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Pediatric Bruxism and Sleep Disorders Early Detection

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Abstract

Oral parafunction and sleep disorder parasomnia, bruxism involves the dentist and particularly the pediatric dentist to detect in additionto masticatory and occlusal problems, sleep disorders. It is a question of characterizing bruxism in connection with not only dental problems but also sleep disorders. The etiology of bruxism is not formally elucidated, there is however a strong consensus on its multifactorial origin. Bruxism would be caused by central factors (neuropathic or psycho-emotional) involving the central nervous system (CNS) and autonomic (ANS) modulated among other things by sleep and the psychic state. In addition, certain local factors can maintain the parafunction: breathing disorders and sleep parasomnia in particular revealing a pattern of intricate cause-consequences. The aim of this study was to describe the relationship between dental and sleep disorder by the same symptom bruxism in children. Bruxism was the reason for consultation of 98 children aged 3-6 years with more or less extensive loss of dental material evolving over several months and repeatedly. The search for self-reported information on behavioral and attention disorders as well as the daytime and nocturnal signs reported by parents suggesting sleep disorders. A polysomnography made, it was possible to confirm the diagnosis and to indicate the severity of the sleep disorder, namelyinsomnia (2%), hypersomnia (4%) circadian rhythm disorders (8%), other parasomnias (16%), and 70% had OSAS with an average AHI of 4.4/h. A statistical association was found between bruxism and OSAS (P<0·001; Chi-square test).

Keywords: Bruxism; Children; Parafunction; Parasomnia sleep disorders; Polysomnography; OSAS

Introduction

Bruxism is considered as an oral parafunction in dentistry [1,2] and a parasomnia by sleep medicine [3-7]. It is described as a non-nutritive, repetitive, involuntary, most often unconscious chewing motor activity that can occur both during sleep and while awake. Presence of unusual grinding is the parafunction most frequently encountered during sleep. It is characterized by the involuntary movements described as rhythmic activity of the masticatory muscles (RMMA) [7], associated with sound phenomena that the patient is unable to reproduce when awake [8]. In 1931 Frohman used the term "bruxism" to designate the dysfunctional or Parafunctional action of clenching the teeth more or less continuously in positions of maximum intercuspation or excursion of the mandible [2]. Often described by parents with colorful expressions "It sounds like chalk squealing on a blackboard!" during his sleep or "it sounds like he is rubbing his teeth against each other" or even "it sounds like he is eating his teeth during the night" to report the dental shrill noise or friction.

The clenching, grinding, swinging and tapping of the teeth are the different forms of bruxism. The impressive and unpleasant noise produced by this action does not wake the sleeper.

An oral parafunction, bruxism in children must be diagnosed early in order to counteract the deleterious effects on the various structures of the masticatory apparatus. Sleep parasomnia, bruxism can reveal sleep disorders. If the etiology of bruxism is not formally elucidated, there is however a strong consensus on its multifactorial origin. Bruxism would be caused by central factors (neuropathic or psycho-emotional) involving the central nervous system (CNS) and autonomic (SNA), modulated among other things by sleep and the psychic state. In addition, certain local factors can maintain the parafunction: breathing disorders sleep parasomnia in particular revealing a pattern of intricate cause-consequences. Customary of the oral dimension of bruxism, the objective of this article is to sensitize the dental surgeon and particularly the pediatric dentist to broaden his diagnostic strategy to other dimensions in particular parasomnia, for a multidisciplinary and holistic approach to the management of child bruxism.

Interview-clinical examination-positive and differential diagnosis

Mentioned in an innocuous or worrying way by the parents, its presence must rightly lead the dentist to a thorough and complete interrogation in order to seek if necessary the other diurnal and nocturnal signs of any other pathologies of the child including bruxism. Moreover, there is an increased possibility of the repercussions of certain pathologies on bruxism: endocrine dysfunction, hyperthyroidism, neurological, muscular and sleep disorders of which bruxism can constitute an isolated or associated

parasomnia. Thus many authors have taken an interest in the stress/bruxism relationship and have concluded that there is a correlation between emotional experience and this symptom which is both parafunction and parasomnia.

The anamnesis reveals episodes of tenseness and often daytime and nighttime dental grinding.

The interview seeks details about the child's behavioral habits, environment and psychosocial factors. Para-functional oral habits (habit of biting objects, onychophagia, chewing gum, etc.), breathing problems manifested by snoring, psychosocial disorders, anxiety and stress, family history of bruxism [9]. Two very specific times during determining children can grind their teeth physiologically. This is when the baby teeth erupt and the permanent teeth erupt. Many children tend to grind their teeth from these eruptions. This physiological situation calls for no therapeutic attitude except that of informing and reassuring the parents. Spontaneous cessation of bruxism is achieved when permanent teeth appear in the mouth.

Exo-oral examination performs a palpation of the neck and head to eliminate pain related to a dysfunction of the masticatory system or other joint pain. The examination of the posture of the head will have to be carried out. Similarly, the presence of hypertrophied masseter muscles can be an indirect sign of clenching or grinding teeth [6]. Pain in the masticatory muscles reflects the signs evoking the duration and intensity of bruxism. The signs of oral breathing will be sought such as the presence of dark circles, collapsed nostrils, labial in occlusion with chapped lips. The risk of presenting or developing a sleep obstructive breathing disorder in connection with retrognathia, micrognathia, macroglossia, anterior crowding, adenotonsillar hypertrophy verified. Of course, while primary snoring is often the initial symptom reported by parents and should warrant careful screening for OSAS, the same is not true for bruxism. OSAS is a common pediatric disorder characterized by recurrent events of partial or complete upper airway obstruction during sleep which result in abnormal breathing and sleep pattern. OSAS in children is associated with neurobehavioral deficits and cardiovascular morbidity which highlights the need for prompt recognition, diagnosis, and treatment.

Intraoral examination indicates the presence of bruxofacets. These are occlusal wear facets found outside the functional contact zones which are often established in pairs by excessive dental wear on the maxillary canines and on the incisors. The generalized tooth wear due to bruxism can cause not only a loss of vertical dimension, but also most often an advancement of the mandible. The dental examination concerns malocclusions designated as risk factors for bruxism.

The examination of the mucous membranes looks for the imprint of the teeth or even the bites of the ridges, the gums and the tongue by indentations on the lateral edges of the tongue (crenellated).

Additional examinations will depend upon the parafunction, parasomnia and diagnostic axes retained. Full-night polysomnography (PSG) remains the gold standard diagnostic test for diagnosing bruxism during sleep. It refers to a systematic process used to collect physiologic parameters during sleep. It is a procedure that utilizes electroencephalogram, electro-oculogram, electromyogram, electrocardiogram, and pulse oximetry, as well as airflow and respiratory effort, to evaluate for underlying causes of sleep disturbances.

Material and Method

A prospective, single-center and observational study made from 2017-2019. Bruxism was the reason for dental consultation of children aged 3-6 years. All parents of children participating in the study were asked to fill a questionnaire with three section: personal data, children sleep quality data and OSAS risk factors.

Bruxism could be assessed as "possible" with the self-report questionnaires, but as “definite” with the self-reports and (PSG). Indeed, PSG confirmed the diagnosis and indicated the type and severity of the sleep disorder. Thus the assessment of the severity of OSAS is usually based on the Apnea-Hypopnea Index (AHI) defined as the number of apnea or hypopnea events per hour of sleep.

Although the AHI is often criticized for its limitations, it remains the best studied metric of OSAS diagnosis and severity.

The exclusion criteria related to periods of dental eruption. The interrogation showed that this bruxism occurred outside of any period of eruption. The search for self-reported information on behavioral and attention disorders as well as the daytime and other nocturnal signs reported by parents suggesting sleep disorders.

Signed consent form from parents was required.

Data analysis was performed with R. v3.6.0 and results were presented as frequency and percentage. Wilcoxon Rank Sum Test and Chi-square tests were calculated using odds ratios with 95% confidence interval (CI). A p-value of <0.05was considered as statistically significant.

Results

A total of 98 pediatric patients with bruxism were recruited I the study. The mean and median age in years was 4·48 years (SD: ± 1·04 years). Demographics by age, gender of children, and parental socioeconomic status are summarized in table 1.

The clinical features according to diagnosis, duration of bruxism and the state of sleep disorders are summarized in tables 2-4.

Discussion

Socio-economic characteristics

Bruxism affects children equally. There is no significant difference in the prevalence of bruxism between females and males. In our survey, it was revealed some children, this teeth grinding occurring during the day in anxious children, but grinding during sleep is most common. A high prevalence has also been found the age group of 3-4 years, 52% presented the most affected by bruxism despite the completeness of the deciduous teeth as several authors [10,11].

Socioeconomic characteristics were also associated with the occurrence of bruxism 79.6%. This symptom is more commonly found among children from families with a better socioeconomic status, which may be related to the higher number of daily duties and demands by children, compared to children from a poor background (Table 1).

In adequate sleep has a negative impact on the children’s over all health, cognitive function, and quality of life. In sleep deprivation, children tend to be sleepy during the day and this can have many cognitive, behavioral, and metabolic consequences. Unsatisfactory school performance, mood disturbances. The under-notification of bruxism can occur when parents are unaware of this habit in their children (Tables 1 and 2).

Bruxism duration: under diagnosed and unrecognized

Indeed, parents will never complain to the dental surgeon about their child’s sleep, on the other hand they will complain about bruxism. Commonly called teeth grinding, parents inevitably make the

Table 1: Demographic distribution of patients.

Demographic data		N=98	(%)
Age	3-4	52	52.0
	4-6	46	46.0
Gender	Female	50	51.02
	Male	48	49.98
Parents' income	<50k €	20	20.40
	50-200k €	78	79.60
Parents' housing	Permanent	43	43.8
	Semi-permanent	55	56.1
Level of education of parents	Primary	15	15.3
	Secondary	45	45.9
	Tertiary	38	38.0

Table 2: Clinical data of study participants.

Clinical Features		N= 98	(%)
Number of dental consultations	≤ 3	24	24.48
	>3	74	75.52
Dental state	Retrognathia	38	38.77
	Cross-bite	28	28.57
	Micrognathia	10	10.20
	Anterior crowding	5	5.10
	No malocclusion	19	19.38
Duration of bruxism	≤ 1 year	15	15.30
	>1 year	83	84.69
Sleep disorders	Present	63	70.78
	Absent	35	35.71
AHI	≤ 5	83	84.69
	>5	15	15.30

connection between teeth and teeth grinding, hence the complaint is to the dental surgeon at first. As a first-line informed health professional, heparticipates in the detection, diagnosis and management of this parafunction-parasomnia [12]. The history and clinical examination are the fundamental pillars to help diagnose OSA in pediatric patients with bruxism.

Despite apparent symptoms and potentially severe consequences, children bruxism related to sleep disorders may be under diagnosed and unrecognized. It may take more than 3 consultations (Table 2) for a sleep disorder screening. Frequently found in children, bruxismis not always considered pathological. Our study suggests the early PSG as additional examination can help detect significant sleep-related problems in children was useful for making therapeutic decisions regarding children. OSAS as the primary sleep problem for most of the children. History and examination are fundamental areas that dentists can use to help diagnose OSAS in pediatric patients from bruxism.

Interest of bruxism early detection

Asking a few simple questions about sleep (also using validated questionnaires) and a complete medical history is the basic principle of screening for children sleep disorders. The questions should be asked to the parents who can easily report the signs and symptoms, nocturnal and diurnal, related to sleep disorders. In case of suspicion

Table 3: Bruxism and sleep disorders.

Sleeping disorders	Types of sleep disorders (n=98)	
	Bruxism N (%)	Non bruxism N (%)
Insomnia	1(2.00)	2(4.16)
Parasomnia	8 (16.00)	20(41.66)
Hypersomnia	2 (4.00)	3(6.25)
Circadian rhythm	4(8.00)	5(10.41)
OSAS	35 (70.00)	37.5 (18.36)
Total	50	48

Table 4: Statistical analysis.

Characteristic of patients		Bruxism	No bruxism	p-value
Age*	3-4 years	52.1 ± 6.385	47.8 ± 9.541	0.318
	4-6 years	3.98 ± 2719	4.83 ± 2.879	0.014***
AHI**	Female	27(54)	23(46)	0.0007****
	Male	28(58)	20 (42)	

*Data was presented as mean ± Standards deviation and Wilcoxon Rank Sum Test was used for analysis,
**Data was presented as frequency (%) and Chi-square test was used for analysis, and
**** indicates statistically significant value of <0.05 and <0.01, respectively.

and comorbidities, the dentist must refer their young patient to the specialist, a sleep medicine specialist). Our study suggests the early PSG may help detect significant sleep-related problems in children and is useful for making therapeutic decisions regarding children. OSAS was the primary sleep problem for most of the children. Its management must be complete, rigorous and multidisciplinary. Screening for bruxism related to OSAS is justified by its prevalence, by the potentially severe consequences and by the existence of an efficacious treatment. After an eruption, this habit is lost in most cases. If tooth clenching is diagnosed early, it can be treated by knowing the primary causes of this problem.

Multidisciplinary approach

Bruxism and habitual snoring are strongly linked. Similarly, a link has also been established between bruxism and tonsillar hypertrophy, which is managed by the ENT. Thus upper airway obstruction is one of the components of obstructive sleep apnea. Bruxism can also be caused by allergic processes, such as asthma or airway infections, which are managed by the allergist.

From the polysomnographic results, we found that the majority of children 70% with bruxism had severe OSAS (Table 2) children. In fact, bruxism is more quickly and easily taken into account when it is correlated with dental malocclusions and the search for ENT disorders may be easier to evoke [13]. Thus, the study showed that 38.77% of retrognathia, 28.57% of crossbite and 19.38% a micrognathia with or without dental crowding. However, it is important to emphasize that bruxism can exist in the absence of any dental malocclusion 19.38% (Table 2).

In fact, bruxism is more quickly and easily recognized when it is correlated with dental malocclusions and the search for sleep disorders may be easier to evoke [13]. Thus, retrognathia 38%, cross bite 28%, micrognathia 10.20 with or without dental crowding were

found. However, it is important to note that bruxism can exist in the absence of any dental malocclusion 20% (Table 2). The management of bruxism is not the sole responsibility of the dental surgeon, given the various disciplines involved in the management of bruxism (the list is not exhaustive).

Additional examination

We found that the AHI value does not always correlate with the severity of the bruxism and the sleep disorders. Indeed, children with discrete signs could present high AHI values and vice versa. Hence the need for a screening approach based mainly on clinical findings. The mean AHI of 4.4 reflects the need to take into account the clinical signs because 70% of the children suffered from OSAS, the most common sleep disorder, of which bruxism is one of the symptoms and contributes to the polymorphism of clinical symptoms [9,11,12,14,15]. Indeed, the speed of the detection depends on the end of the medical emergency of the parents. Thus, among the sleep disorders related to bruxism, 70% present an OSAS, 16.4% ahypersomnia, of the treatment necessary to avoid the deleterious consequences on the growth of the child, including learning difficulties and cognitive-behavioral consequences. It is therefore the responsibility of the dental surgeon not to limit himself to the child's teeth, but above all to look for all other symptoms related to upper airway obstruction [10].

Conclusion

Our study confirms the relationship of dentistry function and sleep parafunction disorders. Bruxism is increasingly being observed in children and this fact highlights the importance of early diagnosis, in addition to the guidance and commitment of parents with the proposed treatment, in order to effectively treat this change that can negatively affect the quality of life for children and their families. Likewise, it is important to emphasize that children with sleep apnea wake up several times during the night, which increases parafunctional activity. Screening for bruxism related to OSAS is justified by its prevalence, potentially severe consequences and by the existence of an efficacious treatment.

Conflict of Interest Statement

There are no conflicts of interest.

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