



Main approaches to malocclusions and orthognathic surgery in facial aesthetic: an integrative review

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Abstract

Introduction: In the scenario of orthodontic corrections, orthognathic surgery makes it possible to restore the functional and aesthetic patterns of the face, and non-surgical or minimally invasive procedures have optimized the results of ortho-surgical facial treatments.

Objective: the present study aimed to perform a systematic review of the main information about orthognathic surgery in malocclusions, as well as to present the aesthetic importance. **Methods:** Clinical studies with qualitative and/or quantitative analysis were included, following the rules of the systematic review-PRISMA. **Results and Conclusion:** A total of 107 articles were found involving "malocclusions and orthognathic surgery". A total of 47 articles were evaluated in full, and 33 were included and discussed in this study. Aesthetic/functional rehabilitation is necessary until the eruption of permanent successor teeth occurs. A practical option to obtain this rehabilitation is through the installation of aesthetic or functional space maintainers. These are orthodontic devices that replace one or more deciduous teeth and are used to preserve the space destined for the permanent tooth successor, preventing it from suffering deviations during its eruption. The facial typology seeks to redefine the relationships between deleterious habits and malocclusions, through the valuation of individual morphological characteristics, which will lead to craniofacial growth and development to assume certain facial types. Therefore, due to the aging of the stomatognathic apparatus the orofacial functions can be modified, such as malocclusion, therefore for greater effectiveness and longevity of the final result of the orthodontic treatment, the indefinite use of fixed inferior containment should be established and accompanied by

the professional.

Keywords: Malocclusions. Orthognathic surgery. Aesthetics. Orthodontic treatment.

Introduction

In the scenario of orthodontic corrections, orthognathic surgery makes it possible to restore the functional and aesthetic patterns of the face, and non-surgical or minimally invasive procedures have optimized the results of ortho-surgical facial treatments [1-4]. In this sense, aesthetic/functional rehabilitation is necessary until the eruption of permanent successor teeth occurs [5]. A practical option to obtain this rehabilitation is through the installation of aesthetic or functional space maintainers [6].

Concerning craniofacial growth and development, it is known that throughout life there are variations in its structure, due to the demand and projected requests, such as, for example, oral habits [7,8]. Habits are patterns of muscle contraction that serve as a stimulus to the normal growth of the craniofacial complex. Thus, the face requires besides genetic stimuli, external stimuli for its development, offered naturally by the functions of respiration, suction, chewing, and deglutition [9].

More and more Brazilian adolescents suffer from the lack of or lack of dental spaces, a study confirms that the high rate of dental crowding is an aggravating problem in aesthetics and should have greater attention on public health, these problems can interfere in social life and the self-esteem of adolescents [9].

Dental crowding is the type of malocclusion that occurs most frequently among the Brazilian population and leads to the development of caries and gingival diseases, damaging oral health and disfavoring them aesthetically [10,11]. Temporomandibular TMDs may

also have their development related to malocclusions, making them an aggravating cofactor of this disease [12].

Orthodontics is the specialty that prevents, intercepts, and treats crowding, a diastema, and malocclusion. Orthodontic treatment is essential to reduce the impact of poor quality of life where the treatment period may generate dissatisfaction with the appearance, but the result of the post-treatment brings satisfaction and returns the well-being to the patient [13].

Contention plates are used after orthodontic correction to control dental movements, it was designed to keep the teeth in the position obtained after orthodontic treatment [14]. There are several containment models used by professionals in orthodontics. Among these varied orthodontic containment models, the most requested for patients are the Hawley and Begg plates for the upper arch and the lingual fixed bars and the Hawley plate for the lower ones [15].

With the advancement of age the stomatognathic apparatus changes, causing the teeth, gums, and bone tissues to change their structures, the professionals must be attentive to these changes and able to take measures of prevention and the promotion of the health of its patient, orthodontics these anatomical and physiological changes may influence the treatment outcome [16]. Space maintainers are important when there is early loss of deciduous teeth due to caries disease and trauma. The early loss of the second deciduous upper or lower molars after the eruption of the first permanent molars entails closure of space, especially when the permanent successor slows to erupt [17].

Even if the permanent molars are in occlusion, this fact will not prevent the inclination of the permanent ones, however, the loss of space will be less severe than that observed during the active movements of the eruption [18]. Moreover, the installation of a maintainer is necessary to avoid harmful repercussions to the normal development of the occlusion that can lead to future problems of malocclusion such as arch shortening, a mesial inclination of the first permanent molar, and impaction of the second premolar that even succeeding in breaking out, if directed by lingual or palatal accompanied by gyro-versions, supra-eruption of the antagonist teeth and impairment of future periodontal support [19].

Partial or total loss of the dental structure causes a reduction of the available space in the arch, causing a structural and functional imbalance. Each tooth must remain harmoniously in its correct position, aligned with proximal contacts, in semi-elliptic curves for the maxilla

and parabolic for the mandible, receiving the action of external and internal muscular forces [20]. In cases where one of these forces is altered or removed, changes such as dental migration and loss of space, leading to an occlusal disharmony with deleterious consequences to the stomatognathic system of the child, may lead to a discrepancy between the present space and the space required for the eruption and accommodation of all permanent teeth [21].

By the age of six years, the first permanent molars should erupt, with the lower ones before the upper ones preferentially [22]. These teeth, after erupting, seek occlusion with the antagonists guided by the distal face of the second deciduous molars. Thus, early loss of primary molars will impair the occlusion of the first permanent molars. The variations in the time of exfoliation of deciduous teeth depend on several parameters, including genetic and environmental parameters. It is considered a prematurely lost tooth when it occurs at least six months before the loss of the homologous tooth, or when the deciduous tooth does not exfoliate before the half to three-quarters of the root of the successor's tooth is formed.

Therefore, the present study aimed to perform a systematic review of the main information about orthognathic surgery in malocclusions, as well as to present the aesthetic importance.

Methods

Study Design

The present study was followed by a systematic literature review model, according to the PRISMA rules. Access available at: <http://www.prisma-statement.org/>

Data sources and research strategy

Clinical studies were included as case reports, retrospective, prospective and randomized trials with qualitative and/or quantitative analysis. Also, some review studies were included. Initially, the keywords were determined by searching the DeCS tool (Descriptors in Health Sciences, BIREME base) and later verified and validated by the MeSH system (Medical Subject Headings, the US National Library of Medicine) to achieve consistent search.

Mesh Terms

The main MeSH Terms were malocclusions, orthognathic surgery, aesthetics, orthodontic treatment. The literature search was conducted through online databases PubMed, Periodicos.com, Google Scholar, Ovid, Scopus, Web of Science and Cochrane Library.

Study quality and risk of bias

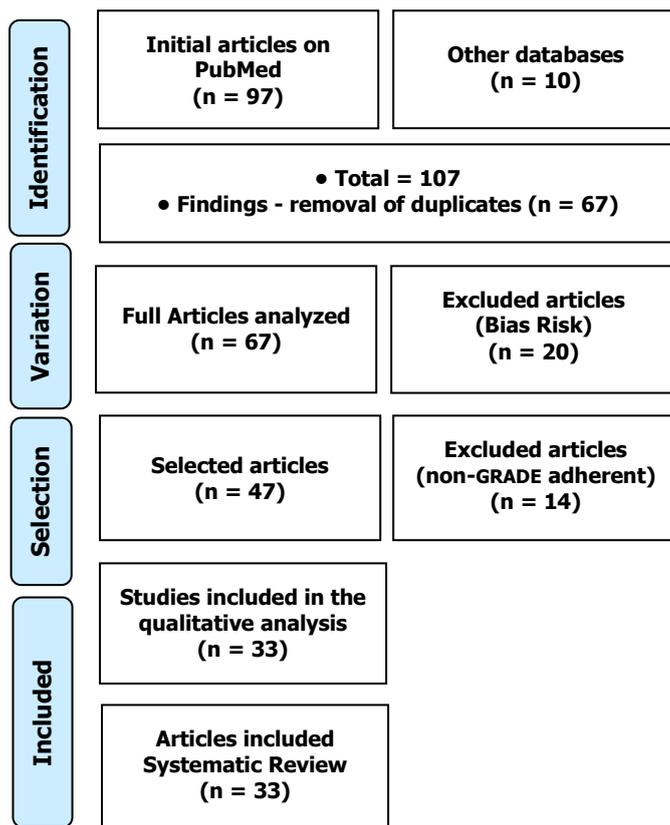
The quality of the studies was based on the GRADE instrument, with randomized controlled clinical studies, prospective controlled clinical studies, and studies of systematic review and meta-analysis listed as the studies with the greatest scientific evidence. The risk of bias was analyzed according to the Cochrane instrument.

Results

Litratue Review and Discussion

A total of 107 articles were found involving "malocclusions and orthognathic surgery". Initially, was held the exclusion of existing title and duplications following the interest described in this work. After this process, the summaries were evaluated and a new exclusion was held. A total of 47 articles were evaluated in full, and 33 were included and discussed in this study (Figure 1).

Figure 1. The selection process of scientific articles.



After selecting the literary findings, a retrospective study of 54 patients compared the costs and benefits of surgical first (SF) and orthodontic first (OF) approaches in patients with skeletal class III malocclusion. The duration of the SF was shorter than that of the OF, due to the reduced orthodontic time. Operating time was longer with SF than with OF. There was no significant

difference in hospital stay, hospitalization, or orthodontic costs. Study results revealed that total treatment time was significantly shorter with SF than with OF, although the two approaches did not differ significantly in terms of the total cost [23].

A high percentage of malocclusions are caused by these early losses, he proposed, in 1907, a space maintainer that would remain unchanged, even if for a prolonged length of stay in the oral cavity [5-8]. In the literature, there are initiatives towards the use of maintainers since 1924. From 1930, the authors recommend and talk about the necessity of using such devices [9-11]. Space maintenance is one of the most important activities in the prevention of malocclusion [12,13]. The purpose of deciduous dentition is to maintain the perimeter of the bow for successors to erupt normally, hence great importance should be given to tooth loss at this stage. However, attention should be paid to the loss of young permanent teeth [14].

In this context, a study showed that of 119,000 school-aged children examined, a 51% malocclusion index was found, and in 80% of those, a preventive orthodontic treatment orientation would be required [6]. In Brauer's study of the incidence of malocclusions, with 41 patients examined, 42 premature extractions of primary first molars and 71 premature extractions of primary second molars were found [7].

Handling the premature loss of deciduous teeth requires care, especially when done by the clinical dentist. The consequences of inadequate procedures have serious repercussions on normal dental development [15]. The loss can compromise the eruption of permanent teeth and decrease the perimeter of the arch. The maintenance of the loss space is of paramount importance to ensure normal eruption and development of the dentition [16-19].

The strategy for the maintenance of space in the deciduous and mixed dentition is, first, to know the problem to plan the treatment [20]. The treatment differs from the posterior to the anterior region and causes as well. Loss in the anterior region is usually due to trauma, which is common when the child is learning to walk. Rampant cavities would be the cause of loss of anterior and posterior teeth [21].

Most of the posterior ones are lost by caries, rarely by trauma [22]. To maintain the spaces of dental losses, the use of space-saving devices is indicated, as there is no loss of space, since the permanent tooth may take months to erupt [23-26]. In another study on the incidence of malocclusions, with 41 patients examined, 42 premature extractions of primary first molars and 71 premature extractions of primary second molars were found [26]. Aesthetic/functional rehabilitation is

necessary until the eruption of permanent successor teeth occurs [24]. A practical option to obtain this rehabilitation is through the installation of aesthetic or functional space maintainers [29].

Thus, space maintainers are orthodontic devices that replace one or more deciduous teeth and are used to preserve the space destined for the permanent tooth successor, preventing it from suffering deviations during its eruption [30]. These devices, regardless of the design chosen, should be as realistic as possible. However, there are several requirements, such as: maintaining the desired interproximal space, not interfering with the occlusion of the opposing teeth nor with the eruption of the permanent tooth, allowing sufficient mesiodistal space for the permanent tooth alignment to erupt, not to infer in phonetics and chewing and present a simple framework and be easily hygienized [31].

Space maintainers are important when there is early loss of deciduous teeth due to caries disease and trauma. The early loss of the second deciduous upper or lower molars after the eruption of the first permanent molars entails closure of space, especially when the permanent successor slows to erupt [32]. The facial typology seeks to redefine the relationships between deleterious habits and malocclusions, through the valuation of individual morphological characteristics, which will lead to craniofacial growth and development to assume certain facial types, different in their structural and functional aspects [33].

It is these particularities that will define the action of these habits on the face [33]. These limits are aimed at the differential diagnosis, to establish, in each case, the possibilities of the individual himself, speech-language intervention, and, mainly, the need for interdisciplinary action [33].

Thus, the neuromuscular stability of the stomatognathic system may be impaired by the presence of deleterious habits [1,2]. In addition to the habits of digital sucking, prolonged use of the pacifier, tongue sucking, or lips triggering facial changes and/or functional adaptations, there are habits, mainly related to masticatory muscles, such as bruxism, dental tightening, onicofagia, cheek bite or lips [2]. These habits result in an abnormal request of the masseter, temporal and pterygoid muscles, both medial and lateral. Such muscles, in a state of hyperfunction, may present painful symptomatology and decreased coordination [2,3].

Conclusion

Due to the aging of the stomatognathic apparatus

the orofacial functions can be modified, such as malocclusion, therefore for greater effectiveness and longevity of the final result of the orthodontic treatment, the indefinite use of fixed inferior containment should be established and accompanied by the professional.

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Data sharing statement

No additional data are available.

Conflict of interest

The authors declare no conflict of interest.

Similarity check

It was applied by Ithenticate@.

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