



Ortho-surgical treatment in Class II skeletal patients with mandibular retrognathism: a concise systematic review

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Abstract

Introduction: In the setting of class II malocclusion corrections, the union of orthodontic and surgical procedures was developed. Bilateral sagittal split osteotomy is standard protocol for correcting mandibular retrognathism. Class II dental malocclusion with deep bite needs to be treated early by orthodontics. Thus, the commonly used technique combines BSSO for mandibular advancement and recoil genioplasty to correct the resulting chin protrusion. **Objective:** To carry out a systematic review of the main considerations of ortho-surgical treatments in class II patients with mandibular retrognathism. **Methods:** Experimental and clinical studies (case reports, retrospective, prospective and randomized) with qualitative and/or quantitative analysis were included, following the rules of the systematic review-PRISMA. **Results and Conclusion:** A total of 128 articles was found involving class II malocclusion and ortho-surgical treatments. After, a total of 64 articles were fully evaluated and 24 were included and discussed in this study. A meta-analysis study evaluated the best functional appliance improving mandibular length in individuals with retrognathism. Sander Bite Jumping reported the greatest increase in mandibular length, with 3.40 mm. Another meta-analysis study compared dental, skeletal, and aesthetic outcomes between orthodontic camouflage and orthodontic-surgical treatment in patients with Class II skeletal malocclusion and retrognathic mandible with anterior growth. The difference between treatments was not statistically significant regarding SNA angle, linear measure of the lower lip to the Ricketts aesthetic line, convexity of the skeletal profile or soft tissue profile excluding the nose. In contrast, orthodontic-surgical

treatment was more effective to the ANB, SNB and ML/NSL angles and the soft tissue profile including the nose.

Keywords: Class II malocclusion. Orthodontics. Surgery. Mandibular retrognathism.

Introduction

In the setting of class II malocclusion corrections, the union of orthodontic and surgical procedures was developed. For this, there are common protocols such as Le Fort I maxillary advancement for maxillary retrusion or bilateral sagittal split osteotomy (BSSO) to correct mandibular retrognathism [1-5]. Furthermore, anterior subapical osteotomies have been described for correct mandibular alveolar retrusion and protrusion, maxillary protrusion, and open bite, replacing or facilitating orthodontic treatment [2,6-10].

In this context, Class II dental malocclusion with deep bite needs to be treated early by orthodontics. When growth is achieved, only surgical procedures can treat this malocclusion. Therefore, the commonly used technique combines BSSO for mandibular advancement and recoil genioplasty to correct the resulting chin protrusion [3].

Also in this context, to establish muscle balance, eliminate oral dysfunction and allow an adequate length of the maxilla and mandible, it is necessary to use removable appliances [6]. Studies have analyzed different methods, morphogenic changes of the mandible, associated with the use of functional appliances for forwarding propulsion of the mandible [7-12].

Despite this, there is controversy, given that some

review studies did not find significant differences between groups treated with functional appliances and controls, and other authors observed satisfactory results [11-13]. Furthermore, studies have found other results for treatment with functional appliances, such as statistically significant secondary mandibular stretching and changes in the facial profile due to incisal inclination [13].

Therefore, the present study performed a systematic review of the main considerations of ortho-surgical treatments in class II patients with mandibular retrognathism.

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

The search strategies for this review were based on the descriptors: "Class II malocclusion. Orthodontics. Surgery. Mandibular retrognathism". The research was carried out from August 2021 to September 2021 and developed based on Google Scholar, Scopus, PubMed, Scielo, 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.

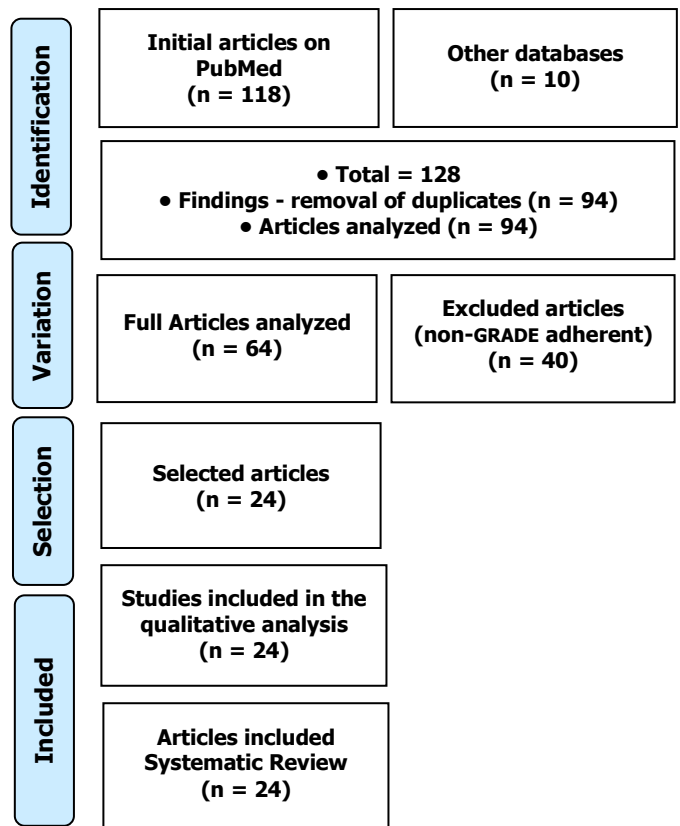
Results

A total of 128 articles was found involving class II malocclusion and ortho-surgical treatments. Initially, the existing title and duplications were excluded according to the interest described in this work. After this process, the abstracts were evaluated and a new exclusion was performed. A total of 64 articles were fully evaluated and 24 were included and discussed in this study (Figure 1).

According to literary findings, functional devices are used to improve mandibular length in skeletal class II patients. Thus, a meta-analysis study evaluated the best functional appliance improving mandibular length in individuals with retrognathism. The Sander Bite Jumping reported the greatest increase in mandibular length (3.40 mm; 95% CI 1.69-5.11) followed by the

Twin Block, Bionator, Harvold Activator, and Frankel devices [14].

Figure 1. The selection process of scientific articles.



Another systematic review and meta-analysis study compared dental, skeletal, and aesthetic outcomes between orthodontic camouflage and orthodontic-surgical treatment in patients with skeletal class II malocclusion and retrognathic mandible with anterior growth. The difference between treatments was not statistically significant regarding SNA angle, a linear measure of the lower lip to the Ricketts aesthetic line, the convexity of the skeletal profile, or soft tissue profile excluding the nose. In contrast, orthodontic-surgical treatment was more effective in relation to the ANB, SNB, and ML/NSL angles and the soft tissue profile including the nose. Different treatment effects on overjet and overbite were found according to the severity of baseline values [15].

Besides, a prospective study comparing adolescent and post-adolescent growth periods in relation to the efficacy of the conventional activating device in patients with Class II mandibular retrognathia using lateral cephalometric radiographs and three-dimensional photogrammetry. Fifteen patients in the adolescent growth period and 17 patients in the post-adolescent growth period were included, and all were treated with conventional activating devices. Conventional activator therapy resulted in similar effects in both growth periods

with respect to improvements in sagittal mandibular growth and maxillomandibular relationship (ANB° and SNB° angles). The effective mandibular length was increased (Co-Gn length) and the maxillary horizontal growth was restricted (SNA angle° decreased) in both groups after treatment. Duration of treatment was significantly longer in the post-adolescent group. Increases in the projections of the menton, pogonion, and sublabial points were observed in the three-dimensional photogrammetric views. Total lip volume was reduced, while mandibular volume significantly increased in both groups. The inferior gonial angle showed a greater increase in the post-adolescent group [16].

Therefore, the use of functional removable appliances in growing individuals with skeletal Class II is effective in the treatment of Class II malocclusion [17,18]. The most common method to analyze mandibular length in the clinic is the lateral cephalogram [19]. However, clinical success cannot be measured by mandibular length alone. Other factors such as facial outcomes, solution of parafunctional oral habits and functional alterations must also be considered [20].

Furthermore, differentiating the effect of removable functional appliances in improving mandibular length in children treated in the prepubertal phase and children treated in the pubertal spurt increases the potential risk of reporting the influence of the patients' natural growth [21,22]. Furthermore, functional appliances are effective, regardless of the type of appliance. The combined estimate of the effect evaluated by the fixed effect model has revealed a statistically significant increase in the mandibular length of the treated individuals. Mandibular growth was always greater in treated individuals regardless of the type of appliance used, indicating that functional appliances have a favorable effect on the correction of mandibular retrognathism [23,24].

Conclusion

After analyzing the main considerations of ortho-surgical treatments in class II patients with mandibular retrognathism, the union of orthodontic and surgical procedures was highlighted and well established. There are common protocols such as Le Fort I maxillary advancement for maxillary retrusion or bilateral sagittal split osteotomy (BSSO) to correct mandibular retrognathism. Orthodontic-surgical treatment has shown greater efficacy to the ANB, SNB and ML/NSL angles and the soft tissue profile including the nose.

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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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