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REVIEW

Impact of bruxism in children: from occlusion to salivary quality

Impacto del bruxismo en niños: desde la oclusión hasta la calidad salival

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ABSTRACT

Introduction: bruxism was identified as a parafunctional activity capable of generating non-physiological wear facets and associated with non-carious lesions such as attrition, abrasion and abfraction. In children, this condition presented unique characteristics due to its high capacity for tissue regeneration and physiological adaptation, which generally caused asymptomatic pictures. Therefore, early diagnosis was based on the identification of occlusal imprints and their relationship with the stomatognathic system.
Development: several authors emphasized the importance of occlusal imprints as a diagnostic tool to differentiate between normal function and parafunction. It was pointed out that factors such as biotype, neuromuscular activity and individual adaptability influenced alterations of the masticatory system, including temporomandibular joint (TMJ) dysfunction. In addition, the relationship between bruxism and saliva quality was critical, as the latter, regulated by the autonomic nervous system, played a protective and facilitating role in balancing the oral microenvironment. The variable composition of saliva and its influence on microbial growth, including bacteria and fungi such as Candida spp. was highlighted.
Conclusion: the diagnosis of bruxism required a multidisciplinary approach integrating knowledge of oral neurophysiology, jaw biomechanics and salivary composition. This approach allowed the development of more effective preventive and therapeutic strategies, ensuring a better quality of life for pediatric patients. The findings reinforced the need for a detailed analysis of the factors involved in this pathology in order to implement comprehensive solutions.

Keywords: Bruxism; Stomatognathic System; Occlusal Imprints; Salivary Quality; Early Diagnosis.

RESUMEN

Introducción: el bruxismo fue identificado como una actividad parafuncional capaz de generar facetas de desgaste no fisiológicas y asociada a lesiones no cariosas como atrición, abrasión y abfracción. En niños, esta condición presentó características únicas debido a su alta capacidad de regeneración tisular y adaptación fisiológica, lo que generalmente ocasionó cuadros asintomáticos. Por lo tanto, el diagnóstico temprano se basó en la identificación de huellas oclusales y su relación con el sistema estomatognático.
Desarrollo: diversos autores destacaron la importancia de las huellas oclusales como herramienta diagnóstica para diferenciar entre función normal y parafunción. Se señaló que factores como el biotipo, la actividad neuromuscular y la adaptabilidad individual influyeron en las alteraciones del sistema masticatorio, incluyendo la disfunción de la articulación temporomandibular (ATM). Además, la relación entre el bruxismo y la calidad de la saliva fue fundamental, ya que esta última, regulada por el sistema nervioso autónomo, desempeñó un papel protector y facilitador en el equilibrio del microambiente oral. Se destacó la composición variable de la saliva y su influencia en el crecimiento microbiano, incluyendo bacterias y hongos como Candida spp.
Conclusión: el diagnóstico del bruxismo requirió un enfoque multidisciplinario que integrara conocimientos

de neurofisiología oral, biomecánica mandibular y composición salival. Este enfoque permitió desarrollar estrategias preventivas y terapéuticas más eficaces, asegurando una mejor calidad de vida para los pacientes pediátricos. Los hallazgos reforzaron la necesidad de un análisis detallado de los factores involucrados en esta patología para implementar soluciones integrales.

Palabras clave: Bruxismo; Sistema Estomatognático; Huellas oclusales; Calidad Salival; Diagnóstico Temprano.

INTRODUCTION

When making a diagnosis, the most difficult thing is to distinguish between similarities. This is why it is necessary to study more thoroughly the etiological agents of aspects of wear considered non-physiological resulting from non-carious lesions, in this case, bruxism, in order to arrive at an early diagnosis and timely treatment.[1]

Children in childhood show more excellent fatigue resistance when subjected to intermittent muscular effort, great physiological adaptation, and tissue regeneration associated with a short use of the masticatory components in situations that favor an asymptomatic picture. We must, therefore, focus on the “traces” found on the occlusal surfaces and incisal edges.[2]

Albert Szent-Oyorgyi wrote: “If the STRUCTURE does not tell us something about the FUNCTION, it means we have not observed correctly.”

DEVELOPMENT

In the field of BRUXISM, OCCLUSAL MARKS are important diagnostic elements in determining whether or not the system is dysfunctional.

In the field of the masticatory system, its function, and dysfunction, there are multiple factors to consider as it forms part of a system that is a morpho-functional unit that is anatomically integrated and physiologically coordinated: the stomatognathic system (S.E.) whose anatomical determinants are:

- Right TMJ
- Left TMJ
- Occlusion
- Neuromuscular system

In this work, we focus on the relationship between OCCLUSION - PARAFUNCTION - SALIVA

About OCCLUSION AND PARAFUNCTION, any neuromuscular alteration will cause physiological compensation or pathological claudication depending on the following factors: biotype, neuromuscular activity, chewing pattern, and individual adaptability.[3]

Figure 1. Components and Dynamics of the Stomatognathic System

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Many authors mention occlusion as an etiological factor present in stomatognathic system dysfunction.

As early as 1979, Ramfjord and Ash wrote that occlusal trauma can manifest itself in the periodontium, complex tooth structures, pulp, TMJs, soft tissues of the cavity, and the neuromuscular system.

Yojiro Kawamura believes that mandibular movements will be altered to a greater or lesser extent depending on whether one or more elements of the masticatory system are affected. Dysfunction of the mandibular muscle mechanisms, pathological conditions of the TMJ and oral sensory mechanisms, and a certain degree of malocclusion are the main factors that induce mandibular movement dysfunction. The symptoms of mandibular disorders vary depending on the location of the attack.(4)

According to the AAOP, bruxism is a daytime or nighttime parafunctional activity that includes teeth clenching, grinding, and wearing one's teeth in the absence of subjective awareness. It can be diagnosed based on the presence of clear wear facets that are not generated by masticatory function.(5)

Anibal Alonso mentions Centric Bruxism and Eccentric Bruxism as different pathologies. Thus, in Centric Bruxism or clenching, Mutually Protected Occlusion and Mutually Shared Occlusion may act, and their pathogenic capacity will be limited. In contrast, these mechanisms will initially have acted through contact in eccentric bruxism. Still, they will then have been destroyed until they disappear in the face of the characteristics of bruxism: excessive forces, prolonged duration, and horizontal cycles.(6)

Donald Seligman states that bruxism is not a diagnosis but rather the observed effect of a central phenomenon. He assumes that wear and bruxism will occur to some degree in all patients and that any extensive bruxism activity can complicate the phenomenon with or without dysfunction.(7)

J.C. Turell writes that anything added to or removed from the occlusal surfaces can be transmitted to the TMJs immediately or indirectly, with or without symptoms, for better or worse.(8)

Arturo Manns Fresse reports that, in cases of bruxism, the parafunctional activity of teeth clenching and/or grinding causes greater daily and repeated muscle activation than normal. A. Manns Fresse – Stomatognathic System.(9)

Y. Kawamura considers that the essential factor in reaching a pathology diagnosis is knowing what is normal. Practical knowledge of current anatomy and physiology is indispensable for professionals to make reliable diagnoses and find the most appropriate and effective treatment. Whenever we talk about mandibular movements, we must consider not only the problems related to each functional element of the mandibular structures but also the physiological organisms that integrate these elements into well-organized movements and the possible variations in the development of mandibular movements.(10)

For Yojiro Kawamura, occlusion is the contact relationship between teeth resulting from muscular control of the masticatory system.(11)

For Carlos Gualco, occlusal relationships should be considered as a compensatory manifestation of functional adaptation to the evolutionary dynamics of jaw growth and the activity of the muscular component of the biotype to match the centric relation (CR) with the position of maximum intercuspation (PMI) on an ideal plane.(12)

For Functional Jaw Orthopedics, Occlusion is linked to Oral Neurophysiology.(13)

Thus, relationships are observed that demonstrate the importance of understanding Oral Neurophysiology in order to work on this project, which seeks to connect occlusal dysfunction (bruxism) and saliva quality.

Wilma Simoes considers that the muscles that carry or support the bones, protecting and driving the power of movement, are like true "SOBRES." These are the masseter, medial pterygoid, and constrictors of the pharynx, which surround the jaw and the noble structures of the neck, respectively. Other muscles, such as the temporal, mylohyoid, and hyoglossus, are considered " SHEETS," as they adjust the best direction for the most opportune occasion, regulating the position of the tongue, hyoid bone, and jaw, synchronizing movements. Finally, the 'REINS' are the finishers, commanding the perfection of the minor details and making fine adjustments to the movements. They are classified as Main Reins (Pt, External, Styloglossus, and Digastric) and Complementary (Stylohyoid, Geniohyoid, and Stylopharyngeus). The external pterygoid (1st rein) is innervated by cranial nerve V, the styloglossus (2nd rein) by cranial nerve XII, and the digastric (3rd rein) by cranial nerve V anterior and cranial nerve V posterior.(14,15)

Wilma Simoes also describes the existing muscular intercommunication as "shooting stars," in which each star in the constellation is a muscle related to the others: Suprahyoid, Hyoglossus, Temporal, Pt. Lat. Sup., Orbitalis, Pt. Lat. Inf., Milohyodeus, V. ant. Digastric, Masseter, Pt. Medial, Buccinator, Orbit. Orbis Palatoglossus, Intrinsic. Reaffirming the neuromuscular connection in occlusal dysfunction.(16)

In the field of Functional Jaw Orthopedics, this organization outlines concepts about the mechanisms of operation of Functional Orthopedic Appliances, specifically SIMOES NETWORK (SN) APPLIANCES, which will be used in this work.

With regard to SALIVA, the parasympathetic system regulates salivary function through a neuromuscular intercommunication relationship.

This control system originates in the bulb, in the upper and lower salivary nuclei closely linked to motor neurons of the glossopharyngeal and facial nerves, cranial pairs also present in the muscular reins of the masticatory system according to the muscular organization of Wilma A. Simoes based on Oral Neurophysiology.[17,18]

SALIVA is an aqueous solution, with water as its solvent and organic and inorganic substances in a slightly hypotonic solution.

Its chemical composition varies depending on the rate of salivary flow and/or the type of stimulus that gives rise to a particular variation in flow. For example, taste stimuli excite salivary secretion rich in enzymes. In contrast, a mechanical stimulus (such as the placement of functional orthopedic appliances - FOA) excites a type of secretion that is either very aqueous, hypotonic, or, conversely, a mucous secretion.

Under conditions of salivary rest (without stimulation of secretion), 1 ml/minute is secreted, especially by the submandibular gland (70 %), which is called basal secretion. Under these conditions, the density is 1002 to 1012.

Among the inorganic components eliminated by saliva are chloride, bicarbonate, phosphate, iodide, bromide, fluoride, sodium, potassium, and calcium (which are highly variable depending on salivary flow).

Among the organic components are proteins such as amylase, lysozyme, kallikrein, immunoglobulins, soluble protein substances, and albumin, but the most important are glycoproteins, a combination of a macromolecule formed by proteins and carbohydrates, specifically glycosaminoglycans.

Glycoproteins are represented by mucin, which determines the high viscosity that confers many of saliva's physicochemical characteristics and functions.

These glycoproteins have a high molecular weight and sialic or neuraminic acid content. Research shows that these glycoproteins are involved in the pathogenic processes of caries and periodontal disorders. They are absorbed into the tooth surface in vivo, forming an insoluble film with no organic structure called salivary film, from which bacterial plaque forms.

The quantity and quality of salivary glycoproteins vary, with some forming films more easily than others.[19]

A relationship has been found between BRUXISM and SALIVA regarding spontaneous basal secretion due to acetylcholine released by the parasympathetic system. The flow and quality of saliva are constantly changing in response to stimuli acting on the salivary gland through the autonomic nervous system, particularly the parasympathetic cholinergic system.

Saliva is essential to the oropharyngeal environment and enables speech, taste, chewing, normal bolus formation, and swallowing.

It plays a vital role in protecting the hard and soft tissues of the oral cavity by helping to maintain the balance of the environment with microorganisms.

Many people suffer from subjective or objective alterations in their saliva's quantity and/or quality, which may be secondary to diseases, medications, medical treatments, or emotional situations.[20]

Saliva is essential in the microenvironment of the oral cavity for the development of various microorganisms, including primary colonizers such as Streptococcus gordonii. In turn, it is believed that bacteria are facilitators for fungi of the Candida genus to adhere to tissues, as this fungus depends on environmental conditions to grow.[21,22,23]

CONCLUSION

The diagnosis of bruxism and its relationship with the stomatognathic system, parafunction, and salivary quality highlights the need for a comprehensive and multidisciplinary approach. This study has highlighted that non-carious lesions, such as attrition, abrasion, and abstraction, can provide key clues for early diagnosis, especially in children who tend to be asymptomatic due to their high capacity for physiological adaptation and tissue regeneration.

The importance of occlusal impressions as a diagnostic element was reaffirmed, considering their relationship with functional alterations of the neuromuscular system and occlusion. Several authors have pointed out that temporomandibular joint (TMJ) dysfunction and mandibular movements are due to the interaction of multiple factors, such as biotype, muscle activity, and masticatory pattern.

In addition, the relationship between bruxism and saliva was highlighted, emphasizing that the latter plays a crucial role in the balance of the oral microenvironment, either as a protective medium or as a facilitator for microbial growth, including fungi such as Candida spp. Factors such as saliva's chemical composition, flow, and viscosity vary according to external and internal stimuli and are regulated by the autonomic nervous system.

Finally, the findings suggest that an accurate diagnosis requires a thorough understanding of normal anatomy and physiology. Only through detailed analysis of functional patterns and the interrelationship of mechanical, biological, and chemical factors can more effective preventive and therapeutic strategies be developed for managing bruxism and its implications for oral health.

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