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Management of a Complexly Impacted Upper Central Incisor and Canine: A Case Report

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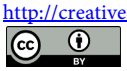

Abstract

Anterior dental inclusions, especially those involving both the canine and upper central incisor, are a rare and significant clinical challenge in orthodontics and oral surgery. This report examines the complex orthodontic management of a rare case involving the simultaneous treatment of both impacted canines and the upper central incisors in an adolescent patient. It discusses the therapeutic approach, the various orthodontic stages, and the outcomes, highlighting the significance of early diagnosis and comprehensive planning.

Subject Areas

Dentistry

Keywords

Impacted, Upper Central Incisor, Upper Canine, Management

1. Introduction

Impacted teeth are teeth that, for various reasons, have not emerged into the oral cavity within the standard time frame [1].

The maxillary canine is, after the mandibular third molar, the most frequently impacted tooth, affecting 1% to 3% of the population [2] [3].

Inclusion of the central incisor is rarer, accounting for approximately 0.06% to 0.2% of inclusion cases, and is often linked to eruption abnormalities or the presence of obstructive pathologies (cysts, odontomas, supernumerary teeth) [4]-[6].

The simultaneous absence of a canine and a maxillary central incisor is infrequent and not only affects the appearance of the smile, but also has negative repercussions on self-esteem and social interactions.

Hence, there is a need for early treatment and careful planning.

The aim of this treatment is to demonstrate early orthodontic management of a rare case of inclusion of upper canines and incisors.

2. Diagnosis and Treatment

A 13-year-old female presented with the symptoms of unerupted upper right canines and central incisors. This situation of canine inclusion and upper central incisor is associated with Class I left canine and molar relationships, and Class I right molar relationship (Figure 1), with the upper lateral incisors in a palatal position, which led to an unsightly smile and a lack of school integration, significantly impacting his daily life. Radiography CBCT (Figure 2) revealed a complex orthodontic case with an impacted right maxillary canine and central incisal. The lack of space in the maxilla, particularly on the right side compared to the left, presents an additional challenge in this case.

Figure 1. Frontal view of the maxillary arch.

Figure 2. Radiography CBCT revealing both impacted maxillary canines and central incisal.

The treatment plan was carefully designed and executed, starting with maxillary expansion through the Ragno Fan-Type Rapid Expander (Figure 3), followed by the orthodontics treatment with archwire.

Figure 3. Maxillary expansion through the Ragno Fan-Type Rapid Expander.

After maxillary expansion was achieved, a 0.016 "×0.022" stainless steel wire was inserted after four months of initial leveling on 0.014, then "0.016", and 0.016 "×0.022" nickel-titanium wires. This created the space needed to accommodate the impacted 13 and 11 (Figure 4).

Figure 4. Maintaining the space between teeth 13 and 11 with an open coil.

The progression of the impacted teeth's movement was evaluated regularly and meticulously every month. Six months later, the crown of tooth 13 had emerged sufficiently and was inserted into place. A 0.014-inch segmented nickel-titanium wire was then inserted for alignment (Figure 5).

After 13 months of treatment, a significant milestone was reached when tooth 11 erupted spontaneously and was taken over by the fixed appliances. Eighteen months of treatment resulted in all teeth being in their proper place and well

aligned on the maxillary arch. This result was followed by the placement of upper and lower 3-3 lingual retention wires (Figure 6).

Figure 5. Aligning and leveling the teeth 13 and 11 using fixed appliances.

Figure 6. Bonding of an upper and lower 3-3 lingual retainer wire.

Follow-up records taken two years after treatment confirmed the stability of the results, marking the success of the treatment.

3. Discussion

Impacted canine patients frequently present narrow maxillary and mandibular incisors that have been reported at the impaction site [7]. Other studies report missing maxillary lateral incisors and transpositions of maxillary impacted canines [8].

In our case, the maxilla was narrow, and the central incisor was impacted.

According to several authors [7]-[9], the most effective treatment for managing

impacted teeth can be summarized in five phases.

• Phase 1: Initial orthodontic treatment aimed at maintaining space on the maxillary arch and aligning and leveling the teeth using fixed appliances.

• Phase 2: Use of a custom-made welded anchorage preparation and a rectangular stabilization arch to achieve adequate anchorage and maintain sufficient space in the dental arch.

• Phase 3: Surgical exposure and orthodontic traction of the maxillary impacted canine toward the center of the alveolar ridge.

• Phase 4: Final orthodontic treatment to align the impacted tooth in the maxillary arch.

• Phase 5: Periodontal treatment after orthodontic therapy to restore periodontal health.

In our current clinical case, only three phases were required: Phase 1, Phase 2, and Phase 4. This choice can be explained by the fact that we sufficiently widened the maxilla in both the transverse and sagittal directions using the disjunction device "Ragno Fan-Type Rapid Expander". This expansion device creates greater expansion of the intercanine region and minimal intermolar expansion compared to other expansion devices, such as Hyrax. The ratio between intercanine and intermolar width is close to 4:1 for "Ragno Fan-Type Rapid Expander" compared to 0.75:1 for "Hyrax" [10]. This result explains our choice of the "Ragno Fan-Type Rapid Expander", which addresses the need for greater anterior expansion compared to the posterior region in our patient. In addition, maintaining the space between teeth 13 and 11 with an open coil allowed the impacted teeth to erupt spontaneously without the need for traction surgery.

Some studies [10] [11] have reported a relatively high prevalence of gingival defects in impacted teeth, which may require adjunctive post-orthodontic periodontal surgery. This additional surgery, performed after the orthodontic treatment, is aimed at correcting any gingival irregularities to achieve an esthetic gingival contour.

After orthodontic treatment, our patient's exposed canines and incisal gingival contours were acceptable and functionally satisfactory, with no bleeding and no probing depths greater than 3 mm, eliminating the need for further mucogingival surgery, which was a great relief to both our patient and us.

4. Conclusions

As this case demonstrates, the technique of creating sufficient space using a Ragno Fan-Type Rapid Expander, combined with maintaining the space using an open coil, can be a very effective solution for impacted canines and incisors when biomechanical principles are rigorously applied. The harmonious smile and functional chewing achieved at the end of treatment have enabled this young patient to integrate perfectly into her social and school life.

However, to ensure the reproducibility of the success of complex inclusion treatment using the "Ragno Fan-Type Rapid Expander", a series of clinical cases

and a meta-analysis would be desirable.

Conflicts of Interest

The authors declare no conflicts of interest.

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