

Management of an Unerupted Maxillary Canine: A Case Report

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Abstract :

Permanent canines are the foundation of an esthetic smile and functional occlusion. Any deviation from the normal sequence of development leads to the impaction of teeth. Among multiple treatment options, alignment of impacted canines into the arch is the best treatment approach. This report describes the surgical and orthodontic management of a buccally impacted permanent maxillary canine with mesial diastema.

Introduction :

A canine as being impacted if it was unerupted for at least 6 months with complete root development or if the contra lateral tooth was erupted for at least 6 months with complete root formation.¹ Permanent canines are the foundation of an esthetic smile and functional occlusion.² The most commonly ectopically erupting permanent teeth are the maxillary first molars, maxillary canines and

mandibular lateral incisors. Maxillary canine impaction incidence in population is 1-2.5%.³ Frequencies of maxillary canine impactions are significantly higher than that of mandibular canines.⁴ Palatal impaction is much more common than labial impaction⁵ and maxillary canine impactions occur twice in females than in males⁶. In this study, a maxillary canine was brought into the arch by the closed eruption technique using fixed appliance therapy.

Case report:

A 20 years old female patient reported to the Department of Orthodontics at Bangobohu Sheikh Mujib Medical University (BSMMU) seeking treatment for spacing between teeth. Intraoral examination revealed a class 1 malocclusion with an unerupted right maxillary canine. Maxillary

arch showed spacing between central incisors and right canine region. A whitish bulging area of the tip of the right canine was visible and midline was shifted to right with normal overjet and overbite. Soft tissue was normal, oral hygiene was good and medical history was noncontributory.



(1) Pre-orthodontic intraoral front view. (2) Pre-orthodontic intraoral right lateral view. (3) Pre-orthodontic OPG.

Radiographic examination showed that all teeth including the third molars were present. Right maxillary canine was impacted and slightly curved. A horizontal tube shifting technique (parallax) with periapical radiographs confirmed that right canine was on buccal position. Cephalogram

showed a class 1 skeletal pattern. Model analysis confirmed availability of adequate space for canine. Treatment plan consisted of guiding right canine in to occlusion by closed eruption after surgical exposure and 018" Roth PRE was placed in upper arch only for this treatment.

First leveling was done by 0.016 NiTi wire. Space between central incisors was closed in 0.016 SS by power chain. Open coil spring was used between right first lateral incisor and first premolar to regain the canine space. Then, the crown of the impacted canine was exposed by creating a window under local anesthesia and a bracket was bonded to an accessible site on the tooth. Power chain was used in 0.018 SS to apply traction to guide impacted canine. Once the impacted teeth broke through the gingival tissue, bracket of canine was finally bonded. Patient was recalled after three weeks later to adjust the power chain to maintain traction force. Six months later, when the teeth came close to the occlusion a box loop in 0.016 SS wire was given to correct the rotation. After rotation correction, residual space between right lateral incisor and canine was closed by 'V'loop in 0.017"×0.025"SS. After closing the space a fixed retainer was given for retention purpose and bracket was removed.



(4) Post-orthodontic intraoral front view. (5) Post-orthodontic intraoral right lateral view. (6) Post-orthodontic OPG.

Discussion :

Impacted permanent maxillary canines are detected quite regularly in the clinical and radiographic examination of a young patient. The first step in treatment requires both clinical and radiographic assessment in order to determine accurately the location and position of the impacted tooth. Inadequate arch space and a vertical developmental position are often associated with buccally canine impactions.⁵ Genetic factors have been reported to be the primary cause of palatally impacted maxillary canines.⁷ Pathological sequelae like cysts, tumors, external /internal resorption of the impacted teeth and /or adjacent teeth, transmigration, referred pain and periodontitis have been associated with tooth impaction. There are four treatment options for impacted teeth; observation, intervention, relocation and extraction.⁸ When the condition is identified early, interceptive extraction of the primary canines completely resolves permanent impaction in majority while others show some improvement in terms of more favorable canine positioning. However, extraction of the primary cuspids do not guarantee elimination or correction of the problem. As a general rule, when the degree of overlap between the permanent maxillary cuspid and the neighboring lateral incisor exceeds half the width of the incisor root, the chances of complete recovery are poor.

An angle exceeding 31° from the vertical significantly reduces the chance of normal eruption following an extraction.⁹ A principal of treating unerupted canines by assessing the vertical axial eruptive path and suggested that labial tipping of 45° is generally orthodontically untreatable.¹⁰ Horizontal position, age of the patient, vertical height and bucco-palatal position in descending order of importance are the factors which determine the difficulty of canine alignment.¹¹ When the interceptive treatment fails, efforts to reposition impacted teeth surgically or orthodontically should be considered. The prognosis of orthodontically erupting and repositioning an impacted tooth within the alveolar process depends on the angulation and position of the impacted tooth, available space, and presence of keratinized gingival tissue, patient cooperation and the length of treatment time.¹²

Labially impacted maxillary canines uncovered with an apically positioned flap have more unaesthetic sequelae, such as increased clinical crown length, increased width of attached tissue, gingival scarring, intrusive relapse and damaged periodontium than those uncovered with the closed eruption technique.¹³ We chose closed eruption as the impacted teeth were situated quite high.

Ankylosis needs to be ruled out after surgical exposure by determining tooth movement with reasonable digital force or metallic sound on percussion. It is desirable to deliver a light force in the occlusal direction, using elastics, elastic chain, NiTi spring, or tie wire. Cole et al. described the use of magnets in the management of teeth that fail to erupt.¹⁴ The authors used power chain as traction attachment in 0.016" SS which transmitted a continuous traction force to the tooth. Power chain was adjusted every three weeks to maintain traction force.

Complications associated with orthodontic repositioning of impacted teeth includes absence of or inadequate keratinized tissue, reduced sulcular depth, gingival recession, increased gingivitis, ankylosis, multiple exposures, devitalization, pulpal obliteration, external root resorption, injury to adjacent periodontium, marginal bone loss and extraction of the adjacent and /or impacted tooth. Failure of the surgical orthodontic treatment of impacted permanent upper canines can be caused by a range of factors like ankylosis, unsuitable position, inflammation, periapical granuloma, collision of the crown of the impacted canine with the root of the adjacent tooth, insufficient space, unsuitable procedure of the surgical exposure, unsuitable direction of the applied orthodontic force, malformed root of the adjacent lateral incisor.¹⁵

The option to extract the canine should be considered for ankylosed teeth, canines undergoing external or internal root resorption, teeth with severe root dilacerations, canines lodged between the roots of the central and lateral incisors, teeth with pathologic changes, and when the occlusion is acceptable and the first premolar substitutes for canine in an otherwise functional occlusion with good alignment. The aim of this case report was to demonstrate the potential of aligning extremely malpositioned impacted canine.

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