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Tonsil Surgery in the Management of Obstructive Sleep Apnea-Hypopnea Syndrome (OSAHS) in Children at the ENT Department of Ignace Deen National Hospital

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Abstract

Introduction: Obstructive Sleep Apnea-Hypopnea Syndrome (OSAHS) is a sleep-related breathing disorder characterized by repeated episodes of partial obstruction of the upper airways (hypopnea) and/or intermittent complete obstruction (apnea). Our aim is to study the role of adeno-tonsillectomy in the management of OSAHS in children. **Methodology**: This was a prospective descriptive study conducted in the ENT-Head and Neck Surgery department of Ignace Deen National Hospital over a six-month period. We included in our study all patients aged 0 to 15 years, presenting with OSAHS of ENT etiology and who had undergone tonsillectomy/adenoidectomy. **Results**: The frequency of OSAHS was 13%. The mean age of our patients was 5.1 ± 3.8 years. There was a predominance of males (69.6%) with a sex ratio of 2.28. Snoring (98.6%), nasal obstruction (97.1%), and mouth breathing (96.6%) were the main reasons for consultation. Adeno-tonsillectomy (45.4%) was the primary surgical intervention. Almost all children (99.0%) had a simple postoperative course. **Conclusion**: OSAHS is a condition with a multifactorial etiology. Adeno-tonsillectomy remains the first-line surgical treatment to prevent severe complications and relieve the patient. Multidisciplinary collaboration is essential in the management of OSAHS.

Keywords

Surgery, Adeno-Tonsillectomy, OSAHS, Child

1. Introduction

Obstructive Sleep Apnea-Hypopnea Syndrome (OSAHS) is a sleep-related breathing disorder characterized by repeated episodes of partial obstruction of the upper airways (hypopnea) and/or intermittent complete obstruction (apnea), leading to interruptions in ventilation and the normal sleep rhythm [1]. It is a common chronic respiratory disease in children, with a dramatic impact on health [2]. Indeed, OSAHS is associated with neurobehavioral deficits and cardiovascular morbidity, highlighting the need for early recognition, diagnosis, and treatment [3]. Its diagnosis should be considered in children with typical symptoms (snoring, restless sleep, or daytime hyperactivity) or risk factors (adenoid hypertrophy, craniofacial abnormalities, obesity, abnormalities in upper airway muscle tone) [3] [4]. Although the pathophysiology of OSAHS in children is multifactorial, the most common cause in Otolaryngology is the enlargement of adenoids and tonsils, leading to upper airway restriction during sleep. In children with hypertrophied adenoids or tonsils, the first-line treatment is tonsillectomy with or without adenoidectomy, collectively referred to as adeno-tonsillectomy, which significantly improves the clinical condition of patients [3] [5]. Over the past decade, obstructive sleep apnea-hypopnea syndrome has been widely recognized as a frequent and relatively common disorder with potentially serious clinical implications in children [6].

Our objective is to study the role of adeno-tonsillectomy in the management of OSAHS in children in the ENT-Head and Neck Surgery Department, Ignace Deen National Hospital.

2. Methodology

This was a prospective descriptive study conducted in the ENT-Head and Neck Surgery Department at Ignace Deen National Hospital over a six-month period from January 1 to June 30, 2023. The study focused on children diagnosed with OSAHS who underwent surgery on the palatine/Luschka's pharyngeal tonsils. We included all patients aged 0 to 15 years with OSAHS of ENT etiology, who had undergone tonsillectomy/adenoidectomy, and who agreed to participate in the study. Patients under the age of 6 months were excluded. We performed an exhaustive recruitment of all patients meeting our selection criteria. Our variables were quantitative and qualitative, divided into epidemiological, diagnostic, and therapeutic data. Data collection was manual, using a pre-established survey form integrated into the Kobocollect application. The data obtained were analyzed with Epi Info software version 7.4.0. The results were used solely for scientific purposes, and medical confidentiality was maintained.

3. Results

Epidemiological Data: In this series, we recorded 1,594 consultations. We collected 207 cases, representing a prevalence of 13% (Figure 1). The average age of the patients was 5.1 ± 3.8 years, with extremes of 7 months and 15 years. The age groups of 0 to 5 years, 6 to 10 years, and 11 to 15 years represented 55.1%, 30.9%, and 9.2%, respectively. Males accounted for 69.6% (144 cases), while females accounted for 30.4% (63 cases), resulting in a sex ratio of 2.28.

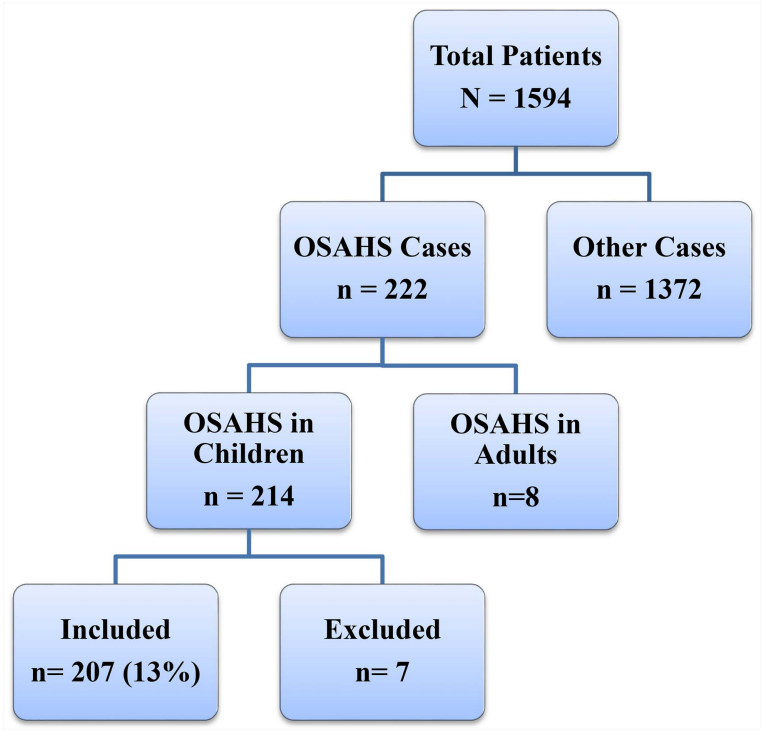

Figure 1. Flow diagram of patients admitted to the ENT-Cervical-Facial Surgery department from January 1 to June 30, 2023, for OSAHS.

Diagnostic Data: The average consultation delay was 8.88 ± 16.91 months (extremes: 1 month to 10 years). Symptoms included nighttime, daytime, and accompanying signs (Table 1). The following histories were noted: rhinosinusitis (77.3%), tonsillar hypertrophy (59.9%), adenoid vegetation (32.4%), allergic and hypertrophic rhinitis (13%). Prematurity, gastroesophageal reflux, septal deviation, and nasosinusal polyposis each accounted for 1% of the cases. Grade 4 and 3 of the Brodsky classification represented 59.4% and 34.8% of the cases, respectively. Classes 1 and 2 of the Mallampati classification represented 5.3% and 93.7%, respectively. Hypertrophy of the pharyngeal tonsils of Luschka was found in 97.1% of cases on nasofibroscopy (Table 2). Adenoid vegetation (Figure 2) and hypertrophic tonsillitis (Figure 3) were noted in 147 and 142 patients, respectively (Table 3). Biological assessments were conducted on all patients, with X-rays of the nasopharynx performed in 98 patients, CT scans in 4 patients, and cardiac Doppler ultrasounds in 1 patient.

Table 1. Distribution of patients admitted according to the reasons for consultation.

Signs	Number (N = 207)	Percent
Nighttime signs		
Nighttime snoring	204	98.6
Nasal obstruction	201	97.1
Mouth breathing	200	96.6
Micro-awakening during the night	187	90.3
Apnea/Hypopnea	181	87.4
Head in hyperextension	151	72.9
Sitting position	107	51.7
Abnormal position	84	40.6
Respiratory difficulty	82	39.6
Restless sleep	60	29.0
Sweating	33	15.9
Enuresis	13	6.3
Pallor	8	3.9
Daytime signs		
Asthenia upon waking	185	89.4
Drowsiness	147	71.0
Morning headaches	138	66.7
Hyperactivity	66	31.9
Irritability	43	20.8
Lack of concentration	4	1.9
Behavioral disorders	4	1.9
Growth delay	3	1.4
Developmental delay	2	1.0
Learning difficulties	2	1.0
Accompanying signs		
Fever	131	63.3
Swallowing difficulties	125	60.4
Rhinorrhea (runny nose)	64	30.9
Cough	4	2.0
Others	4	2.0

Others: adenoid facies; anorexia; right eyelid edema; and vomiting.

Table 2. Distribution of patients received according to the results of the ENT examination.

Results of the ENT examination	Number (N = 207)	Percent
Rhinological examination		
Anterior rhinoscopy		
Hypertrophy of the lower turbinates	178	86.0
Pale mucous membrane	111	53.6

Continued

Mucous rhinorrhea	**110**	**53.1**
Purulent rhinorrhea	20	9.7
Nasofibroscopy		
Enlarged adenoids	102	97.1
Cavum lesion	2	1.0
Choanal atresia	1	0.5
Otological examination		
Chronic otitis media with open eardrum	2	1
Otitis externa	2	1
Earwax plug	32	15
Earwax blade	10	4.8
Recurrent acute otitis media	5	2.4
Seromucous otitis	2	1.0

Table 3. Distribution of patients received according to the etiologies/risk factors.

Etiologies/risk factors	Number (N = 207)	Percent
Adenoid vegetation	147	71.0
Hypertrophic tonsillitis	142	68.6
Hypertrophic rhinitis	31	15.0
Pharyngitis	23	11.1
Nasal polyposis	2	1.0
Septal deviation	2	1.0
Choanal atresia	2	1.0
Foreign bodies in the nasal cavity	2	1.0
Obesity	2	1.0

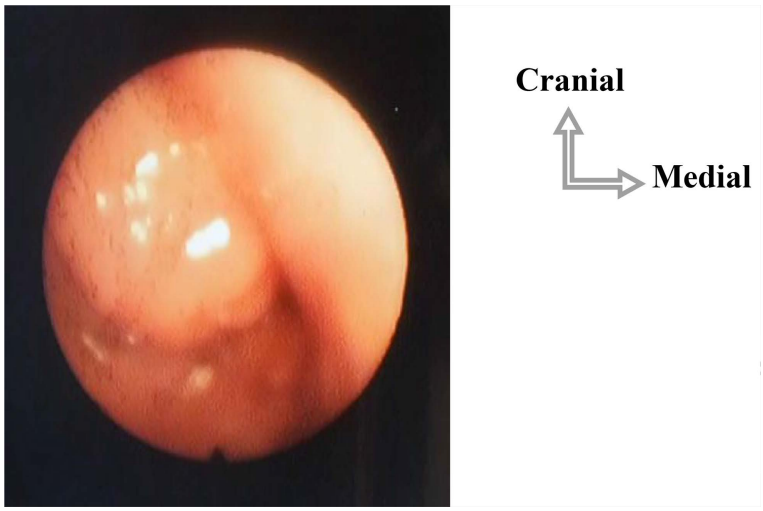

Figure 2. Nasofibroscopic image of adenoids.

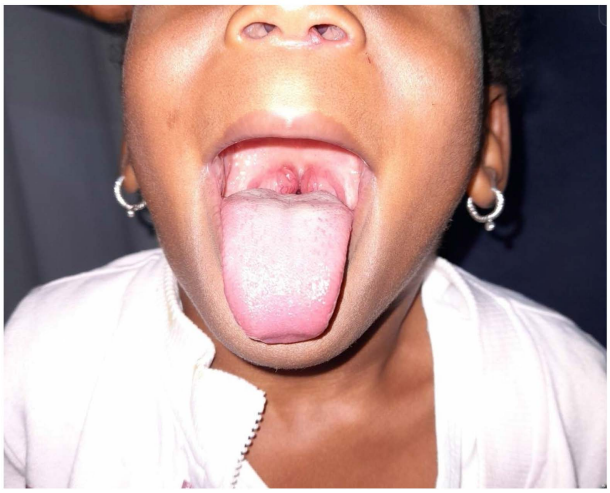

Figure 3. Examination of the oropharynx reveals enlarged Brodsky stage IV tonsils.

Therapeutic and evolutive Data: Adenoidectomy was performed in 58 patients (28%), tonsillectomy in 55 patients (26.6%), and adeno-tonsillectomy in 94 patients (45.4%). Medical treatment included analgesics (37.7%), antibiotics (100%), non-steroidal anti-inflammatory drugs (69.1%), intranasal corticosteroids (10.6%), mouth rinses (71.5%), nasopharyngeal disinfection (84.1%), and adherence to a hygiene-dietary regimen (100%). Postoperative outcomes were uncomplicated in 205 patients (99% of cases). Two cases were referred to pulmonology (1 case of asthma) and neurology (1 case of epilepsy).

4. Discussion

We conducted a descriptive prospective study over a period of 6 months. The objective was to study the role of adenotonsillectomy in the management of OSAHS in children at the ENT-Head and Neck Surgery department at Ignace Deen National Hospital. During this study, we faced certain constraints, such as the lack of polysomnography in our context and the reluctance of some parents regarding surgery. Despite these shortcomings, we obtained results that we compare to the data in the literature. In our study, out of a total of 1594 patients seen in consultation, we recorded 207 cases of OSAHS in children, representing a hospital frequency of 13%. This result is higher than that reported by Lenouvel I *et al.* [7] in France (2019), which noted a frequency of 1% to 4%. This may be related to the environment or lifestyle of the population, as well as exposure to factors favoring recurrent rhinosinusitis and allergies. We observed that patients aged 0 to 5 years (55.1%) were the most affected, with an average age of 5.1 ± 3.8 years. Our average age was close to that reported by Blanc F *et al.* [8] (2019) in France, who reported an average age of 5.5 ± 2.6 years, but lower than that reported by Gachelin E *et al.* [9] (2015) in France, who found an average age of 10.5 ± 3.3 years. This predominance may be related to the hypertrophy of lymphoid tissue in the ENT region, marking this period of adaptation to recurrent rhinosinusitis infections on one

hand, and the fact that the diameter of the upper airways is smaller in children compared to adults on the other hand [10]. We noted a male predominance (69.6%) with a sex ratio of 2.28. This result is comparable to that of Gachelin E *et al.* [9] in France (2015), who also reported a male predominance (sex ratio of 1.04). It differs from the findings of Manel Ben H *et al.* [11] in Tunisia (2018), who noted a female predominance with a sex ratio of 0.81.

The symptoms were dominated by snoring (98.6%), nasal obstruction (97.1%), and mouth breathing (96.6%). Our data are comparable to those of Manel Ben H *et al.* [11] in Tunisia (2018), who found that nighttime snoring, memory disturbances, and morning fatigue were reported at 87%, 73%, and 66%, respectively. In the series by Gachelin E *et al.* [9] in France (2015), snoring, nasal obstruction, and morning headaches were among the top reasons for consultations, accounting for 60%, 41.1%, and 14.4%, respectively. The most commonly reported symptoms by parents of children with OSAHS are snoring and difficulty breathing during sleep. However, snoring has low specificity for OSAHS, and clinical symptoms alone cannot reliably distinguish OSAHS from primary snoring [12]. Other symptoms during sleep include paradoxical breathing (where the chest wall moves inward during inhalation), gasping, restless sleep, frequent awakenings, or pauses in breathing. The duration and frequency of these symptoms must be determined, as well as the degree of persistence (e.g., intermittent, only during illness, or all the time). The voice may be hyponasal due to nasal obstruction or muffled due to tonsillar hypertrophy, with the size of the tonsils assessed using the Brodsky score [13].

Examination of the head and neck can reveal additional clues about the source of upper airway obstruction, such as retrognathia, macrognathia, midfacial hypoplasia, nasal obstruction, and macroglossia. While cardiac anomalies are rare and usually manifest in the context of severe long-standing disease, children may develop systemic hypertension or pulmonary hypertension [5], which can present as pronounced closure of the pulmonary valve (loud P2). In young infants and children undergoing a non-contributory physical examination, neurological impairments affecting the muscle tone of the upper airways must be ruled out. Other common nocturnal signs include diaphoresis and enuresis. Excessive daytime sleepiness is rare [14]. Rhinosinusitis (77.3%), tonsillar hypertrophy (59.9%), and adenoid vegetation (32.4%) were the most commonly reported histories. The repetition of infections would justify this predominance. Regarding the Brodsky score, which evaluates tonsil volume, grade 4 (59.4%) was the most frequently observed in our series. With respect to the Mallampati score, class 2 (93.7%) predominated in our study. This score assesses the relationship between the volume of the tongue, the soft palate, and the oral cavity. In the study by Heath D *et al.* [4] in Canada (2021), children with tonsil sizes classified as 3 were 3.41 times more likely to undergo adenotonsillectomy than children with tonsils classified as 1, while children with tonsil sizes classified as 4 were 7.96 times more likely to have adenotonsillectomy compared to children with tonsils classified as 1. Fibroscopic

examination specifies the size of adenoid vegetation, the position of the soft palate and tonsils, mobility, laryngeal appearance, the size of the base of the tongue, and swallowing and phonation movements. It can be performed in a sitting or supine position. The use of a pediatric nasofibroscope with a small diameter (2.2 mm) should be preferred whenever possible [15]. The main etiologies encountered in our series were adenoid vegetation (71%) and hypertrophic tonsillitis (68.6%). Our data are similar to those of Camoina A *et al.* [16] in France, who reported that adenoid vegetation (78%) and tonsillar hypertrophy (67%) were the predominant etiologies. The main preoperative exploratory examinations performed during our study were biological assessments (100%), nasofibroscopy (50.7%); computed tomography (CT) and X-rays of the nasopharynx (47.4%). Most radiological examinations are unnecessary in routine consultations. The volume of adenoid vegetation is ideally evaluated directly by nasofibroscopy. However, an X-ray of the nasopharynx may be prescribed for recalcitrant children, with excellent correlation to adenoid volume [17]. Patients with complex craniofacial malformations may benefit from cephalometric analysis and a CT scan of the facial skeleton, allowing exploration of both the nasal cavities and the rhinopharynx, the facial region, mandibular morphology, glossoptosis, and pharyngeal volume. These examinations are also useful in the preoperative assessment for midfacial advancement surgery or mandibular distraction [18].

Adeno-tonsillectomy (45.4%) was the main surgical intervention performed in our series. Our data were comparable to those of Oillic H *et al.* [18], who reported that adenotonsillectomy was the surgical treatment used in the majority of patients, with rates of 68% and 90%, respectively. Adenotonsillectomy is the most commonly described intervention in the surgical treatment of OSAHS of ENT origin in children [19]. The resolution of apneic symptoms can reach up to 88% [19]. Adenoid-tonsillar hypertrophy is the most common cause of OSAHS of ENT origin in children. This surgical intervention provides more space for air passage in the upper airways [1]. Almost all children (99.0%) had uncomplicated postoperative outcomes. This result aligns with those of Oillic H *et al.* [18], who also reported uncomplicated postoperative outcomes in their series. These results underscore the crucial role of surgery in the treatment of OSAHS, particularly in children. It must be performed by trained ENT surgeons. Multidisciplinary collaboration is standard for cases of persistent OSAHS.

5. Conclusion

OSAHS is an increasingly common condition in the pediatric population, particularly among school-aged boys. Its symptoms are varied and non-specific, primarily characterized by nighttime snoring, nasal obstruction, and mouth breathing. Management depends on the underlying etiologies, particularly ENT-related ones, with adenotonsillectomy being the first-line treatment that significantly improves the clinical condition of patients. However, a multicenter study will be necessary to evaluate the quality of life of children who have undergone tonsil surgery

for OSAHS.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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