such evidence-based guidelines are available, it is appropriate to rely on strategies

which most clearly define the presence and severity of SDB and provide the best guidance regarding treatment efficacy and safety. Clinical evaluation alone has been proven to be insufficient in this regard, and at present, only lab-based PSG provides optimal direction in these important areas. Consensus expert guidelines issued by the American Thoracic Society and American Academy of Pediatrics^{5,6} provide a useful starting point in defining parameters for clinical and PSG evaluation of children before and after AT, but do not reflect recent data suggesting the risk of residual SDB is sufficiently high to warrant more liberal use of postoperative PSG in the pediatric population.

It is interesting to note how substantially the standards of practice for evaluation and treatment of suspected SDB differ for children compared to adults. In the adult population, the most common treatment of OSA (CPAP) is virtually never undertaken until the presence and severity of OSA has been objectively documented on some variety of baseline PSG. In children with suspected SDB, the overwhelming majority receive adenotonsillectomy without polysomnography before or after surgery, in a fashion that virtually guarantees that some children without clinically significant SDB will receive surgery unnecessarily and that other children will have residual SDB that is not identified or treated in a timely manner.

The paradoxical practice patterns for children compared to adults will continue to pose a dilemma for practitioners of sleep medicine until evidence-based guidelines are established. But until then, is it appropriate to accept a lesser standard for the treatment of our children than we consider appropriate for adults?

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