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Case Report

The Interest of Single-arch Extraction in the Management of Class III Malocclusion: Therapeutic Occlusion

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Abstract

Introduction: Skeletal Class III is a complex sagittal discrepancy that requires treatment ranging from orthopedics to orthognathic surgery. In cases of moderate malocclusion where patients refuse surgery, dentoalveolar compensation via monomandibular extractions (lower first premolars) represents a specific therapeutic alternative.

Case Report: This report describes the case of a 13-year-old female patient presenting with a skeletal Class III due to maxillary retrognathism, associated with an anterior crossbite and mandibular crowding. The treatment plan involved maxillary expansion followed exclusively by the extraction of the mandibular first premolars.

Results: The treatment successfully achieved a Class I canine relationship, a functional anterior guide, and harmonious facial aesthetics. The final molar relationship resulted in a functional "therapeutic Class III" occlusion. Particular attention was paid to post-treatment occlusal equilibration including selective grinding, torque adjustments, and deepening of the fossae to ensure long-term stability and prevent occlusal overloading.

Conclusion: Monomandibular extraction is an effective compromise for skeletal Class III when clinical indications are strictly followed. Long-term success relies on a rigorous occlusal adjustment protocol to compensate for the reduction in contact points and to ensure optimal functional stability.

Keywords: Class III malocclusion, Orthodontic compensation, Therapeutic occlusion, Occlusal equilibration.

Introduction

Skeletal Class III is a sagittal anomaly characterized by an anterior position of the mandible relative to the maxilla, taken as a reference. It is due to either maxillary retrognathism, mandibular prognathism, or a combination of both.

At the dental level, there is an anterior crossbite and Class III canine and molar relationships.

The treatment of Class III can vary from orthopedics to surgery depending on the patient's age, clinical form, and the severity of the case.

Orthodontic treatment by dentoalveolar compensation is indicated in mild to moderate forms without significant aesthetic deficit and with normal vertical growth.

This type of treatment involves several therapeutic approaches to achieve Class III occlusal correction, namely:

Intermaxillary Elastics (IME), extractions of maxillary second premolars and mandibular first premolars, mandibular incisor extraction, and, exceptionally, monomandibular extractions. This last therapeutic choice presents very specific indications in Class III cases, notably:

- Mild skeletal Class III without dentoalveolar compensation, presenting mandibular incisor-canine crowding with a correct maxillary arch.

This type of treatment results in a therapeutic Class III molar occlusion associated with a Class I canine relationship and balanced incisor relationships [1].

However, its indication is controversial and requires adherence to the previously mentioned criteria as well as occlusal equilibration to ensure stability.

The objective of this work is to demonstrate, through a clinical case, the management of a skeletal Class III case using monomandibular extractions.

Clinical Case

The patient is a 13-year-old female whose extraoral examination shows a symmetrical face, flattened cheekbones, a flat profile, a straight nasolabial angle, upper lip retrusion, lower lip protrusion, and an increased mandibular angle (Figure 1).

Figure 1: Extraoral Examination.

The intraoral examination shows end-to-end relationships, a transverse deficit in the maxillary arch, and Class III canine and molar relationships (Figure 2).

Figure 2: Intraoral Examination.

Radiographic examination with cephalometric analysis confirms the skeletal Class III due to maxillary retrognathism and hyperdivergence, with an absence of dentoalveolar compensation (Figure 3).

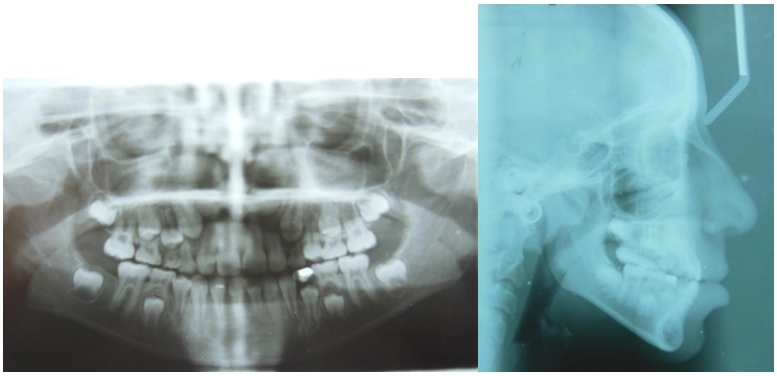

Figure 3: Radiographic Examination.

Ideally, management of the case would require surgical intervention through maxillary advancement and mandibular setback. As the patient refused this approach, we proposed a compromise treatment using monomandibular extractions to correct the incisor relationship while preserving upper lip support.

In the first phase, we began with maxillary expansion followed by alignment and leveling. In the mandibular arch, the first premolars were extracted with maximum anchorage; the extraction space was used for canine retraction and incisor retraction to correct the incisor relationship. The presence of the mandibular wisdom tooth germ will help prevent the over-eruption of the maxillary second molar.

At the end of the treatment, we achieved a therapeutic Class III compromise occlusion characterized by Class I canine and Class III molar relationships, without compromising the patient's profile (Figures 4 and 5).

Figure 4: Intraoral Results.

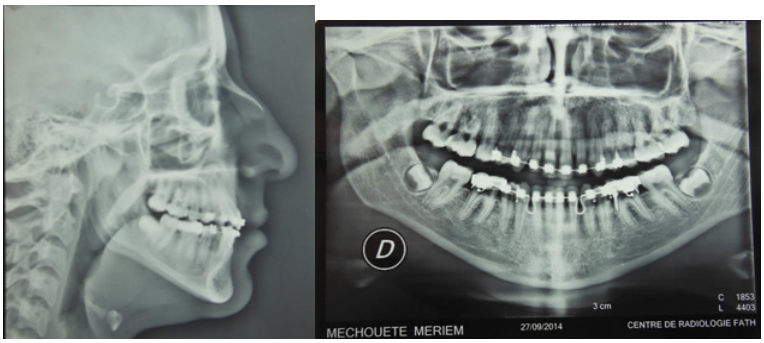

Figure 5: Lateral Cephalometric and Panoramic X-ray at the End of Treatment.

Discussion

Managing skeletal Class III through monomandibular extractions is a compromise solution whose therapeutic choice requires strict adherence to its indications and the use of occlusal adjustment to improve stability. This therapeutic solution is rarely recommended because it leads to an overall reduction in the number of occlusal contact points and their unfavorable arrangement, resulting in a tooth-to-tooth occlusion at the level of the maxillary second premolar and the mandibular first molar. This leads to static occlusal instability and a disturbance of guidance, hence the importance of establishing occlusal equilibration to improve intercuspation, stability, and avoid occlusal overloading [2].

In our patient's case, the choice of monomandibular extractions allowed us to correct the incisor relationship and restore a functional anterior guide while preserving facial aesthetics.

At the end of the treatment, we proceeded with occlusal adjustment and equilibration. This consisted of:

- At the mandibular level: deepening the central fossa of the first molar and the mesial fossa of the second mandibular molar, combined with stabilizing composites on the lingual cusps to optimize occlusal stability with the maxillary second premolar and first molar [3].

- At the maxillary level: creating a slight mesial rotation of the upper first molar, grinding the enamel bridge (oblique ridge), and deepening the central fossa to avoid interference and facilitate occlusion with the two mandibular molars [4], Adding radiculo-vestibular torque (buccal root torque) to the maxillary second premolar optimizes the occlusion of the palatal cusp with the central fossa of the mandibular first molar while compensating for mandibular transverse loss and reducing interference [5].

Thanks to these adjustments, we were able to improve occlusal stability and reduce dental overloading.

Conclusion

Despite the controversy surrounding monomandibular extractions, therapeutic Class III can constitute a useful and simple compromise choice in the management of skeletal Class III, provided that its indications are strictly respected and proper occlusal adjustment is performed to improve long-term stability [6].

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