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Orthodontic Treatment Of Impacted Upper Incisor Teeth Caused By An Odontoma

Odontoma Nedeniyle Gömülü Kalmış Üst Kesici Dişlerin Ortodontik Tedavisi

Orthodontic Traction of Impacted Incisors

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ABSTRACT

Aim: Odontomas are benign developmental anomalies arising from dental tissues during odontogenesis and are frequently associated with delayed eruption or impaction of permanent teeth. This case report presents the surgical and orthodontic management of impacted maxillary incisors associated with an odontoma.

Materials and Methods: An 8-year-old girl presented with unerupted maxillary left central and lateral incisors. Clinical and radiographic examinations revealed a radiopaque mass consistent with an odontoma. The lesion was surgically removed, and the closed-eruption technique with gold chain attachment was applied to the impacted teeth. Orthodontic traction was initiated to guide eruption. The lateral incisor erupted first, followed by the successful eruption of the central incisor.

Conclusion: Impacted incisors associated with odontomas can be successfully erupted through careful surgical removal of the lesion combined with appropriate orthodontic traction, resulting in favorable functional and esthetic outcomes.

Keywords: Impacted Incisor; Impacted Teeth; Odontoma; Orthodontic Treatment

ÖZET

Amaç: Odontomalar, odontogenez sırasında gelişen, diş dokularından kaynaklanan ve sıklıkla diş sürme gecikmesine veya gömülüliğe yol açan benign gelişimsel anomalilerdir. Bu olgu sunumunun amacı, odontomaya bağlı olarak gömülü kalan üst keser dişlerin cerrahi ve ortodontik yaklaşımla sürdürülmesini sunmaktır.

Birey ve Yöntem: Sekiz yaşındaki kız hasta, sürmeyen üst sol santral ve lateral keser dişler şikâyetiyle kliniğimize başvurmuştur. Klinik ve radyografik değerlendirme sonucunda odontoma tanısı konulmuştur. Odontoma cerrahi olarak çıkarılmış ve gömülü dişlere kapalı sürdürme tekniği ile altın zincir uygulanarak ortodontik traksiyon yapılmıştır. Lateral dişin ardından santral diş başarıyla ağız içine sürdürülmüştür.

Sonuç: Uygun cerrahi ve ortodontik planlama ile odontomaya bağlı gömülü keser dişler fonksiyonel ve estetik olarak başarılı şekilde sürdürülmüştür.

Anahtar Kelimeler: Gömülü Diş; Gömülü Kesici Diş; Odontoma; Ortodontik Tedavi

Introduction

Odontoma is a group of dentigerous tumors that develop in the jawbones during odontogenesis. Odontomas are non-neoplastic developmental anomalies or malformations and can be classified as hamartomas.¹

Odontomas can lead to delayed tooth eruption, tooth impaction, pain in the affected area, bone expansion, infection, diastema formation, cyst formation, retention of primary teeth, dental crowding, and root resorption. The recurrence after enucleation is low.²

This case presentation will focus on the orthodontic eruption of the impacted central and lateral incisors due to an odontoma.

Materials and Methods

Diagnosis

An 8-year-old girl was admitted to our clinic, primarily concerned about her unerupted upper incisors. Her medical history was not relevant. During the intraoral examination, despite the patient's right central and lateral teeth incisors erupting, the left central and lateral incisors were not visible in the mouth. No swelling or inflammation was observed in the mucosa. Upon examination of the panoramic radiograph of the patient, a radiopaque mass resembling a crown was observed in the area of the impacted central and lateral incisor teeth (Figure 1). The diagnosis of odontoma in this case was based on clinical and radiographic findings. Histopathological examination was not performed; however, the radiographic appearance was considered sufficient for clinical diagnosis. The patient was diagnosed with an compound odontoma based on the observed mass.



Figure 1. Pretreatment intraoral photographs, extraoral photographs, panoramic record

Treatment Objectives

The treatment objectives were to:

- 1) Removal of the mass identified as an odontoma

based on a preliminary diagnosis.

- 2) Facilitate the eruption of the impacted central and lateral incisor teeth.

Treatment Alternatives

As the initial treatment option for the patient, removal of the odontoma in the relevant area is followed by a routine check-up of the impacted teeth to assess their eruption.

As a second option, removal of the odontoma and placement of a gold chain on the impacted teeth for orthodontic traction was considered.

Since the spontaneous eruption of the tooth may take time and could affect the patient's psychosocial condition, the second option was considered.

Treatment Progress

After obtaining informed consent from the patient's legal representative, complete removal of the odontoma under local anesthesia was planned, along with orthodontic treatment to align the impacted incisors. Following the extraction of the upper left primary lateral incisor tooth under local anesthesia, a mucoperiosteal flap extending from the labial surface of the right central to the left canine was reflected, exposing the odontoma. The odontoma was carefully removed to avoid negatively impacting the unerupted teeth (Figure 2.a). The calcified structure measured 9 mm mesiodistally and 11 mm incisocervically (Figure 2.b).

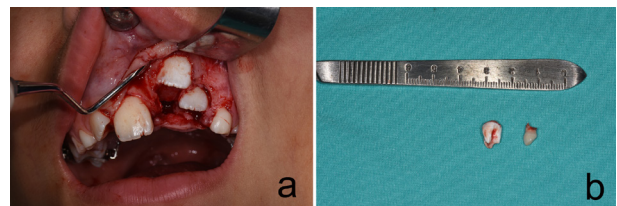


Figure 2. a) After removal of odontoma b) Extracted primary lateral tooth and odontoma

To ensure that no remnants were left behind, the area was carefully curetted. The bone over the buccal surface of the crowns of the impacted central and lateral incisor teeth was removed without exposing the cervical region. A gold chain was applied to the buccal surfaces of both the central and lateral incisor teeth (Figure 3.a). The mucoperiosteal flap was sutured back in place. The orthodontic appliance design was based on a fixed anchorage system. Maxillary first molars were banded.

No transpalatal arch was used in this case. Anchorage control was reinforced with the use of cervical headgear. An extrusion arch was bent using a 0.017" x 0.025" Beta-Titanium (TMA) archwire. Since the impacted lateral incisor tooth could partially obstruct the eruption of the impacted central incisor tooth, it was planned to first facilitate the eruption of the lateral incisor tooth, followed by the central incisor tooth. The extrusion arch was applied to the gold chain on the lateral incisor tooth to deliver approximately 30 grams of force (Figure 3.b).

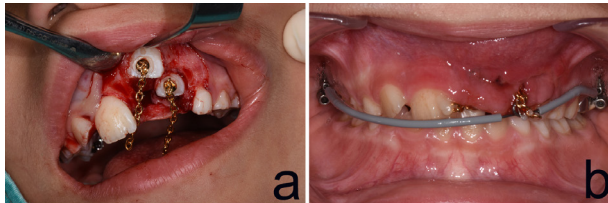


Figure 3. a) Gold chain application b) Lateral incisor ligated to the extrusion arch

The extrusion arch induces mesial tilting of the upper molars due to the counterclockwise couple it generates. Bands were placed on the maxillary first molars, and cervical headgear was prescribed for 12 hours of daily use to reinforce anchorage and to neutralize the forces causing side effects on the molars. The patient was seen every four weeks to check the force of the extrusion arch. After two months, the lateral incisor tooth had fully erupted. At this stage, the lateral incisor tooth was detached from the extrusion arch, and a new extrusion arch was bent for the central incisor tooth (Figure 4.a). After 2.5 months, the central tooth erupted into the oral cavity. 0.022" slot MBT prescription brackets were bonded to the upper incisors. The archwire sequence started with 0.014-inch nickel–titanium (NiTi) archwires for initial leveling and alignment, followed by 0.016-inch NiTi and 0.016 × 0.022-inch NiTi archwires. Subsequently, 0.017 × 0.025-inch stainless steel archwires were used for finishing and detailing.(Figure 4.b). The patient was followed up at monthly intervals and is currently undergoing functional orthopedic treatment with a Twin Block appliance.

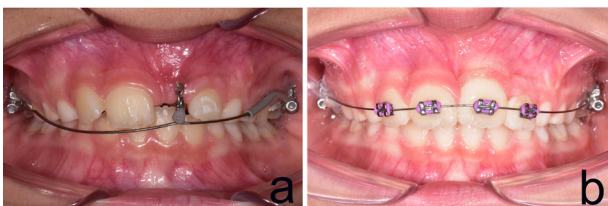


Figure 4. a) Central incisor ligated to the extrusion arch b) Levelling of incisors

Treatment Result

The left upper central and lateral incisor teeth, which were impacted due to the odontoma, were aligned in their proper position. It was observed that both teeth were vital, and the gingiva was at an acceptable level (Figure 5).



Figure 5. Intraoral and extraoral images after the teeth have been levelled and aligned

Discussion

Odontomas are benign developmental anomalies that are frequently associated with delayed eruption or impaction of permanent teeth, particularly in the anterior maxilla. They are usually asymptomatic and are often detected during routine radiographic examinations.^{1,3}

Orthodontic treatment is not consistently prescribed for the repositioning of impacted teeth following odontoma excision. Rather, the therapeutic modality is frequently guided by a detailed radiological analysis of the impacted tooth's developmental status.^{4,5} With the help of radiological images, the possibility of eruption can be determined by observing the root lengths of impacted teeth.

Active eruption occurs during the first half of root growth⁶ and erupts when half to three-quarters of its final root length has developed.⁷ The roots of the patient's impacted central and lateral incisor teeth were very close to the total root length and had passed the active eruption stage. At the same time, the lateral incisor tooth was positioned in a way that would prevent the spontaneous eruption of the central incisor tooth. Considering these two factors, we thought it would be more appropriate to actively erupt the teeth by applying orthodontic force for our patient.

There are two main surgical techniques used to expose an impacted tooth and to bond an orthodontic attachment. In one of these techniques, the closed eruption technique,

the tooth is exposed, the attachment is bonded, and then the area is closed again before orthodontic force is applied. In the second technique, after the tooth is exposed through a surgical intervention and the attachment is bonded, the area is not closed again. This technique can cause mucogingival problems, especially if the tooth is labial.^{8,9} To avoid mucogingival issues, the closed-eruption technique was used in our patient.

Beta titanium archwires maintain force better than other archwires and allow for the application of light, continuous force.¹⁰ For these reasons, it is preferred in extrusion arch applications. Although alternative methods such as NiTi coil springs and elastic traction exist, the extrusion arch with TMA wire was preferred in this case due to its ability to provide controlled, light, and continuous forces.

The use of cervical headgear at night was recommended to eliminate potential side effects on molar teeth caused by the moment created by the extrusion arch. The force transmitted by the headgear to the molars passes below the molars' center of resistance. This way, the force is directed both distally and slightly downward.¹¹ The effect of the headgear prevents molar mesial tipping and intrusion, which are side effects of the extrusion arch.

The TMA extrusion arch enabled controlled tooth movement and proper alignment while minimizing damage to the impacted teeth. Anchorage was reinforced with cervical headgear to prevent unwanted molar movement. Potential risks such as root resorption, anchorage loss, and gingival complications were carefully monitored throughout treatment. In this case, the impacted incisors were successfully erupted, and the gingival levels and contour were satisfactory, with no signs of recession or inflammation. These periodontal outcomes are consistent with previous studies, which have shown that the closed-eruption technique generally preserves gingival architecture and promotes favorable soft tissue esthetics compared to open-eruption methods.

Although the short-term outcomes were favorable, long-term prognosis should also be considered. The risk of relapse exists, particularly if retention protocols are not properly maintained, but careful orthodontic finishing and regular follow-up can minimize this risk. Root resorption is a potential concern with any orthodontic

traction, especially in teeth that have been impacted for an extended period; however, in this case, no signs of root resorption were observed during treatment, and periodic radiographic monitoring is planned to detect any late changes. Overall, with appropriate retention and follow-up, the impacted incisors are expected to remain stable and functionally and esthetically satisfactory in the long term.

CBCT imaging was not performed, as conventional radiography was deemed sufficient, and additional radiation exposure was avoided due to the patient's age. This may be considered a limitation.

Similar cases of impacted incisors associated with odontomas have been successfully managed with surgical removal followed by orthodontic traction.^{8–10} In the present case, eruption was achieved within 4.5 months using a TMA extrusion arch, which is in line with treatment durations reported in previous studies. The use of light continuous forces and controlled mechanics contributed to favorable and predictable outcomes.^{1,12}

The present case has several distinctive features. The patient was treated at an early age, which allowed timely intervention and improved treatment outcomes. In addition, the simultaneous impaction of both the maxillary central and lateral incisors presented a more complex clinical situation compared to single-tooth impactions. A controlled orthodontic approach using a TMA extrusion arch was preferred, and approximately 30 grams of force was applied to achieve gradual and safe eruption. Anchorage was reinforced with cervical headgear to counteract undesirable molar movement. These factors contributed to the successful eruption and alignment of the impacted teeth.

In this patient, the impacted upper central and lateral incisors were successfully guided into eruption within 4.5 months. The teeth remained vital, and the gingival contour and levels were preserved. Both the patient and her family expressed satisfaction with the esthetic and functional outcomes.

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