

SURGICAL EXPOSURE OF A UNILATERAL IMPACTED MANDIBULAR CANINE FOLLOWED BY ORTHODONTIC EXTRUSION: A CASE REPORT.

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ABSTRACT

Impacted teeth are those with a delayed eruption time or that are not expected to erupt completely based on clinical and radiographic assessment. Impaction of the permanent third molar teeth is a common clinical occurrence. There are several etiologic factors for canine impactions have been proposed - primary reasons are long path of eruption and genetic influence. The maxillary canine is developing high into the palate with a tortuous course of its eruption path and the mandibular canine is also developing at the lower border of the mandible which might lead to its impaction. In the case presented here, we performed surgical exposure of the impacted canine followed by orthodontic extrusion of the same to its proper alignment in the arch. A 10 -year-old female child came to the Department of Pedodontics for routine dental check-up. On intra - oral examination, the mandibular left lateral incisor was found rotated and there was spacing between the central incisor and lateral incisor. On radiographic examination it was revealed that there was ectopic eruption of the lower left permanent canine with its crown almost overlapping the root of the lateral incisor of same side. The management of impacted canines is important in terms of aesthetics and function. Clinicians must formulate treatment plans that are in the best interest of the patient and they must be knowledgeable about the variety of treatment options.

Key words: Impacted canine, ectopic eruption

INTRODUCTION

Impacted teeth are those with a delayed eruption time or that are not expected to erupt completely based on clinical and radiographic assessment¹. Impaction of the permanent third molar teeth is a common clinical occurrence. All teeth can be impacted, however, third molars, maxillary canines, mandibular second premolars and maxillary central incisors are the teeth most frequently involved². The prevalence of impacted third molars are 16.7% -68.6% and maxillary canines impaction is 0.9 - 2.2% [D'Amico et al., 2003; Aydin et al., 2004; Rohrer, 1929]³⁻⁵. The impaction of the mandibular canine is less frequent, and the prevalence of impacted mandibular permanent canines ranges only 0.05-0.4% [Mead, 1930; Yavuz et al., 2007; Sham et al., 1978; Brown et al., 1982]⁶⁻⁹. In this case-report we described a rare condition of impacted mandibular canine of a child in the mixed dentition period.

There are several etiologic factors for canine impactions have been proposed - primary reasons are long path of eruption and genetic influence¹⁰. The maxillary canine is developing high into the palate with a tortuous course of its eruption path and the mandibular canine is also developing at the lower border of the mandible which might lead to

its impaction. The genetic influence of canine impaction was studied by various authors and found genetic involvement in canine impaction. However, females are found to be more affected with canine impaction? (Because x chromosome is involved). In cases of cleft lip and palate, the maxillary canine tends to erupt through the cleft or it may get impacted. The supernumerary tooth or tooth fragments of primary tooth may also cause impaction of permanent canine although supernumerary teeth mostly cause impaction of permanent incisors. Ectopic eruption path and thick palatal mucosa can contribute to impaction of maxillary canine. Endocrinologic deficiency may also be a contributing factor in some cases with canine impaction but it is also more likely to cause generalized impaction or delayed eruption of all the teeth¹¹.

The other factors are the arch length tooth size discrepancy where jaw size is smaller than the tooth material may cause impaction of canine. In cases of absence of maxillary lateral incisor, {due to congenital missing tooth} there is loss of guidance for the canine¹²⁻¹⁴. If there is retained primary canine or premature loss of primary canine will also cause impaction of permanent canine. Trauma to the primary canine may sometimes

cause dilaceration of the permanent canine leading to impaction^{15,16}.

Although usually asymptomatic, the situation represents functional, aesthetics, orthodontics and surgical problems. After diagnosis, four types of stances are possible, facing impaction or missing eruption of teeth: abstention (mandibular canines close to the alveolar nerve); extraction; etiologic therapy if a deciduous tooth blocks the evolution; surgical exposure¹⁷.

In the case presented here, we performed surgical exposure of the impacted canine followed by orthodontic extrusion of the same to its proper alignment in the arch.

CASE REPORT

A 10 -year-old female child came to the Department of Pedodontics for routine dental check-up. On intra - oral examination, the mandibular left lateral incisor was found rotated and there was spacing between the central incisor and lateral incisor. On radiographic examination it was revealed that there was ectopic eruption of the lower left permanent canine with its crown almost overlapping the root of the lateral incisor of same side (Fig-1).



Figure 1: Preoperative IOPA showing ectopically erupting canine on lower left side

More than two third of the root formation has been completed and there is less possibility for the tooth to erupt on its own. So we had planned to expose the tooth surgically followed by orthodontic extrusion. An OPG was taken for the record purpose (Fig-2). The goals of treatment for the patient were to expose the impacted mandibular left canine and then bring it into the dental arch, to level and align the dental arches.



Figure 2: Preoperative Orthopantomogram showing the ectopically erupting canine on lower left side

Both lower first permanent molars were banded & brackets were placed on right mandibular primary canine, permanent lateral and central incisor, left mandibular permanent central and lateral incisor (Fig-3).



Figure 3: Photograph after bracket placement

One week later surgical exposure of the impacted canine was planned and under aseptic conditions. Left inferior alveolar nerve block was administered using 2% Lignocaine with adrenaline. The impacted mandibular left canine was exposed surgically and the muco-periosteal flap was reflected just enough to expose the crown of the tooth (Fig-4). The exposed crown of impacted canine was etched, bonded and a orthodontic bracket was placed under proper isolation (Fig-4). After this procedure, extraction of retained primary lower left canine (73) was done followed by suture placement. Post-surgical instructions were given and necessary antibiotics and analgesics were prescribed. Patient was recalled after a week for suture removal.



Figure 4: Photograph showing the impacted ectopically erupting canine after flap reflection

An uneventful healing was observed at recall visit and sutures were removed after 7 days. Orthodontic force was applied immediately by ligating the bracket with 0.009 ligature wire to 0.016 round Ni-

Ti to pull the canine. Then, to move the crown of the canine away from the apex of the root of the lateral incisor, distal and upward traction was applied to the canine, using an elastic chain hooked from the bracket on the canine to the buccal tube of the left molar band (Fig-5).



Figure 5: Photograph showing orthodontic extrusion of impacted canine

Over the next 6 months, the progress of canine eruption was evaluated monthly. No complications were observed at the surgical site, and the gingiva remained healthy. Once sufficiently erupted, the crown of the impacted canine was rebonded with a canine bracket to finish the occlusion. (Fig-6)



Figure 5: Photograph showing post-operative view after six months follow up

DISCUSSION

Canines are important for an attractive smile as it is the cornerstones of the dental arch and are also essential for a functional occlusion. Therefore, extraction of the impacted permanent canine is generally contraindicated. The diagnosis and localization of the impacted teeth is the most important step in the management of impacted teeth. However, bringing an unerupted or impacted permanent canine into the occlusion should not be the only goal in managing these teeth. The aim should be to attain proper occlusion, with a healthy zone of attached gingiva and ideal alveolar bone height.

Failure of eruption of the mandibular canine is an unusual event¹⁸. Mandibular canine impaction is

regarded as a much rarer phenomenon and there are limited numbers of studies revealing its frequency of occurrence⁴. **Grover and Lorton**¹⁹ found only 11 impacted canines (0.22%) in the mandible in 5000 individuals. **Chu et al.**²⁰ reported five mandibular impacted canine (0.07%) teeth in 7486 patients. A study by **Rohrer**⁵ examining 3,000 patients radiographically found 62 impacted maxillary canines (2.06%) and only three impacted mandibular canines (0.1%), in a 20:1 ratio. In another study by **Aydin et al**⁴ involving 4500 Turkish patients, the incidence of mandibular canine impaction was 0.44%. Definitely, maxillary canine impaction is more frequent than is mandibular canine impaction^{3,4,21}.

There are many reasons for the failure of tooth eruption, including inadequate space, supernumerary teeth, premature loss of deciduous teeth, retention of deciduous teeth, excessive crown length, hereditary factors, functional disturbance of endocrine glands, tumors, cysts, and trauma²²⁻²⁷. However, our patient had no apparent tumors, cysts, and dental trauma. Therefore, in this present case, we believed that the origin of the canine impaction was due to the ectopic eruption of lower left permanent canine.

The mandibular canines are affected by pathology in a lower ratio than the third molars and premolars^{18,20}. However, some authors reported few cases of dentigerous cyst, squamous odontogenic tumors, and ameloblastoma which were associated with impacted mandibular canine teeth^{26,27,28}. But in our case no such pathologies were observed.

Most impacted teeth are asymptomatic, but chronic infection with fistula formation and some symptoms such as pain and swelling have been reported in the literature^{18,20}. In our case the tooth was completely asymptomatic.

There are several treatment options proposed for impacted mandibular canines including surgical removal, exposure and orthodontic alignment, transplantation, and observation²⁹. If adequate space for alignment of an impacted mandibular canine exists and it is mechanically possible to reposition an impacted mandibular canine into proper position, then orthodontic treatment is indicated^{29,30}. Following surgical exposure, the impacted tooth may be allowed to erupt passively, especially if it has a favourable angulation to erupt on its own. Alternatively, forced eruption may be carried out in conjunction with orthodontic alignment^{30,31}. As a third alternative, if an impacted canine cannot be positioned favourably but there is space for its full eruption, then orthodontic treatment may help to align the adjacent teeth in their migrated order followed by crowning or recontouring of some teeth to improve esthetics³².

Orthodontic treatment is associated with soft and hard tissue changes, thus creation and maintenance

of gingival and periodontal health is paramount to ensure optimal results. Although no specific dimensions of keratinized tissue have been indicated for maintenance of periodontal health, in orthodontic cases presence of keratinized tissue is important to prevent formation of periodontal defect^{33,34}. Classically, three fundamental principles are considered when treating impacted teeth: the surgical approach, the type of fixation that is adhered to the tooth for its posterior traction and the orthodontic movements that have to be applied in order to position the tooth in the dental arch^{35,36,37}. From a periodontal perspective, the appropriate surgical technique should allow the orthodontist to apply measured forces in a favourable direction for efficient correction of the impaction and for avoidance of damage to adjoining soft tissues and teeth^{33,34,35,38}.

The orthodontic guidance of impacted canine may not be successful in all the cases; there may be failures, nonalignment of impacted canine in the desired position. The prognosis is worst in cases where canine is impacted horizontally and apically deep in palatal process³⁹. The other factors known for failure include ankylosis of impacted canine, malformations of root, external resorption. Root resorption is reported to be more frequently in palatally impacted canine. An unexplained pain can be because of collision of crown of impacted canine with roots of adjacent teeth. If the impacted canine does not respond to the applied orthodontic force for 3 months, supplementary treatment plan has to be carried out⁴⁰.

CONCLUSION

The management of impacted canines is important in terms of aesthetics and function. Clinicians must formulate treatment plans that are in the best interest of the patient and they must be knowledgeable about the variety of treatment options. When patients are evaluated and treated properly, clinicians can reduce the frequency of ectopic eruption and subsequent impaction of the maxillary canine.

Various surgical and orthodontic techniques may be used to recover impacted canines⁴¹. The proper management of these teeth, however, requires that the appropriate surgical technique be used and the clinician must be able to apply measured forces in a favourable direction. This allows for complete control in efficient correction the impaction and for avoidance of damage to adjacent teeth. Careful selection of surgical and orthodontic techniques is essential for the successful alignment of impacted canines.

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