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Effects of adenoidectomy/adenotonsillectomy on ADHD symptoms and behavioral problems in children

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ABSTRACT

Objectives: In children, the most common reason of upper airway obstruction (UAO) is adenotonsillar hypertrophy. In literature, the adverse effects of UAO and obstructive sleep apnea syndrome on behavior and attention in children have been reported in several articles. However, the methods used for the evaluation of behavioral disorders have not been standardized in those studies. The aim of this study was to investigate the behavioral and attention characteristics of children before and after adenoidectomy/adenotonsillectomy using an internationally valid method.
Methods: A total of 41 patients, between 6 and 11 years of age and having a medical history of UAO for at least one year for which adenotonsillectomy procedure was indicated, were enrolled in the study. The patients were evaluated for signs of attention/behavioral disorders by a child-adolescent psychiatrist and Kiddie-Schedule for Affective Disorders and Schizophrenia for School-Age Children: Present and Lifetime Version (K-SADS-PL) and The Turgay DSM-IV-Based Child and Adolescent Disruptive Behavioral Disorders Screening and Rating Scale (T-DSM-IV-S), before and at the 6th month following the operation.
Results: In the preoperative period, a psychiatric disorder was identified by K-SADS-PL in 41.4% ($n = 17$) of patients. Of these, 11 patients had attention deficit hyperactivity disorder (ADHD), 6 had enuresis nocturna, and 2 had separation anxiety disorder. Pre- and postoperative mean scores in T-DSM-IV-S parent scale were 31.3 ± 8.5 and 20.2 ± 10.3, respectively, and this difference was statistically significant ($p < 0.001$).
Conclusion: The relationship of UAO and attention/behavioral disorders should be taken into consideration by child-adolescent psychiatrists together with ENT specialists and a multidisciplinary approach is important for the treatment team.

1. Introduction

The presence of additional psychosocial, developmental, emotional and behavioral problems in pediatric patients admitted to otorhinolaryngology clinics is a fairly common situation. Therefore, regarding children who are admitted to otorhinolaryngology clinics, consultations of pediatric psychologist or other behavioral health professional in terms of psychosocial and behavioral disorders is suggested to be a standard part of the examination by specialists [1].

In children, one of the most common reasons of upper airway obstruction (UAO) is adenotonsillar hypertrophy. In children with adenotonsillar hypertrophy, various sleep-related complaints may be encountered. These complaints may be in the range from simple snoring to obstructive sleep apnea syndrome (OSAS). Upper airway obstruction, by affecting many systems, may lead to many serious clinical conditions such as maxillomandibular anomalies, growth retardation, enuresis nocturna, cor pulmonale, right cardiac failure, and systemic hypertension in children [1–6]. Moreover, UAO has been suggested to be associated with symptoms such as learning difficulties, attention deficit, hyperactivity, aggression and antisocial personality [1,6–8]. Recently conducted studies have reported that attention deficit hyperactivity disorder (ADHD) frequently accompanied adenotonsillar hypertrophy and associated respiratory problems in children and in the postoperative period, positive changes in their attention and behavioral problems were observed [3,6].

Among neurodevelopmental disorders, ADHD is the most common disorder; it affects 5.3–7% of school-aged children throughout the world [9–11]. Three subtypes were described for

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attention deficit hyperactivity disorder in Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV)—1994: predominantly inattentive type, predominantly hyperactive–impulsive type and combined type, possessing the characteristics of both groups simultaneously [12]. Attention deficit hyperactivity disorder is a disorder having a chronic clinical course; even if a reduction is observed in severity of symptoms as child grows. In addition, depression, psychosocial problems, alcohol and substance abuse, educational and unemployment problems might develop in adulthood, if they left untreated. The main treatment options are psycho-behavioral interventions directed to the family and the child, arrangement of the classroom environment, and pharmacotherapy [13].

Children having UAO related to adenotonsillar hypertrophy frequently manifest symptoms of attention deficit hyperactivity disorder, behavioral problems and impulsiveness with varying degrees of severity [14]. While OSAS is suggested to affect central nervous system through sleep fragmentation and intermittent hypoxia, inflammatory mechanisms are also contemplated to have an important role in the development of behavioral disorder [2,4,5].

In the literature, there is a few studies reporting the negative effects of UAO and OSAS on behavior and attention of children evaluated using standardized semi-structured diagnostic interviews done by child psychiatrist. [8,15,16]. Most of the studies have been based on the statements of the caregiver or evaluation of the night behaviors of the child [15–17]. The number of studies in which the psychosocial and behavioral assessment was made by a child-adolescent psychiatrist and internationally valid and reliable psychiatric diagnostic guidelines were used is insufficient [18,19].

The aim of this study was to determine the comorbid psychiatric disorders of children with UAO related to adenoid/adenotonsillar hypertrophy in the preoperative and postoperative period by using semi-structured diagnostic interview and to evaluate the effect of adenoidectomy/adenotonsillectomy on attention and behavioral symptoms severity using parent reported scale.

2. Materials and methods

This study was in accordance with Declaration of Helsinki for human subjects and has been approved by Adnan Menderes University Local Ethics Committee for the ethical care on 13.09.2012 with approval number 2012/126. The procedure was described in detail to all volunteers who participated in the study and informed consent was obtained from all parents and guardians prior to enrollment.

A total of 41 patients, between 6 and 11 years of age children and preadolescents, admitted to Adnan Menderes University, Ear, Nose and Throat Clinic with symptoms defining UAO such as mouth breathing, snoring and interruption of sleep and whose detailed ENT examinations, made by the same physician (CG), revealed adenoid/adenotonsillar hypertrophy were enrolled in the study. Patients were enrolled in the study consecutively, according to their order of admittance. The patients who have been suffering of UAO symptoms at least for one year and having adenoid vegetation with or without tonsillar hypertrophy that caused an obstruction of more than 75% at nasopharyngeal passage using flexible nasopharyngoscopeand giving consent for the operation have been included in the study [20]. The exclusion criteria from the study were: adenotonsillectomy performed with the indication of infection with no airway obstruction, craniofacial anomalies, continuous drug therapy due to chronic disorders, patients with neuromuscular diseases, patients with mental retardation, and medical history revealing previous treatment for ADHD. Adenoidectomy/adenotonsillectomy were performed by the same surgeon (CG) using the method of curettage and cold dissection.

All patients were assessed preoperatively and at 6th month following surgery by the same child-adolescent psychiatrist (HA) in terms of psychiatric disorders and symptom severity using the semi-structured psychiatric diagnostic interview and scale mentioned below.

2.1. Semi-structured psychiatric diagnostic interview and scale used

2.1.1. Schedule for Affective Disorders and Schizophrenia for School-Age Children: Present and lifetime version (K-SADS-PL)

Schedule for Affective Disorders and Schizophrenia for School-Age Children: Present and Lifetime Version is a semi-structured instrument developed by Kaufman and colleagues to screen psychopathology in children and adolescents between ages 6 and 18 by gathering information from both parents and the offsprings [21]. Mood disorders, psychotic disorders, anxiety disorders, disruptive behavioral disorders, elimination disorders, eating disorders, tic disorders and alcohol and other substance use disorders are the psychiatric conditions included in this instrument. K-SADS-PL is administered in consideration of DSM-IV diagnostic criteria. Reliability and validity of K-SADS-PL were adapted to Turkish in 2004 [22]. Certified specialist made the K-SADS-PL interview with both child and the caregiver before and after the surgical operation. The implementation period of the test was 2.5 h in average.

2.1.2. The Turgay DSM-IV-Based Child and Adolescent Disruptive Behavioral Disorders Screening and Rating Scale (T-DSM-IV-S)

The T-DSM-IV-S is a well known and widely used questionnaire which was developed by Turgay and translated and adapted into Turkish by Ercan et al. [23]. The T-DSM-IV-S is based on the DSM-IV diagnostic criteria and assesses hyperactivity/impulsivity (9 items), inattention (9 items), opposition/defiance (8 items), and conduct disorder (15 items). The symptoms are scored by assigning a severity estimate for each symptom on a four-point Likert-type scale.

The diagnosis of the disorders was made by the child-adolescent psychiatrist, using K-SADS-PL. The severity of the attention and behavioral symptoms before and after the operation were assessed by parent form of T-DSM-IV-S. Patients were followed-up till 6th month after the operation without giving any treatment for psychiatric conditions.

2.2. Statistical analysis

SPSS 20.0 statistical software package for Windows was used for evaluation of the data [24]. Compliance with the normal distribution was assessed by Kolmogorov–Smirnov test. Paired t test, which is one of parametric tests, was used for data with normal distribution. Wilcoxon paired two-sample test and Mann–Whitney U test were used for the comparison of paired data which did not fit a normal distribution. For the comparison of qualitative data, the chi-square and McNemar tests were used. Yates correction was used. Spearman correlation analysis was used for relational evaluation. Data were shown as the number, percentage, and mean ± standard deviation. For statistical significance, $p < 0.05$ was selected.

3. Results

The mean age of 41 patients enrolled in the study (21 females, 20 males), was 7.2 ± 1.5 years. There was no significant difference between the average ages of females and males ($p > 0.05$). A psychiatric diagnosis was made according to the implemented K-SADS-PL scale, meeting the DSM-IV diagnostic criteria, in 41.4% ($n = 17$) of the patients (Table 1). The most common psychiatric