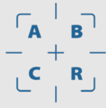

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Tooth Extractions in Orthodontics – Diagnostic and Therapeutic Recommendations

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ABSTRACT

The correct diagnosis of orthodontic cases with malocclusions that require the extraction of the teeth is not always an easy task. Traditional extraction considerations have to be reconsidered to satisfy the patient's needs. A proper extraction decision is the key for a good case finish. The factors which affect the decision about teeth extraction should be seriously determined during planning orthodontic therapy. These include: tooth asymmetries, alveolar bone and teeth discrepancies, and maxillomandibular relationships, as well as skeletal maturation, facial pattern and profile, and patient cooperation. Extractions of specific teeth are required in the various presentations of malocclusion. The goal is always to improve facial aesthetics for the patient and to achieve a stable, well-aligned occlusion.

Key words: malocclusion, tooth extraction, diagnosis, orthodontic planning

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INTRODUCTION

The goal of orthodontic treatment is to bring teeth and dental arches into proper position and relationship in the jaw. There are numerous situations that require therapy; however, the most common problem for which patients seek orthodontic consultations is crowding and irregular positioning of teeth in the arch (according to some studies, more than 50% of the population experiences crowding, with one third of the population having moderate and almost 15% having severe crowding).

Crowding is defined as a dental arch irregularity that occurs due to a lack of transverse and sagittal space for proper tooth positioning. It is a dentoalveolar discrepancy, where there is insufficient bone mass compared to tooth mass (Figure 1, a, b, c, and d). Due to the lack of space, teeth are positioned irregularly in or out of the dental arch, leading to distal eruption, rotation, or impaction (Figure 2, a and b). The exact cause of crowding is not known, but it is believed that genetics (it is more common in children whose parents have crowding) or gene mixing, where a child inherits the jaw size from one parent and tooth size from the other, plays a role. It is often the case that large teeth cannot fit into small jaws. It is believed that, through evolution, the number of teeth and jaw size are decreasing, but bone, being a less differentiated tissue, reduces faster than teeth, leading to a space shortage before the teeth are reduced.

Non - orthodontic extractions are not desirable outcomes of orthodontic treatment; rather, they are a complication where teeth are removed for non-orthodontic reasons, and the resulting space is not properly managed. In contrast, if a tooth is extracted for a non-orthodontic reason, this can lead to improper tooth movement, tilting, and a compromised bite (Figures 3 and 4).

DIAGNOSIS AND ORTHODONTIC PLANNING

The diagnosis and treatment of space-related issues require an understanding of the etiology of crowding and the development of dentition. Most mild to moderate crowding problems (a lack of space up to 4 millimeters in the dental arch) can be addressed by preserving “leeway space” (the difference in mesiodistal width between primary and permanent teeth in the support zone), expanding the dental arches, or reducing enamel (by grinding enamel on both sides of a tooth, it is possible to gain 0.5 mm of space per tooth, which totals 6 mm per arch). Severe crowding cases with more than 10 mm of space deficiency are treated with tooth extractions to preserve facial aesthetics as well as soft and hard tissue health.

In orthodontic therapy, tooth extractions are considered as an option for solving crowded dental arches. Generally, there are two main reasons for tooth extractions – to create space for proper tooth alignment in severe crowding or retrusion of teeth in cases of significant protrusion, often seen in Class II or camouflage therapy in Class II or III. Extractions are typically used for treating moderate to severe crowding and/or for alleviating dental or dentoalveolar discrepancies. Non-extraction therapy is preferred in cases of minor skeletal and moderate dental discrepancies. The choice between extraction and non-extraction therapy is usually based on the orthodontist’s expertise, treatment philosophy, and sometimes current trends in orthodontic circles.

At the same time, the decision to extract may affect various facial parameters such as vertical dimension, treatment stability, and arch width, as well as soft tissue around the mouth, facial profile, and convexity. Extraction or non-extraction therapy is not the goal of treatment; they are merely tools to achieve good therapeutic outcomes.

It is the orthodontist’s responsibility to perform a thorough analysis before starting therapy,

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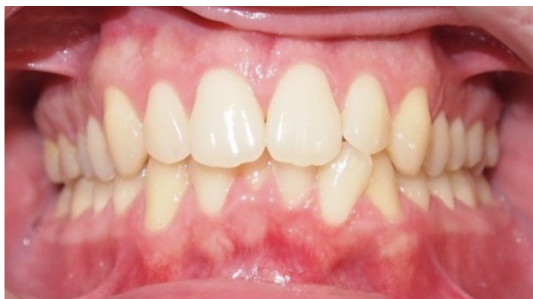
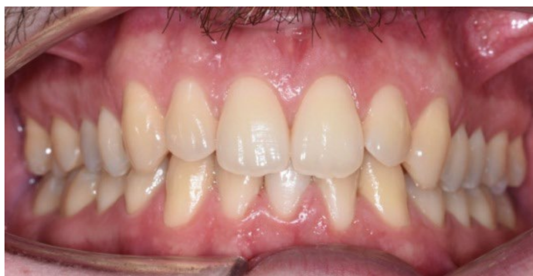
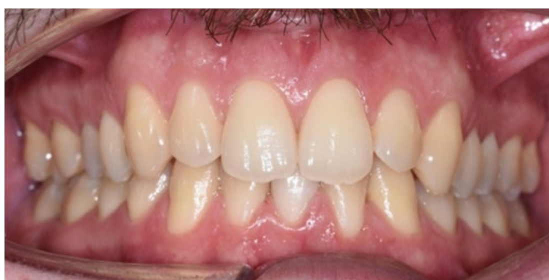
particularly considering how the extraction decision will impact the lessening of crowding and the differences in tooth and arch sizes, in addition to the reduction of excessive proclination of the anterior teeth and lips (which is especially important in females), alignment of the central line, and camouflage skeletal relationships, as well as the possibility of establishing the ideal position of the upper and lower anterior teeth. Tooth extraction affects the profile and the hard and soft tissues of the jaw. This decision is made individually for each patient and is not easy; it must be thoroughly justified with high-quality documentation, as well as radiographic findings, extraoral and intraoral photographs, and diagnostic data. It is important for the patient, and in the case of minors, the parent, to agree with the decision and sign a consent form for the procedure.







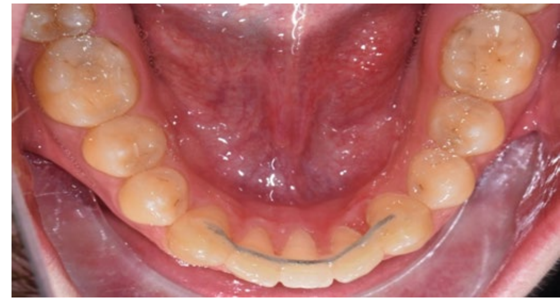
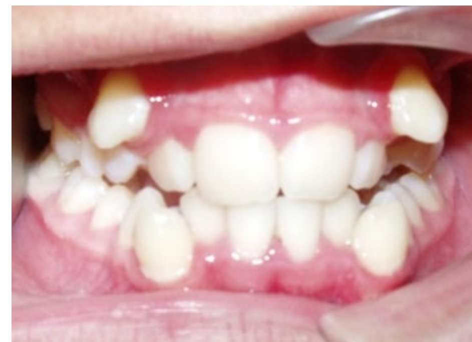


Figure 1. a, b – This case presented with crowding of the permanent mandibular incisors. The treatment plan is extraction of tooth 31 and fixed orthodontic treatment.
c, d – After orthodontic treatment – closure of the extraction space and placement of remaining teeth into that space. The midlines of the upper and lower jaws do not align because there are three incisors in the lower jaw.



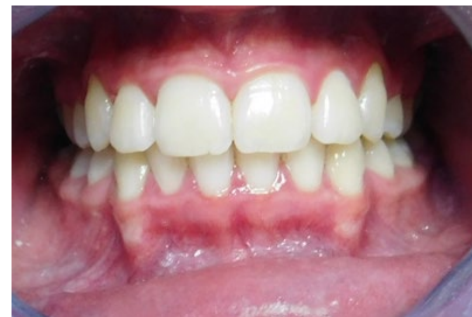


Figure 2. a – Before and after severe crowding in Class I. The treatment plan includes extraction of all four first premolars and fixed orthodontic treatment.
b – End of orthodontic treatment after two years.

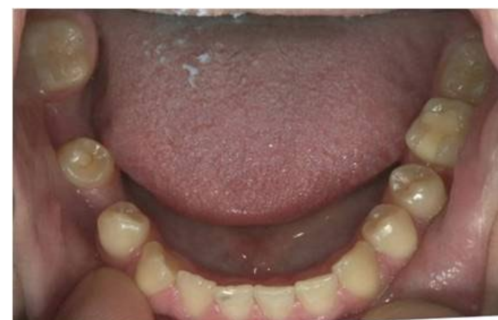


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Figure 3. Early loss of 46 and late loss of 47.

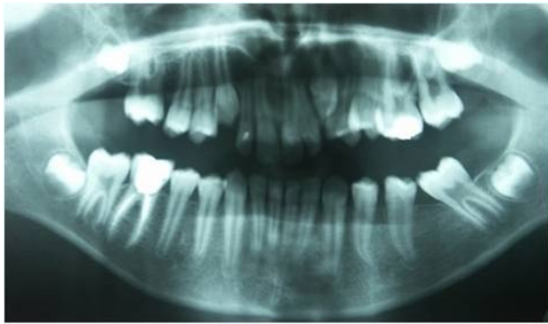

Figure 4. Orthopantomogram showing the tilting of teeth around the extraction site of tooth 36.

CONCLUSION

Extraction or non-extraction therapy are not goals, but options in orthodontic treatment. If used correctly, they can improve the therapeutic result, and if done incorrectly, they can lead to poor functional and aesthetic outcomes. Treatment should always be planned according to a detailed medical history, intraoral and extraoral examination, and radiological analysis, with consideration of patient cooperation, oral hygiene, the presence of caries, and support from soft and hard tissues. Modern orthodontic therapy recommendations are to expand the jaw as much as possible without moving the incisors forward and close extraction spaces without excessive retrusion of the incisors. It is believed that there is no difference in oral health and chewing function between these two approaches. Thus, it follows that the lack of space by millimeters is not the key factor in the final decision regarding extraction therapy, but all these factors and their interactions are taken into account.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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