

Deep bite treatment

Tratamento da mordida profunda

Tratamiento de mordida profunda

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Abstract

The deep bite, or exaggerated overbite, is a malocclusion that presents a multifactorial etiology, which requires a precise diagnosis to obtain a correct treatment plan, aiming a good aesthetic and functional result. Therefore, it is a problem that we often encounter with orthodontic treatments. A Class II, Division 2 malocclusion is characterized by retracted upper teeth (inclined toward the roof of the mouth) and an increased overbite (deep overbite), which can cause oral problems and affect appearance. This problem can be corrected by using special dental appliances (functional appliances) that move the front teeth forward and change the growth of the upper or lower jaws, or both. Most functional appliance appliances are removable and this treatment approach generally does not require the extraction of any permanent teeth. Additional treatment with fixed appliances may be necessary to ensure the best result. The mechanics of treatment for deep bite correction will depend on its etiology, expected growth and vertical dimension. The deep bite treatment approach can follow three lines, the intrusion of anterior teeth, the extrusion of posterior teeth or the association of the two techniques. Through a literature review the present study aimed to highlight the importance of early treatment of this malocclusion, avoiding future damage to the stomatognathic system, also increasing the success and stability after treatment.

Keywords: Overbite; Malocclusion; Class II; Treatment.

Resumo

A mordida profunda, ou sobremordida exagerada, é uma má-oclusão que apresenta etiologia multifatorial, que necessita de um diagnóstico preciso para se obter um correto plano de tratamento, objetivando um bom resultado estético e funcional. Portanto, é um problema com o qual nos deparamos com certa frequência nos tratamentos ortodônticos. Uma má oclusão de Classe II, divisão 2, é caracterizada por dentes frontais superiores retrocedidos (inclinados em direção ao céu da boca) e um overbite aumentado (sobremordida profunda), que pode causar problemas orais e afetar a aparência. Esse problema pode ser corrigido pelo uso de aparelhos dentários especiais (aparelhos funcionais) que movem os dentes frontais para a frente e alteram o crescimento das mandíbulas superiores ou inferiores, ou de ambos. A maioria dos aparelhos de aparelhos funcionais é removível e essa abordagem de tratamento geralmente não exige a extração de nenhum dente permanente. Tratamento adicional com aparelhos fixos pode ser necessário para garantir o

melhor resultado. A mecânica de tratamento para a correção da mordida profunda dependerá da sua etiologia, crescimento esperado e dimensão vertical. A abordagem do tratamento da mordida profunda pode seguir em três linhas, a intrusão de dentes anteriores, a extrusão de dentes posteriores ou a associação das duas técnicas. Através de revisão de literatura o presente estudo visou salientar a importância do tratamento precoce desta máoclusão, evitando prejuízo futuro para o sistema estomatognático, aumentando também o sucesso e estabilidade pós tratamento.

Palavras-chave: Sobremordida; Má oclusão; Classe II; Tratamento.

Resumen

La mordida profunda, o sobremordida exagerada, es una maloclusión que presenta una etiología multifactorial, que requiere un diagnóstico preciso para obtener un plan de tratamiento correcto, buscando un buen resultado estético y funcional. Por tanto, es un problema que nos encontramos a menudo con los tratamientos de ortodoncia. Una maloclusión de Clase II, División 2 se caracteriza por dientes superiores retraídos (inclinados hacia el techo de la boca) y una sobremordida aumentada (sobremordida profunda), lo que puede causar problemas orales y afectar la apariencia. Este problema se puede corregir mediante el uso de aparatos dentales especiales (aparatos funcionales) que mueven los dientes frontales hacia adelante y cambian el crecimiento de los maxilares superior o inferior, o ambos. La mayoría de los aparatos funcionales son removibles y este enfoque de tratamiento generalmente no requiere la extracción de ningún diente permanente. Puede ser necesario un tratamiento adicional con aparatos fijos para asegurar el mejor resultado. La mecánica de tratamiento para la corrección de la mordida profunda dependerá de su etiología, crecimiento esperado y dimensión vertical. El abordaje del tratamiento de mordida profunda puede seguir tres líneas, la intrusión de dientes anteriores, la extrusión de dientes posteriores o la asociación de las dos técnicas. A través de una revisión de la literatura, el presente estudio tuvo como objetivo resaltar la importancia del tratamiento temprano de esta maloclusión, evitando daños futuros al sistema estomatognático, además de aumentar el éxito y la estabilidad después del tratamiento.

Palabras clave: Sobremordida; Maloclusión; Clase II; Tratamiento.

1. Introduction

Overbite is understood as a type of malocclusion, that can present a multifactorial etiology, thus requiring an elaborate and proper differential diagnosis, which can be accentuated when the overbite of the upper incisors over the lower incisors exceeds one third of the crown of the lower incisors in centric occlusion. This type of malocclusion is frequently found in orthodontics. (Moro & Santos 2017).

Therefore, overbite is understood as the overlapping of the crown of the maxillary incisors in relation to the mandibular incisors. Although the value of the overbite in patients with normal occlusion can be variable, it is considered normal when it provides values of 2 to 3 mm or one third of the clinical crown. Above these values is determined the existence of a deep, accentuated or exaggerated bite. (Nanda & Kuhlberg 2007).

The overbite is considered as the overlapping of the maxillary anterior teeth over the mandibular ones, in the vertical plane. It was quantified that, in a normal occlusion, the overbite can vary from 2 to 4 mm, or in a percentage of 5% to 25% of overlap of the upper incisors over the lower ones. Above these values, the existence of a deep, accentuated or exaggerated bite is determined (Nanda, 2005).

When this condition of deep bite is characterized, laterality, protrusion and opening movements are impaired, which can lead to problems in the TMJ, growth and facial development. Its cause is related either to posterior tooth loss, mandibular retrusion, wear of posterior teeth, length of upper and lower incisors, cusp height and vertical growth of the mandible, or as a mandibular ramus height and facial pattern (Silva, 2014).

Some factors should be considered before choosing a treatment plan, such as facial pattern, sagittal relationship, mandibular and maxillary growth, upper labial-incisive and interlabial distance, smile line, and lip length (Sakima et al., 1987). Thus, it is extremely important to know the etiology in order to obtain the best result.

In order to carry out the treatment, it is important that an individual treatment plan is created by the orthodontist, as its treatment is quite complex, having skeletal and/or dental etiological factors. Its prevalence is not shown between male and female individuals.

Therefore, the form of treatment is performed through the intrusion of anterior teeth, extrusion of posterior teeth or a combination of both procedures (Almeida, 2010).

Through an effective treatment, an effective aesthetic result can be achieved, minimizing relapses during the post-retention phase (Brito, 2009).

There are several types of treatments for deep bite, with emphasis on orthopedic and orthodontic appliances, being admissible, if cogent, the use of more than one type of mechanics applied at the same time, in face of the complexity that is the deep bite (Nanda & Kuhlberg 2007).

The proposition of this monograph is to review the literature on the treatment of overbite.

2. Literature Review

In general dentistry, and orthodontics more specifically, has seen a mass consumption and it happens due to the socioeconomic changes that have been taking place around the world and the growing appeal for favorable self- aesthetic standards, including, in addition to children and adolescents, adult patients who are passed the ideal time for an orthodontic treatment (Samorodnitzky-Naveh et al., 2008). These adult patients usually have an extensive list of dental procedures that have already been performed, in addition to tooth loss or certain dental characteristics that interfere both in the treatment plan and in the result and stability of the treatment in the long term (Valarelli et al., 2017). Class II malocclusion is characterized by the distal position of the mandibular first molar in relation to the position of the maxillary first molar, reflecting on adjacent elements such as soft tissue and other teeth.

This malocclusion is one of the most common in orthodontic practice, and its correction, always seeking maximum efficiency, can be achieved by several treatment protocols, such as extraction of 2 or 4 premolars, distalization of maxillary molars, fixed functional appliances and intermaxillary elastics, which can be particularly interesting in cases of Class II subdivision, considering its degree of severity and a profile that allows the extraction protocol. In addition, intermaxillary elastics are easier to use, and adult patient often cooperate with this protocol. (Jason et al., 2013).

Retroclination of the maxillary incisors is one of the most important features of Class II, division 2 malocclusion. In this malocclusion, the mandibular incisors are usually also retracted and subsequently huddled. At the palatal site of the maxillary incisors, it is common to note that the gingiva in this area may be subject to trauma due to the deep overbite and pronounced curve of Spee (Tai & Park, 2014).

Correction of the overbite is one of the main goals of orthodontic treatment. This malocclusion is characterized by vertical overbite in the anterior region, and is also recurrent in adult patients, either because of its growth pattern or because of some factors related to the teeth, such as the loss of posterior teeth, which can be one of the main etiological factors of this malocclusion. To treat deep overbite, the following orthodontic mechanics can be performed: extrusion of mandibular and maxillary posterior teeth, mandibular and maxillary anterior intrusion, clockwise maxillary rotation, and flattening curve of Spee (Tai & Park, 2014). It is important to emphasize that in this period of life (adulthood) the stability of orthodontic treatment has a high potential for relapse, due to the lower ability of the perioral muscles and temporomandibular joint to adapt to new dental positions (Horiuchi et al., 2008).

3. Methodology

The present study consists of an exploratory and descriptive study conducted through a literature review. Exploratory research has as main objective the improvement of ideas. The planning is, therefore, quite flexible, so that it allows the consideration of the most varied aspects related to the fact studied (Marconi et al., 2011).

The literature review is understood as being a methodological approach that refers to reviews, which allow the inclusion of experimental and non-experimental studies for a complete scope of the analyzed phenomenon. It also refers to data from the theoretical and empirical literature (Mendonca et al., 2008)

After defining the theme, a search will be made in virtual databases in health, specifically in the Virtual Health Library - VHL, Latin American and Caribbean System of Information in Health Sciences, LILACS, National Library of Medicine - MEDLINE, Scielo, USP thesis database, Pubmed, in the period from 2008 to 2018. The following descriptors were used for the search: Overbite, malocclusion. Class II. Treatment.

From the reading of the abstracts, the articles were selected given inclusion and exclusion criteria. The criteria for choice were articles and publications on the treatment of deep bite, including articles published in national journals and in English.

After exploratory reading and selection of the material, analytical reading was started, through the reading of the selected articles, which allowed the organization of ideas in order of importance and the synthesis of the fixation of the essential ideas for the solution of the research problem.

4. Results and Discussion

In a large cross-sectional study in the United States carried out by Huang et al. (2012), it was reported that 15% to 20% of the population had an overbite ≥ 5 mm, depending on the age group of interest. Extremely deep overbite may be associated with impaction of palatal tissues, resulting in damage to the periodontium on the lingual surface of the maxillary incisors.

Many methods have been used to treat deep bite malocclusions. They range from removable appliances to fixed appliances with or without orthognathic surgery. While all of these treatments reduce deep bites, it is unclear whether some treatments are more efficient or effective than others. Furthermore, it is unclear whether the severity of pretreatment, premolar extractions, or different retention methods are related to the long-term stability of deep bite correction.

Orthodontists generally agree that space closure mechanics tend to deepen the bite, making it difficult to correct and/or maintain the proper overbite relationship in deep bite patients. Although the heterogeneity of the studies precluded performing meta-analyses, we did not observe major differences based on the graphs we constructed. Several studies report that extraction therapy is not contraindicated for deep bites and that stability was similar. However, three of these four studies used successful treatment as one of the inclusion criteria, and this may have biased the studies towards more stable results (Kim et al., 2009).

Patients with Class II, Division 2 malocclusion are often associated with extremely severe overbite treatment. Many treatment factors may be associated with relapse in these patients, including extractions, change in incisor angulation, leveling techniques, vertical maxillary incisor position, and retention adherence. Lapatki et al. (2014) reported that intrusive maxillary incisors to avoid excessive contact with the lower lip decrease relapse in patients with Class II, Division 2 malocclusion. For all Class II patients, incomplete correction or relapse of the anteroposterior dimension may represent an opportunity for the incisors to erupt, resulting in a relapse of a deep bite.

There is considerable debate about the advantages of sectional versus continuous arch techniques for reducing deep bites. Those in favor of sectional wires claim that continuous wires can increase the angle of the mandibular plane, which will be prone to relapse, resulting in the return of deep bite. Those in favor of continuous wires (with reverse curve of Spee) argue that intrusive and proclined incisors with sectional wires will eventually result in both vertical and angular relapse (Huang et al., 2012).

Only two of our included studies compared sectional versus continuous techniques and, interestingly, reported no significant differences in correction mechanism or subsequent stability. Other authors compared different leveling techniques

and found no major differences in the overbite correction mechanism, reporting that almost all techniques resulted in intrusion and proclination of the incisors (Preston et al., 2008).

Retention was an extremely challenging parameter to assess. About 25% of the studies did not describe the type of retainers used. The other 75% reported the type of restraint and the regimen incompletely. Although the term “post retention” has been used in many studies, its meaning has not always been consistent. Some authors have used this term to indicate the period of time after treatment, while other authors have used this term to indicate the period of time after the use of the fixative has been discontinued. A final challenge with the retention assessment is our poor knowledge of patient compliance. Some studies have reported that the majority of fixed retainers were in place at the time of the final follow-up visit (Parker., 2015). This could certainly affect the potential for relapse; Shannon and Nanda (2014) reported that they found less of a relapse curve of Spee in their fixed retainer patients compared to their removable retainer patients at 2.8 years post-treatment. As most of the included studies had follow-up times > 4 years, retention may have been discontinued by then, especially when removable appliances were prescribed. If true, the impact of retainers may have diminished in the longer studies because retainers would have been discontinued well before the authors conducted their stability assessment.

As an example, Lapatki et al. (2014) found that retention was associated with relapse in a study of patients two years after treatment, but retention was not a factor when patients were evaluated at 9 years. Future studies should carefully report the retention methods employed, as well as whether any retainers are still in place or in use at the time of follow-up. The study by Varalelli et al. (2017), shows that there are several treatment protocols that are performed to treat malocclusions. Therefore, for the case report with a 31-year-old male patient, intermaxillary elastics were chosen for the treatment, in addition to the Spee control curve, using reverse and accentuated stainless-steel wires, as they are considered a way that meets patient's esthetic expectations and orthodontic treatment goals, which was supported by the treatment results that will be shown below. In the clinical evaluation of the patient in the report, a brachycephalic pattern with a symmetrical oval face, good lip sealing and a slightly convex profile was shown.

A good exposure of the upper incisors was observed. It had three quarters of Class II malocclusion on the left side, and also showed the receded maxillary incisors, characteristic of Class II, division 2, being classified as a malocclusion, it had mild maxillary and mandibular crowding and excessive curve of Spee, with deep overbite. and 4mm overjet. The dental midlines were not coincident with the mandibular midline slightly shifted to the left side, as shown in Figure 1.

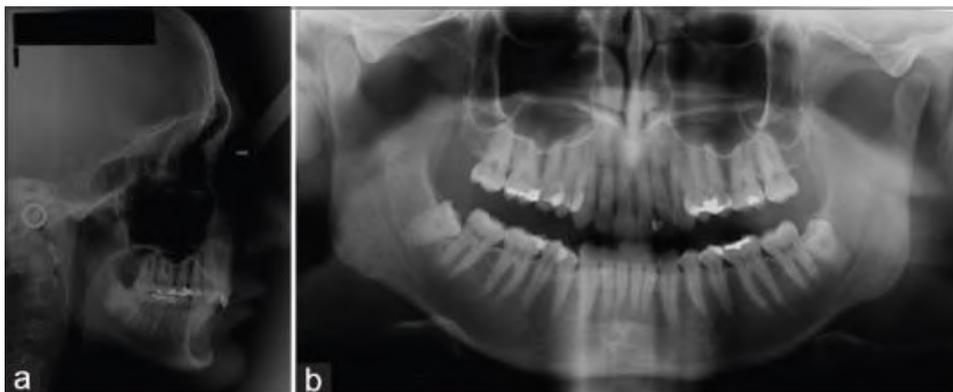
Figure 1. Pre-treatment intraoral photographs.



Source: Varelli et al. (2017).

As for the radiographic examination, the disappearance of the maxillary third molars was observed, with the mandibular molars being partially impacted. It was also possible to visualize anterior dental crowding in both arches and preserved alveolar bone crests. Lateral radiography confirmed the brachyfacial pattern associated with marked overbite (Figure 2).

Figure 2. Pretreatment radiographs.



Source: Varelli et al. (2017).

Based on the clinical features depicted above, the goal of orthodontic treatment was the correction of: Class II malocclusion, deep overbite, and deviation of dental midlines.

One of the treatment options was to correct Class II with tooth extractions, two maxillary first premolars and two mandibular second premolars, but this orthodontic mechanism would worsen the patient's soft tissue profile. Another option was the use of fixed functional appliances; however, the patient discarded it because it was too expensive.

For the treatment of this case, the following orthodontic mechanics was performed: pre-adjusted edgewise appliance of 0.022" x 0.028" with Roth's prescription, without tooth extraction, intermaxillary elastics and curve of Spee corrections. The treatment sequence was performed with sequences of rounded arcs (NiTi and stainless steel) up to 0.020 stainless steel with reverse and accentuated curve of Spee (Figure 3).

Figure 3. (a-c) Maxillary placement of the fixed appliance.



Source: Varelli et al. (2017).

After 8 months, braces could be placed on the lower teeth (Figure 4).

Figure 4. (a-e) After 8 months, placement of the appliance in the mandibular dental arch.



Source: Varelli et al. (2017).

After correcting the excessive overbite, which was successfully performed with Spee's control curve, the intermaxillary elastics protocol was started. Medium strength 3/16 intermaxillary elastics were used to correct Class II. These intermaxillary elastics were placed in different positions during the treatment. At first, it was started with a bilateral elastic band throughout the day, being removed only for feeding and oral hygiene, for 6 months (Figure 5).

Figure 5. (a-c) intermaxillary elastics.



Source: Varelli et al. (2017).

After a total of 26 months of treatment, all brackets were detached. A 3–3 mandibular fixed retainer wire (0.028 stainless steel) was placed, and a maxillary wrap retainer was delivered to be worn full time for 6 months and 12 h/day for the following time.

Based on the clinical and cephalometric data obtained at the end of the orthodontic treatment, it can be stated that the Class I molar and canine relationship was achieved bilaterally and, thus, the correction of excessive overbite, crowding, dental midline deviation, giving the patient a satisfactory profile and a pleasant smile (Figure 6).

Figure 6. (a-g) Debonding after 26 months.



Source: Varalelli et al. (2017).

Figure 7. Dental aspects after 2 years of post-treatment.



Source: Varalelli et al. (2017).

In order for the results to be achieved, the cephalometric radiographs (initial and final) were scanned and transformed into digital files, later loaded into the Dolphin program, where a single examiner marked the cephalometric points and planes to make the tracings to be analyzed (Varalelli et al. al., 2017).

At the end of the reported overbite treatment, a comparison of pre- and post-treatment cephalometric data was performed, where it was observed that there were no significant maxillary and mandibular skeletal changes between each other or in relation to the skull base, although point A was slightly protrusion at the end of treatment, while in skeletal relationships, there was an increase in mandibular plane measurements, consequently increasing the anteroinferior facial height and showing a clockwise mandibular rotation (Varalelli et al., 2017).

In the study by Hamond (2012), one of the treatment options for overbite were the maxillary first premolars and extraction of the right mandibular second premolars, applying the appropriate orthodontic retraction mechanics, correcting the Class II malocclusion and the left dental midline deviation; however, this technique would have as a side effect a greater difficulty in controlling and reducing the deep overbite, combined with an unfavorable facial pattern and profile.

Uribe and Nanda (2013), treated similar adult orthodontic patients with tooth extractions (maxillary first premolars) and Connecticut intrusion arch. Some authors also suggest the use of a helmet with low traction even in patients who do not grow.

Another treatment option in relation to intermaxillary elastics would be fixed functional appliances, as recommended by some authors. They also achieved Class II malocclusion correction through lower incisor proclination and molar extrusion, thereby correcting the deep overbite. However, this treatment option was discarded because fixed functional appliances are often expensive and would also require intermaxillary elastics after their removal (Jones et al., 2008).

Despite all the orthodontic mechanics possible to treat this type of malocclusion, Parker et al. (2015), in their study, stated that, although orthodontic mechanics offers different possibilities and appliances that are possible to use, their effects were very similar to each other.

The maxillary molars presented a slightly distal inclination, contrary to Jones et al. (2015), where the maxillary teeth had a tendency of mesial movements. The maxillary molars also had a small extrusion, due to the accentuation and reversal of the effects of the Curve of Spee, similar to several works. However, Chen et al. (2014), performed a deep correction of the overbite and there were no vertical changes in the maxillary molars.

Millett (2017) conducted a study with children, where he says that in growing children, treatment can sometimes be performed with special upper and lower dental appliances (functional appliances) that can be removed from the mouth. They usually work by correcting the position of the upper and lower anterior teeth and modifying the growth of the upper or lower jaws, or both (growth modification). In many cases, this treatment does not involve the removal of any permanent teeth, but additional treatment with fixed appliances is often necessary for the best result; such appliances are glued to the teeth.

In other cases, treatment is aimed at moving the molar teeth back, providing space for the front teeth to correct. This can be done by applying force to the teeth and jaws at the back of the head using a headgear and transmitting that force to part of a fixed or removable dental support attached to the posterior teeth. This treatment may or may not involve removing permanent teeth.

Other options exist and may include fixed orthosis treatment without extraction of permanent teeth, without functional appliances or headgear (Tai et al., 2014).

As an alternative to headgear, the back teeth can be retained in other ways, such as with an arch across the roof of the mouth or in contact with the front of the roof of the mouth, which connects the two back teeth. Often, in these cases, two permanent teeth are removed from the middle of the upper arch (one on each side) to make room to correct the position of the upper front teeth (Uriber et al., 2013).

In severe cases, particularly in adults, treatment may require a combination of braces and jaw surgery to correct teeth position and bite. In the study by Millett (2017), it does not evaluate this treatment option, which is not generally used for children.

It is important for the orthodontist to determine whether orthodontic treatment alone, performed without removal of permanent teeth, in adult and child patients with Class II, Division 2 malocclusion, produces a different result than no orthodontic treatment or orthodontic treatment involving tooth extraction. permanent.

5. Conclusions

As seen throughout this study, orthodontics is concerned with the growth of the jaws and the face, the development of teeth and the way teeth and jaws come together. Ideally, the lower teeth bite in the middle of the posterior surface of the upper front teeth. When the lower teeth bite further behind the front teeth than ideal, this is known as a Class II malocclusion. A Class II, Division 2 malocclusion is characterized by receded maxillary front teeth (tilted toward the roof of the mouth) and an enlarged overbite (vertical overlap of the front teeth), which can cause oral problems and affect appearance.

Given the above, this problem can be corrected by the use of special dental appliances (functional appliances) that move the front teeth forward and alter the growth of the upper or lower jaws, or both. These appliances can be removed from the mouth

and this approach usually does not require the removal of any permanent teeth. Additional treatment with fixed appliances may be necessary to ensure the best result.

An alternative approach is to provide space for correction of the front teeth by moving the molar teeth back. This is done by applying force to the teeth at the back of the head using a head support (harness) and transmitting that force to part of a fixed or removable dental support attached to the posterior teeth. Treatment can be performed with or without extraction of permanent teeth.

Although common, the union of Class II malocclusion with excessive overbite in adults, its resolution goes through several paths in which orthodontists and patient must be tuned so that the results can be positive at the end of the treatment. The decision that orthodontic mechanics should make must be decided by the orthodontist after a good treatment planning (clinical and cephalometric characteristics of the patient in addition to the psychological profile), since the collaboration of the participant in some treatment protocols is undoubtedly necessary. When deciding to solve the case with intermaxillary elastics and curve of Spee control with stainless steel archwires, a simple and conservative orthodontic mechanics was chosen, in which the subject's collaboration was fundamental so that this choice was effective in the treatment and favorable results were obtained.

The need for orthodontic treatment can be determined by looking at the effect that any given tooth position has on the life expectancy of teeth, or the effect that the appearance of teeth has on how people feel about themselves, or both.

6. Conclusion

As seen during this study, orthodontics is concerned with the growth of the jaws and face, the development of teeth and the way teeth and jaws come together. Ideally, the lower teeth bite in the middle of the posterior surface of the upper frontal teeth. When the lower teeth bite more behind the upper front teeth than ideal, this is known as a Class II malocclusion. A Class II malocclusion, division 2, is characterized by backward upper front teeth (tilted toward the roof of the mouth) and an increased overbite (vertical overlap of the front teeth), which can cause oral problems and affect appearance.

In view of the above, this problem can be corrected using special dental appliances (functional appliances) that move the front teeth forward and alter the growth of the upper or lower jaws, or both. These devices can be removed from the mouth and this approach usually does not require the removal of any permanent teeth. Additional treatment with fixed appliances may be necessary to ensure a better result.

An alternative approach is to provide space for correction of the front teeth by moving the molar teeth backwards. This is done by applying a force to the teeth of the back of the head using a headrest (harness) and transmitting this force to part of a fixed or removable dental support attached to the posterior teeth. Treatment can be performed with or without permanent tooth extraction.

Although, the union of Class II malocclusion with excessive overbite in adults, its resolution goes through several paths in which orthodontists and patients must be tuned so that the results can be positive at the end of treatment. The decision that orthodontic mechanics should make should be decided by the orthodontist after a good treatment planning (clinical and cephalometric characteristics of the patient and the psychological profile), since it is undoubtedly necessary the collaboration of the participant in some treatment protocols. When deciding to solve the case with intermaxillary elastics and Spee control curve with stainless steel arches, a simple orthodontic mechanics were chosen and conservative, in which the collaboration of the subject was fundamental for the treatment of this choice to be effective and favorable results were obtained.

The need for orthodontic treatment can be determined by observing the effect that any particular position of the tooth has on the life expectancy of teeth or the effect that the appearance of teeth has on how people feel about themselves, or both.

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