

Repositioning of Impacted Canine Using Elastic Chain

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Abstract: Failure of eruption of the mandibular permanent canine is an unusual event. There are no such definitive dis - impaction procedures available in the literature. When a patient has an impacted tooth, the timing of orthodontic treatment, the type of surgical procedure to expose the tooth, the orthodontic mechanics, and the potential problems vary depending on which tooth is impacted and its position in the jaw. This case report describes the successful treatment of a patient with an impacted mandibular canine. The impacted tooth was surgically exposed and brought into the arch.

Keywords: Impaction, Surgical exposure, Orthodontic traction

1. Introduction

Tooth eruption is the physiologic process during which the tooth migrates from its site of formation to its functional position in the oral cavity. Permanent mandibular canines usually erupt at the age of 9 - 10 years. Root completion occurs within 3 years of eruption in the occlusal plane. The term 'dental impaction' refers to a tooth placed within the bone and/or soft tissue, which won't erupt by itself or fails to erupt within the expected time of eruption while the contralateral tooth has erupted six months earlier. Archer defined impacted tooth as one which is completely or partially unerupted and is positioned against another tooth or bone or soft tissue so that its further eruption is unlikely. According to Kufte and Shapira, impaction is a condition in which a tooth is embedded in the alveolus so that its eruption is impeded and it is locked in position by bone or by adjacent teeth. Factors disrupting eruption include: [1] Local factors such as presence of supernumerary tooth/cyst/ tumor and tooth size - arch length discrepancy, [2] Systemic factors such as genetic disorders, endocrine deficiencies and history of irradiation of the jaws. The need for surgical exposure and orthodontic traction becomes necessary when the considerable time has lapsed beyond the eruption - time.

2. Case Report

A 15 years old female patient reported with a chief complaint of spacing in upper and lower anterior region. Intra - oral examination revealed absence of 12, 17, 22, 31, 32, 41, 42. The permanent mandibular left canine was missing with the over - retained deciduous canine. An orthopantomograph revealed the absence of the crypts of the missing teeth which further concluded that they were congenitally missing. The permanent left mandibular canine which was impacted with its crown crossing the mid line. Complete absence of numerous teeth suggested it to be a case of hypodontia.



Figure 1: Pre - treatment intra - oral photographs

The treatment objective was to bring the crown to the occlusal plane to enhance stable functional occlusion along with dental and facial esthetics. Surgical exposure and orthodontic repositioning were planned for the impacted mandibular canine. The teeth available in both the arches were bonded. A passive open - coil spring was placed between the brackets of the permanent mandibular left 1st premolar and right canine to maintain the space. After pre - surgical levelling and alignment, surgical exposure was done. A full thickness flap was raised. A lingual button was bonded onto the exposed surface of the canine. An elastic - chain was engaged on the lingual button and the free end was engaged with the main arch wire distal to the impacted canine. The patient was asked to report every 15 days. A stainless - steel ligature wire was ligated on an eyelet of the elastic chain most distant to the lingual button. The other side was ligated beside the open coil spring distal to the impacted canine. When the tie was tightened, it compressed the open coil spring. The Ni - Ti open coil spring tends to return to its original form which further stretched the elastic chain. This stretched elastic chain generated the eruptive force. The eyelets closer to the lingual button were used sequentially in the following appointments.



Figure 2: (A) Space maintenance with passive open coil spring. (B) Surgical exposure followed by bonding of an attachment. (C) Dis - impaction using stretched elastic chain.

After 2 months of repeated activation, the canine came out of the periodontium. A Begg bracket was bonded on the labial surface of the crown. A super - elastic 0.014" NiTi wire was engaged to bring the impacted canine to the occlusal plane. After 1 month, the Begg bracket was replaced by 0.022" slot MBT bracket for further levelling and alignment. The case was finished using the stiffer 0.017" X 0.025" followed by 0.019" X 0.025" stainless - steel wire.



Figure 3: (A) Begg bracket bonded, (B) MBT bracket bonded

3. Discussion

Mandibular canine impaction is less frequent than maxillary canine impaction. Prevalence of impacted maxillary canines is 0.9–2.2% and of impacted mandibular canines is 0.05–0.4%.⁵ Most of the impacted mandibular canines are unilateral and located on the labial aspect of the dental arch. Chu et al⁷ reported five mandibular impacted canine (0.07%) teeth in 7486 patients. A study by Rohrer⁵, examining 3000 patients radiographically, found 62 impacted maxillary canines (2.06%) and only 3 impacted mandibular canines (0.1%). Grover and Lortan⁸ found only 11 cases of mandibular impaction in the mandible in 5000 individuals (0.22%). There are limited numbers of studies revealing mandibular canine impaction with regard to the frequency of gender and side of occurrence ratios. Aydin et al⁹ reported a ratio of 1 male to 1.22 females in impacted mandibular canines but did not report a ratio between right and left side occurrences in impacted mandibular canines.

Different treatment modalities are available such as traction with K - 9 springs, elastic chain, ligature wire or using piggy back wire. In this case, the impacted tooth was brought in the oral cavity. It was also uprighted at the same time. The impacted canine was distant from the lower border of the mandible. Thus, the eruptive force was generated using the stretched elastic chain.

Various surgical techniques have been described for exposing impacted teeth before orthodontic tooth movement. The two most commonly used surgical techniques for impacted teeth are¹⁰: (1) Open technique: exposure of the entire labial aspect to the anatomic crown with total excision of all keratinized tissue (the window approach) and (2) Closed technique: a flap is raised which exposes only 4–5 mm of the most superficial portion of the labial aspect of the cusp tip while maintaining 2–3 mm of keratinized tissues. Several case reports have shown that the window or open approach causes statistically significant loss of attachment, recession and the non - keratinized gingival margin would not match with the adjacent one.¹¹ The closed surgical technique was opted for the maintenance of the gingival margin height along with the preservation of the keratinized gingiva around the entire erupting tooth.¹²

The impacted mandibular canine was rotated. The full thickness flap was raised. A lingual button was bonded on the exposed surface. When the tooth was visible in the oral cavity, a Begg bracket followed by 0.022" slot MBT bracket was bonded.

Lingual button with gold chain is usually used in cases of impacted teeth. In the present case a stainless - steel ligature tie was used instead of the gold chain to make it cost effective.

The extrusive force produced by the ligature tie was measured using the dontrix gauge.

4. Conclusion

Mandibular canine impactions are rare. There is no such definitive dis - impaction procedure available in the literature. It took 8 months to bring the tooth out from the alveolar bone into the arch. Orthodontic management along with the surgical exposure of impacted teeth is the most appropriate way to give functional and aesthetically acceptable occlusion.

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