



ORIGINAL ARTICLE

Excessive vertical overbite: clinical-epidemiologic characteristics and treatment in children under 19 years of age

Sobremordida vertical excesiva: características clínico-epidemiológicas y tratamiento en menores de 19 años

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ABSTRACT

Introduction: excessive vertical protrusion, vertical overbite, overbite or increased overbite are a frequent finding in maxillomandibular discrepancies.

Objective: to update knowledge on overbite or excessive vertical overbite in children under 19 years of age.

Methods: in order to carry out this bibliographic review, 50 articles on the subject were consulted, obtained from Pubmed, LILACS, Hinari, SCielo, academic Google, degree theses and texts of the specialty of Orthodontics. Forty-one articles were used as bibliography, with a predominance of articles published during the last five years and others of earlier date to reference the history of the definition of excessive vertical overbite.

Development: excessive vertical overbite can manifest in children and adults; it is frequent in class I, II and III malocclusions. Its prevalence increases between five and 12 years of age. The precise identification of these anomalies through clinical and radiographic characteristics is fundamental to achieve a correct diagnosis and timely treatment according to their origin during growth. Orthodontic treatment in these cases aims to conform an adequate vertical protrusion of incisors through the application of various strategies according to etiology, age and facial esthetics. The most severe cases achieve better results when treated during growth and development.

Conclusions: Deep bite is a common component of malocclusion in children and adults, its etiology should be considered in order to formulate a detailed diagnosis and treatment plan to achieve optimal skeletal, dentoalveolar, occlusal and esthetic results.

Keywords: Malocclusion; Overbite; Orthodontics, Corrective; Pediatric Dentistry.

RESUMEN

Introducción: el resalte vertical excesivo, la sobremordida vertical, overbite o sobrepase aumentado, son un hallazgo frecuente en las discrepancias maxilomandibulares.

Objetivo: actualizar los conocimientos sobre overbite o sobremordida vertical excesiva en menores de 19 años.

Métodos: para realizar esta revisión bibliográfica se consultaron 50 artículos sobre el tema, obtenidos de Pubmed, LILACS, Hinari, SCielo, Google académico, tesis de grado y textos de la especialidad de Ortodoncia. Fueron utilizados 41 artículos como bibliografía, predominaron los artículos publicados durante los últimos cinco años y otros de anterior data para referenciar la historia de la definición de sobremordida vertical excesiva.

Desarrollo: la sobremordida vertical excesiva se puede manifestar en niños y adultos; es frecuente en maloclusiones clase I, II y III. Su prevalencia aumenta entre cinco y 12 años de edad. La identificación precisa de estas anomalías a través de las características clínicas y radiográficas es fundamental para lograr un diagnóstico correcto y tratamiento oportuno según su origen durante el crecimiento. El tratamiento ortodóncico en estos casos persigue conformar un adecuado resalte vertical de incisivos mediante aplicación de varias estrategias según etiología, edad y estética facial. Los casos más severos logran mejores resultados cuando se tratan durante el crecimiento y desarrollo.

Conclusiones: la mordida profunda es un componente común de la maloclusión en niños y adultos, se debe considerar su etiología para formular un diagnóstico y plan de tratamiento detallado para alcanzar óptimos resultados esqueléticos, dentoalveolares, oclusales y estéticos.

Palabras clave: Maloclusiones; Sobremordida; Ortodoncia Correctiva; Odontopediatría.

INTRODUCTION

In orthodontics, diagnosis is the process of synthesizing the multiple factors of a complex situation in a list of problems where each one suggests a tentative solution: anomalies in tooth position are one of those aspects to be taken into account in orthodontic diagnosis, in most cases, of slight biological variations with respect to the norm, but when they are immediately visible, correction is frequently required as a felt need of the patient.^(1,2,3)

To solve occlusal alterations or disharmonies it is first necessary to recognize them in all their forms and stages of development, this identification constitutes the orthodontic diagnosis; which is a systematic, tentative and exact conjecture directed to two purposes: classification of the case and treatment planning.^(4,5,6)

These occlusal disharmonies are present in more than 70 % of children and youngsters over six years of age. Among these disharmonies are vertical disharmonies, anterior adachia, absence of contact of the teeth in the anterior sector of the arch between jaws of great interest for orthodontists due to the lack of stability in therapeutic results, and overbite or underbite, which is of great interest for orthodontists due to the lack of stability in therapeutic results, and overbite or exaggerated overlapping of the anterior teeth over the lower teeth or increased vertical bite, causing occlusal, periodontal and temporomandibular disorders.^(7,8)

The vertical overbite or overbite in most patients is part of maxillomandibular discrepancies, predisposes the patient to periodontal diseases, functional problems that affect the temporal, masseter and lateral pterygoid muscles, producing a mandibular and condylar distalization beyond the centric relation, increasing the susceptibility of patients to temporomandibular joint (TMJ) pathologies.⁽⁹⁾

Deep bite, as part of the vertical dysplasias, is considered a complex entity of multifactorial origin where factors such as: genetic (craniofacial growth and development, neuromuscular pattern, ethnic characteristics, heredity), environmental (dysmorphofunctional habits, such as mouth breathing, tongue thrusting, among others), are involved.⁽¹⁰⁾

The treatment of vertical dysplasias is a challenge for orthodontists due to the identification of their origin, whether hereditary or acquired, and their adverse effects on the supporting tissues, TMJ, neuromuscular system and ultimately dental occlusion.^(10,11)

Having our health system a staggered and integral structure, from primary health care in stomatology to tertiary care with the correction of these dysplasias surgically and considering the harmful effects that deep bite has on the stomatognathic apparatus, it was decided to carry out the present literature review with the aim of updating the knowledge about overbite or excessive vertical overbite in children under 19 years of age.

METHODS

A literature review was carried out in Spanish, English and Portuguese of full text articles with the descriptors: vertical overbite and children/childhood and adolescents (children, childhood, adolescent). The databases indexed were Pubmed, LILACS, Hinari and sCielo. A Google search of published theses on the subject was also performed. The search was limited to the last five years, articles were reviewed, and a selection was made that responded to the objective of the current study.

Some older articles were located to reference the history of the definition of vertical overbite. In addition, graduate theses were reviewed, as well as texts of the specialty of orthodontics.

DEVELOPMENT

Definition

The deep vertical overbite, excessive vertical overbite, vertical overclosure or overpass is perhaps one of the most common malocclusions and more difficult to treat successfully, should not be approached as a disease but rather as a clinical manifestation of underlying discrepancies, can be defined as the vertical overlap of the upper incisors, with respect to the lower and is expressed according to the percentage of lower coronal length that is covered by the upper; it is considered adequate when it is in a range of 37,9 % to 40 %. When it exceeds this value, it is called deep bite.^(11,12)

Muñoz, et al.,⁽¹²⁾ state that in 1950, Strang defined deep bite as the superimposition of the anterosuperior teeth over the anteroinferior teeth in the vertical plane. However, it was more appropriate to redefine it as the amount and percentage of overlapping of the lower incisors by the upper incisors.

According to Sandoval Vidal,⁽¹³⁾ the deep bite, vertical overbite or increased overbite is defined in which the dimension between the upper and lower incisal margins is excessive, this dental protrusion should not exceed 2 mm.

Chaconas, quoted by Moreira Campuzano,⁽¹⁴⁾ considers it as a percentage and mentions that there is a normal vertical overbite when about 20 % of the labial surface of the lower incisors is covered by the upper incisors.

Moyers,⁽⁴⁾ denotes it as excessive overbite and defines it as a combination of skeletal, dental and neuromuscular features that produce an undue amount of vertical overlap in the incisor region.

Proffit,⁽¹⁵⁾ describes it skeletally as a Class II alternating with Class I. According to Rodriguez and White,⁽¹⁶⁾ deep bite can be defined by the amount and percentage of overlapping of the lower incisors by the upper incisors. The deep bite predisposes the patient to: periodontal disease, due to overload of occlusal forces, excessive tension, trauma, functional problems (limitation of lateral movements), bruxism.

Epidemiology

They can manifest in children as well as in adults and in class I, II and III malocclusions. Malocclusion is higher in children five to six years of age with an incidence of 35,5 % to 39,2 %.⁽¹⁷⁾

In Brazil, an epidemiological study showed a prevalence of increased overbite in children five to 12 years old and children nine to 12 years old of 26,63 % and 31,79 % respectively.⁽¹⁸⁾

Class II malocclusion is a very frequent anomaly reaching more than half of the orthodontic patients, in Spain a prevalence of 51 % was found, being more frequent division one than two, influenced by factors such as environment and race.⁽¹⁹⁾

In Peru, Orellana (et al.),⁽²⁰⁾ analyzed 57 research studies on the prevalence of malocclusions in the regions of Lima, Ica and Arequipa, obtaining a prevalence of class II of 15 %.

Pascual Sanchez (et al.),⁽²¹⁾ carried out a study with 87 orthodontic study models in university students in Madrid to determine the prevalence of malocclusions in this group and found that Class I was the most prevalent, followed by Class II and, finally, Class III.

Few epidemiological and prevalence studies of this malocclusion were found in Cuba.

Etiology

Neuromuscular

Skeletal relationships are present in a series of variations in the form and function of the neuromuscular system.^(22,23)

Lip and tongue muscles

They intervene in the position and inclination of the dental pieces modifying the horizontal and vertical protrusion. Their dysfunction in the generated forces causes the appearance of dental anomalies and occlusion.^(3,7,24)

Masticatory muscles

The intrusion of the posterior sector and the excessive anterior dentoalveolar growth is associated with a high activity of this muscle group.⁽²⁵⁾

Dental development

The deep anterior bite prevents lateral movements of the mandible and the child becomes a vertical chewer; opening and closing movements that serve as a functional stimulus for the growth of the maxillary anterior alveolar process are limited and inhibit mandibular development. The posterior teeth are in infraocclusion due to strong chewing that aggravates the overbite, with the lower incisors presenting a retroclination accentuated by the blockage of the upper incisors, sometimes extruding and reaching the palate.^(23,26)

Growth and development

When the anterior facial height is less than the posterior facial height, the maxillary bases converge on each other and the result is a deep bite of skeletal origin. Alterations in transverse width can also cause a skeletal deep bite as we can have a wide maxilla with a narrow mandible.^(23,26)

Hereditary

This type of dysgnathia appears in several members of the family; there is undoubtedly a genetic mechanism.^(23,26)

Classification

Overbite can be differentiated into:

- Congenital
- Acquired.

Congenital deep bite

Skeletal

Characterized by a horizontal growth pattern. The anterior facial height is reduced, especially at the level of the lower third, while the posterior facial height is excessive; when the anterior facial height is less than the posterior facial height, the maxillary bases converge together or when a wide maxilla is present with a narrow mandible (transverse width alterations) and the result is a deep bite of skeletal origin.^(22,27)

Dentoalveolar

It is when the whole dentoalveolar set presents an alteration of growth and development. In this deep bite there is retroinclination and retrusion of the anterior, upper and lower teeth, being the origin of the malocclusion the advanced position of the maxilla and the delayed position of the mandible. This type of overbite is characterized by two specific patterns which are under-occlusion of the molars and over-eruption of the incisors, or a combination of both.^(22,27)

Acquired deep bite

Acquired deep bites, on the other hand, are caused by environmental factors that alter the dynamic harmony between the structures around the teeth and the occlusal forces, such as: a lateral thrust or abnormal tongue posture causing underocclusion of the posterior teeth, wear of the occlusal surfaces or tooth abrasions, anterior (or mesial) tilting of the posterior teeth at extraction sites (by the physiological process of occlusal equilibration).^(14,27,28,29)

Clinical features

The profile of these patients has the tendency to be concave, protruding the chin eminence and there is lip retrusion, generally accompanied by a decrease of the lower third and a horizontal or hypodivergent growth associated with a brachycephalic facial pattern, increased muscle tone, in a square face with increased transverse diameters and a perfect lip seal. The diagnosis of this alteration by radiographic study will determine if the discrepancy or alteration is at the bony level.

The deep bite produced by molar underbite presents a wide interocclusal space, the tongue occupies a tilted position and the distances between the basal planes of both jaws and the occlusal plane are short.^(14,27,28,29)

In the deep bite produced by the over eruption of the incisors, the incisal edges of the incisors exceed the occlusal plane, the molars have erupted completely and the interocclusal space is reduced, the incisors are compressed by the labial musculature, the hypertonicity will create coronal retroinclination of the incisors and the growth is hypodivergent.^(29, 30)

Anterior deep bites in the primary dentition are quite frequent, but are rarely treated, they can be associated with the presence of class II malocclusions in the process of development.^(14,26,28,30)

Sometimes the overbite is so severe that the lower incisors are completely covered by the upper incisors. This excessive overbite can cause trauma to the lower vestibular gingiva and the palatal mucosa of the upper jaw. Deep bite is a typical clinical sign of Class II, division two malocclusions.^(31,32,33,34)

Associated postural alterations

Poor dental position and bone growth are also related to body posture. A study conducted in the province of Ciego de Avila found a statistically significant association between malocclusions and body posture.⁽³⁵⁾

Treatment

The diagnosis of this alteration through radiographic study and cephalometry will determine if the discrepancy or alteration is at the bone level or at the dental level and/or if it is located in the upper maxilla or in the mandible.⁽³⁶⁾

In the case of a growing patient, the developmental process influences both the etiopathogenesis and the orthopedic and orthodontic correction. The growth and mandibular rotation will be a determining factor in the type of malocclusion that will develop and in turn will present several phenomena in this process such as the descent of the glenoid fossa and the vertical growth of the condyle.^(37,38)

This growth confronts the incisors with the labial musculature and the hypertonicity will create the retroclination of the crowns of the central incisors causing a deep bite. From this functional influence and the consequent deviation of the dental eruptive pattern, the rest of the occlusal anomalies will be caused, such as retroclination, overbite, mesialization of the buccal segments and crowding.^(8,12,17,18)

The factors that determine the treatment strategy are:

Etiology

The therapeutic approach should respond to the nature of the problem and be directed as much as possible to the source of the discrepancy. Since vertical alterations are commonly a consequence of the discrepancy between vertical growth of the mandibular ramus and vertical dentoalveolar development, it is essential to identify whether the deep bite is a consequence of vertical excess of the mandibular ramus or lack of vertical dentoalveolar development of the posterior teeth.^(17,26)

Age

Dental eruption conditions the degree of vertical dentoalveolar development, hence vertical control of the eruption of the anterior and posterior teeth during the period of mixed dentition can be a successful strategy to achieve early and stable correction of the deep bite, particularly in those patients who present reduction in lower facial height and anti-clockwise mandibular rotation pattern. This avoids further alterations in the three-dimensional development of the jaws, since anterior or posterior vertical control during growth helps to improve the sagittal relationship of the jaws. In addition, early treatment reduces the execution of vertical orthodontic movements that are more difficult to execute and more unstable in adult patients.^(14,26,28)

Facial esthetics

Treatment planning for deep bite should consider aspects related to the facial profile and vertical skeletal pattern and dental exposure.^(6,27,39,40)

In patients with concave profile, hypodivergent skeletal pattern and reduced anteroinferior facial height, extrusive posterior tooth movements are indicated to correct the deep bite, which should be done gradually to promote adequate neuromuscular adaptation and decrease the risk of relapse.^(6,27,39,40)

The harmonic vertical projection of the maxillary incisors is a primary objective of orthodontic treatment, since it determines the preservation of the adequate lip-to-tooth relationship at rest and in the smile according to the age and sex of the patient.^(10,12,15,40)

Meanwhile, in patients with convex profile, hyperdivergent skeletal pattern, vertical excess, increased exposure of incisors at rest and interlabial space, orthodontic treatment should be oriented to the intrusion of the incisors and vertical control. This avoids extrusion of the posterior teeth, increases the vertical dimension, repositions the mandible by its clockwise rotation and increases the interlabial distance.^(10,12,15,17)

CONCLUSIONS

The correction of deep bite requires care in the diagnosis and treatment plan, being interested in knowing the different clinical manifestations that this type of malocclusion presents, since they are contributing factors of disturbances in this temporomandibular joint, its early detection is fundamental to obtain the desired results acting as soon as possible during the period of development and growth of the patients. That is why it is important to deepen in this subject and that professionals are trained and updated to solve in a timely manner the clinical alterations that are presented and in other cases to inform to prevent this alteration from progressing.

Declaration of conflict of interest

The authors declare that they have no conflict of interest in this article.

Authorship contribution

AMG: conceptualization, research, project management, writing - original draft.

CGD: conceptualization, research, methodology, writing - original draft, review and editing.

JRA: conceptualization, research, writing- original draft

AGG: conceptualization, research, writing - original draft

JWS: conceptualization, research, writing - original draft

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