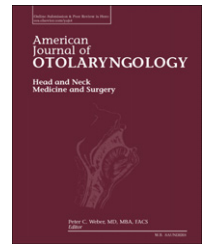


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Pediatric otolaryngology: Principles and practice

## Impact of adenotonsillectomy on ADHD and nocturnal enuresis in children with chronic adenotonsillar hypertrophy



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## ARTICLE INFO

## Article history:

Received 26 May 2015

## ABSTRACT

**Objective:** Children with chronic adenotonsillar hypertrophy (CAH) are more likely to have symptoms of attention deficit hyperactivity disorder (ADHD) and enuresis nocturna (EN) and benefit from surgery. The aim of this study was to evaluate the effect of adenotonsillectomy on ADHD and EN symptoms in children with CAH.

**Study design:** Cross-sectional study was conducted.

**Setting:** Parent-based questionnaires.

**Methods:** Parents of children with CAH were given Turgay DSM-IV Based Child and Adolescent Behavior Disorders Screening and Rating Scale (T-DSM-IV) and Nocturnal Enuresis Questionnaire (NEQ) before and six months after adenotonsillectomy. Inattention (IA) and hyperactivity-impulsivity (HI) subscores of T-DSM-IV were used in the present study. The rates of ADHD and EN were compared before and after surgery.

**Results:** A total of 75 children between 5 and 16 years of age and their families participated in the study. All 75 families completed T-DSM-IV and NEQ. Mean IA ( $5.69 \pm 4.88$  versus  $4.46 \pm 4.40$ ) and HI ( $6.53 \pm 5.60$  versus  $5.93 \pm 5.45$ ) scores as well as total ADHD scores ( $12.22 \pm 8.99$  versus  $10.42 \pm 8.70$ ) improved significantly after surgery. This significance was found to be statistically important ( $p < 0.05$ ). Furthermore 26 of the subjects were diagnosed with primer EN before adenotonsillectomy and 14 of these enuretic children had total remission six months after surgery. The frequency of EN dropped from 34.7% to 16.0% and this remission rate was found to be statistically significant ( $p < 0.05$ ).

**Conclusion:** Children with CAH had high frequency of ADHD and EN symptoms in the present study. Adenotonsillectomy was found to be effective in improvement of these symptoms.

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## 1. Introduction

The impact of chronic adenotonsillar hypertrophy (CAH) and related symptoms on childhood development and behavior has been well published. Symptomatic CAH manifesting various degrees of airway obstruction can lead to sleep problems like sleep disordered breathing (SDB), neurocognitive dysfunction [1,2], externalizing symptoms, such as hyperactivity, impulsivity, aggression, oppositional behavior, conduct problems [3-6], and somatization and internalizing symptoms, such as anxiety, depression, social withdrawal, and emotional instability [7-9].

Several studies have found that CAH has been associated with attention deficit hyperactivity disorder (ADHD), and treatment of CAH may diminish symptoms of ADHD in a subset of children. ADHD and other disruptive behavior disorders have been found to be the most common psychiatric diagnoses in children undergoing adenotonsillectomy [6]. Because ADHD is one of the most common psychiatric disorder of childhood, relation with ADHD and CAH has become more important in this context. Children with ADHD symptoms should be assessed from view of CAH and surgery is often associated with improvement in these symptoms and decreased need for stimulants.

On the other hand, CAH in childhood is occasionally associated with enuresis nocturna (EN) [10]. Higher incidence of enuresis with a percentage of 35 was reported in children with obstructive sleep apnea syndrome (OSAS) compared with their healthy peers and adenotonsillectomy significantly improved enuresis in these children [11].

In addition, enuresis is also common in children with ADHD although the mechanism of enuresis in ADHD remains elusive. Previous studies have demonstrated a significantly increased prevalence of ADHD in children with enuresis [12,13]. So children with ADHD and drug resistant enuresis should be assessed in consideration of the possibility of CAH and related disorders.

The purpose of this study is to investigate the rates of ADHD and EN symptoms in children with CAH and also the impact of adenotonsillectomy on these symptoms in this population. Possible mechanisms will be discussed.

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## 2. Materials and methods

### 2.1. Participants

Subjects for this study were recruited from a sample of pediatric cases referred to Otorhinolaryngology Department of Gaziosmanpasa University Medical Faculty Hospital between January 2013 and June 2014. The study enrolled 75 children with CAH ranging in age from 5 to 16 years. Children with autism spectrum disorders or mental retardation (IQ < 70), and having diagnosis of any neurologic or metabolic disorder were excluded from the study.

### 2.2. Measures

#### 2.2.1. Turgay DSM-IV Based Child and Adolescent Behavior Disorders Screening and Rating Scale (T-DSM-IV)

The scale was developed by Turgay et al. [14] and translated and adapted to Turkish by Ercan et al. [15]. It is based on the DSM-IV

diagnostic criteria and evaluates inattention (IA) (9 items), hyperactivity-impulsivity (HI) (9 items), opposition defiance (OD) (8 items), and conduct disorder (CD) (15 items). Greater scores reflect increase in severity. Symptoms are scored by assigning a severity estimate for each symptom on a 4-point Likert-type scale (0 = not at all, 1 = just a little, 2 = quite a bit, and 3 = very much). IA and HI subforms of the scale were used to assess ADHD rating in this study.

#### 2.2.2. Nocturnal Enuresis Questionnaire (NEQ)

This questionnaire was developed by the authors to assess nocturnal enuresis. It includes specific questions about enuresis nocturna based on DSM-IV criteria. NEQ was filled by the help of a clinician to diagnose EN in the present study.

### 2.3. Procedure

Children who referred to Otorhinolaryngology Department with such complaints like nasal congestion, snoring, sleeplessness, mouth sleeping and night sweating underwent clinical examination. A routine ear-nose-throat examination, fiberoptic nasopharyngoscopy and tympanometry were performed during the preoperative period. Following the evaluation, the parents of children with an indication of adenotonsillectomy were informed about the study. In order to determine the frequency of ADHD and EN, parents were asked to fill out T-DSM-IV scale by themselves and NEQ by the help of a clinician at the preoperative visits. There were no intraoperative or postoperative complications. After discharge, the patients were followed up periodically until the sixth postoperative month. At postoperative month six, the parents filled out the forms by the same way as in the preoperative period and the patients underwent a general examination. All families completed T-DSM-IV and NEQ both in the preoperative and postoperative periods. Written informed consent from parents was taken and the faculty ethical committee approved the study.

### 2.4. Statistical analysis

Statistical analysis was performed by using commercial software (IBM SPSS Statistics 19). Values are expressed as N (%) or mean  $\pm$  SD. Independent samples T test was used for continuous variables in comparisons between two groups. Yates corrected chi-square test or Fisher's test was used for comparisons of qualitative variables. Paired samples test was used for comparison of two dependent measurements.  $p < 0.05$  was considered as statistically significant.

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## 3. Results

The study consisted of 75 subjects (46 males and 29 females) with a mean  $\pm$  SD of  $9.28 \pm 3.13$  (between 5 and 16) years of age. Mean IA ( $5.69 \pm 4.88$  versus  $4.46 \pm 4.40$ ) (before versus after surgery) and HI ( $6.53 \pm 5.60$  versus  $5.93 \pm 5.45$ ) scores as well as total ADHD scores ( $12.22 \pm 8.99$  versus  $10.42 \pm 8.70$ ) improved significantly after surgery. This significance was found to be statistically important ( $p < 0.05$ ).

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