



Major clinical approaches and treatment in malocclusion: a systematic review

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Abstract

Introduction: Malocclusion has been an aggravating factor in the development of caries, and may not be the main factor for the development of some temporomandibular dysfunction, but it is an untreated cofactor when diagnosed. The use of orthodontic restraint in the post-treatment phase is of great importance so that there is no recurrence of tooth movement that may occur during the period of remodeling of the dental structures. **Objective:** It was to explore the literary findings about the importance of knowing the advances in orthodontics in order to better understand the main treatments of malocclusions and the importance of their use for rehabilitation in the functional, aesthetic and psychological aspects of the patient. **Methods:** The systematic review rules of the PRISMA Platform were followed. The search was conducted from December 2025 to January 2026 across the Web of Science, Scopus, Embase, PubMed, ScienceDirect, SciELO, and Google Scholar databases. The quality of the studies was assessed using the GRADE instrument, and the risk of bias was evaluated according to the Cochrane instrument. **Results and Conclusion:** According to the GRADE instrument, most studies presented homogeneity in their results, with $X^2=72.7\%>50\%$. A total of 138 articles were found and submitted for eligibility analysis, with 28 final studies selected to compose the results of this systematic review. Considering the Cochrane tool for risk of bias, the overall assessment resulted in 27 studies with a high risk of bias and 26 studies that did not meet GRADE and AMSTAR-2 standards. 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: Malocclusion. Aesthetic. Functional rehabilitation. Orthodontics. Space maintainers.

Introduction

Aesthetic/functional rehabilitation is necessary until the eruption of permanent successor teeth occurs [1]. A practical option to obtain this rehabilitation is through the installation of aesthetic or functional space maintainers [2]. Regarding craniofacial growth and development, it is known that throughout life, variations in its structure occur due to demand and projected requests, such as oral habits [3,4]. Habits are patterns of muscle contraction that serve as a stimulus to the normal growth of the craniofacial complex. Thus, the face requires, in addition to genetic stimuli, external stimuli for its development, which are naturally provided by the functions of respiration, suction, chewing, and deglutition [5].

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 in the self-esteem of adolescents [5]. 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 [6,7]. Temporomandibular TMDs may also have their

development related to malocclusions, making them an aggravating cofactor of this disease [8].

Orthodontics is the specialty that prevents, intercepts, and treats crowding, 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 [9].

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 [10]. 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 [11].

With the advancement of age, the stomatognathic apparatus undergoes 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 their patients, orthodontics, as these anatomical and physiological changes may influence the treatment outcome [12]. 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 eruption of the first permanent molars entails closure of space, especially when the permanent successor slows to erupt [13].

Even if the permanent molars are in occlusion, this fact will not prevent the inclination of the permanent ones; the loss of space will be less severe than that observed during the active movements of the eruption [14]. Moreover, the installation of a maintainer is necessary in order to avoid harmful repercussions to the normal development of the occlusion that can lead to future problems of malocclusion such as arch shortening, 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 [15].

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 [16]. 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 [17].

By the age of six years, the first permanent molars should erupt, with the lower ones before the upper ones preferentially. 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 factors. 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 half to three-quarters of the root of the successor tooth is formed [18].

This study aimed to explore the literature findings about the importance of knowing the advances in orthodontics in order to better understand the main treatments of malocclusions and the importance of their use for rehabilitation in the functional, aesthetic, and psychological aspects of the patient.

Methods

Study Design

This study followed the international systematic review model, following the PRISMA (preferred reporting items for systematic reviews and meta-analysis) rules. Available at: <http://www.prisma-statement.org/?AspxAutoDetectCookieSupport=1>. Accessed at: 01/17/2026. The AMSTAR 2 (Assessing the methodological quality of systematic reviews) methodological quality standards were also followed. Available at: <https://amstar.ca/>. Accessed at: 01/17/2026.

Search Strategy and Search Sources

The literature search process was carried out from December 2025 to January 2026 and developed based on Web of Science, Embase, Scopus, PubMed, Lilacs, Ebsco, Scielo, and Google Scholar, covering scientific articles from various periods to the present day. The following descriptors were used in health sciences (DeCS/MeSH terms): "*Malocclusion. Aesthetic. Functional rehabilitation. Orthodontics. Space maintainers*"; and the Boolean "and" was used between the MeSH terms and "or" between the historical findings.

Study Quality and Risk of Bias

Quality was classified as high, moderate, low, or very low regarding the risk of bias, clarity of comparisons, precision, and consistency of analyses. The most evident emphasis was on systematic review articles or meta-analyses of randomized clinical trials, followed by randomized clinical trials. Low quality of evidence was attributed to case reports, editorials, and brief communications, according to the GRADE instrument. The risk of bias was analyzed according to the Cochrane instrument by analyzing the Funnel Plot graph (Sample size versus Effect size), using Cohen's test (d).

Results and Discussion

Summary of Findings

A total of 138 articles were found and submitted to eligibility analysis, with 28 final studies selected to compose the results of this systematic review. The listed studies were of medium to high quality (Figure 1), considering the level of scientific evidence of studies such as meta-analysis, consensus, randomized clinical, prospective, and observational. Biases did not compromise the scientific basis of the studies. According to the GRADE instrument, most studies presented homogeneity in their results, with $X^2=72.7\%>50\%$. Considering the Cochrane tool for risk of bias, the overall assessment resulted in 27 studies with a high risk of bias and 26 studies that did not meet GRADE and AMSTAR-2.

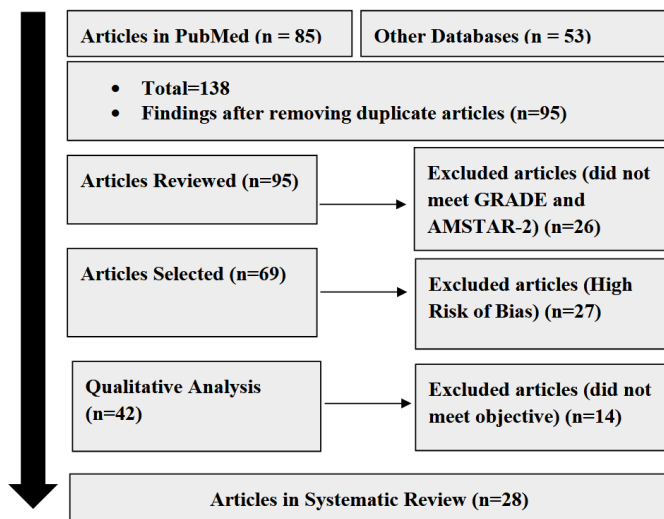


Figure 1. Flowchart showing the article selection process. Source: Own Authorship.

Figure 2 presents the results of the risk of bias of the studies using the Funnel Plot, showing the calculation of the Effect Size (Magnitude of the difference) using Cohen's Test (d). Precision (sample size) was determined indirectly by the inverse of the standard error (1/Standard Error). This graph did not

have a symmetrical behavior, suggesting a significant risk of bias, both among studies with small sample sizes (lower precision) that are shown at the base of the graph and in studies with large sample sizes that are presented at the top.

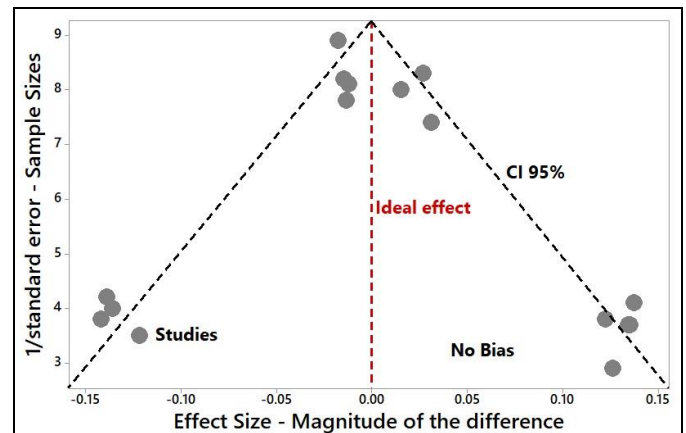


Figure 2. The non-symmetrical funnel plot suggests risk of bias among the studies with small sample sizes that are shown at the bottom of the graph. High confidence and high recommendation studies are shown above the graph (n=28 studies). Source: Own Authorship.

Development - Major Outcomes

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 [1-4]. 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 [5-7]. Space maintenance is one of the most important activities in the prevention of malocclusion [8,9]. The purpose of deciduous dentition is to maintain the perimeter of the bow for successors to erupt normally. Great importance should be given to tooth loss at this stage. However, attention should be paid to the loss of young permanent teeth [10].

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 [2]. 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 [3].

Handling the premature loss of deciduous teeth requires care, especially when done by the clinical dentist. Consequences of inadequate procedures have serious repercussions on normal dental development [11]. 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 [12-15].

The strategy for the maintenance of space in the deciduous and mixed dentition is, first, to know the problem to plan the treatment [16]. 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 [17]. Most of the posterior ones are lost by caries, rarely by trauma [18]. 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 [19-21].

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 [22]. Aesthetic / functional rehabilitation is necessary until the eruption of permanent successor teeth occurs [23]. A practical option to obtain this rehabilitation is through the installation of aesthetic or functional space maintainers [24].

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 [25]. These devices, regardless of the design chosen, should be as realistic as possible. However, there are a number of necessary 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 [26].

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 eruption of the first permanent molars entails closure of space, especially when the permanent successor slows to erupt [27]. 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. It is these particularities that will define the action of these habits on the face. These limits are aimed at the differential diagnosis, with the intention of establishing, in each case, the possibilities of the individual himself, speech-language intervention, and, mainly, the need for

interdisciplinary action [28].

Finally, 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 pterigoid muscles, both medial and lateral. Such muscles, in a state of hyperfunction, may present painful symptomatology and decreased coordination [2,3].

Conclusion

It was concluded that due to the aging of the stomatognathic apparatus, the orofacial functions can be modified, such as malocclusion, 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 a professional.

CRedit

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Application of Artificial Intelligence (AI)

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