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Management of impacted mandibular canine using skeletal anchorage: A case report

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Abstract

A 17 years old male patient presented with impacted mandibular right canine and partially erupted mandibular left canine, with overjet of 0.5mm and 100% overbite. He was treated with fixed orthodontic treatment and canine disimpaction using skeletal anchorage in maxillary arch to avoid undesirable effects on maxillary dentition. Pre-treatment and post treatment records were taken to evaluate the changes.

Keywords: Mandibular canine impaction, orthodontic traction, orthopantomogram, mini-implant

Introduction

Prevention of eruption of a tooth by some physical barrier in its eruption path is defined as dental impaction [1]. Both local or systemic factors may lead to failure of tooth eruption. Obstruction in the eruption path (by a supernumerary tooth, cyst, or tumour); skeletal irregularities leading to insufficient space in the dental arch (micrognathia) or dissimilarity in arch length tooth size are some local factors leading to dental impaction [2]. Genetic disorders and endocrine disorders also lead to failure of tooth eruption. Multiple teeth are usually impacted in systemic conditions. Frequency of impacted mandibular canines ranges from 0.05% to 0.4%, which is less than the prevalence of impaction of maxillary canines which ranges from 0.9% to 2.2% [3, 4, 5].

Malpositioning of the impacted tooth labially or lingually, loss of arch length due to migration of neighboring teeth, formation of dentigerous cyst and root resorption of the impacted tooth as well as the neighboring teeth, are some of the consequences of canine impaction [6]. Therefore, there is a need for close monitoring of eruption status of all the teeth during routine dental visits.

Pediatric dentists, orthodontists, or general dentists usually diagnosed tooth impaction during routine dental examination. Clinical evaluation and radiographic assessment are indispensable tools in the diagnosis of impacted teeth. Aesthetically and functionally acceptable outcomes can be achieved by early detection, timely management, and appropriate surgical and orthodontic treatment.

Diagnosis and Etiology

A 17 years old male patient came to the department with a chief complaint of irregular upper and missing lower teeth. The patient was healthy and had no past history of trauma or abnormal habits. On extra oral examination examination, no TMJ dysfunction was found. There were no gross asymmetries. The patient had a mesoprosopic face, mesocephalic head and a straight profile with competent lips. There was no incisor display at rest whereas the incisor display during smile was 100%. There was no gingival display at smile and at rest. Intraorally, the patient had Angle's Class I malocclusion with an overjet of 0.5mm, overbite of 100%, retroclined upper and lower incisors, rotated upper canines, a missing right mandibular canine with spacing in that area, partially erupted lower left canine and lower midline off to right by 1.5 mm (Fig1).

Orthopantomogram confirmed the presence of all permanent teeth including the impacted lower right canine (Fig 2a). Cephalometrically (Fig2b) the patient had class I jaw bases (ANB-0.5 degrees) and an average growth pattern (FMA-24 degrees).

Treatment Objectives

- Alignment and levelling of both the arches.
- Surgical exposure of right mandibular canine followed by orthodontic traction.
- Achieve normal overjet and overbite
- Class I canine occlusion and optimum soft tissue relationship to be achieved.

Treatment Plan

- Fixed orthodontic therapy with Roth 0.022 slot
- Alignment and leveling of maxillary arch using anterior bite plane
- Alignment and leveling of mandibular arch
- Disimpaction of 43
- Finishing and detailing
- Retention of achieved results

Treatment Progress

Orthodontic treatment was done using Roth-022X028" slot pre-adjusted edgewise appliance. Initially, alignment and levelling was done for upper and lower arches. Flexible NiTi wires were used followed by stiff stainless steel wires (0.014" Ni-Ti to 0.019"X 0.025" SS).

Space was gained for lower canines using open coil springs placed in 0.019"X 0.025" SS wire between lateral incisors and 1st premolars (Fig 3). When enough space was gained in lower arch, surgical exposure of lower right canine was done and mini- implant was placed between upper right lateral incisor and canine. Bondable button was attached to

mandibular right canine during the surgery and orthodontic traction was applied using elastic from button to the mini-implant in the maxilla. (Fig 4a, b) Space was maintained in the arch during canine traction using open coil spring.

In order to correct rotated mandibular canines, buttons were welded on the first molars and canines (banding of canines was done and buttons were welded on customized bands). Couple force was applied on canines for rotation correction using E-chains between canines and anterior segment and between canines and first molars (Fig 5). During canine traction and rotation correction, anterior and posterior turbo was given to maintain clearance between the arches so that forces on the canine could be easily applied without any hinderance.

Settling was done in 0.014" stainless steel arch wire. As upper lateral incisors were peg shaped, so space was maintained in the arch for their proper anatomy and build up was done immediately after debonding. After debonding of both arches (Fig 6), post debonding OPG and lateral cephalogram was taken (Fig 7a, b). Upper and lower Hawley's retainers were given to retain the achieved results (Fig 8).

Treatment Results

In order to achieve better access during surgical procedure, localization of impacted canine must be carried out prior to treatment both clinically and radiographically. In this case, we achieved class I canine relationship, satisfactory improvement in smile with healthy attached gingiva and no periodontal defect. Surgical exposure of impacted mandibular canine using apically repositioned flap and orthodontic correction of the tooth position using skeletal anchorage without undesirable side effects on dentition were together useful in re-establishing an ideal arch relationship and balanced smile.





Fig 1: Pre- treatment clinical photographs



A

B

Fig 2: Pre- treatment (a): panoramic radiograph (b): lateral cephalogram



Fig 3: Open coil springs placed in 0.019"X 0.025" SS wire between lateral incisors and 1st premolars



a

b

Fig 4(a): Canine exposure (b): orthodontic traction using mini- implant



Fig 5: Space maintenance using open coil spring, anterior and posterior turbo, couple force for rotation correction

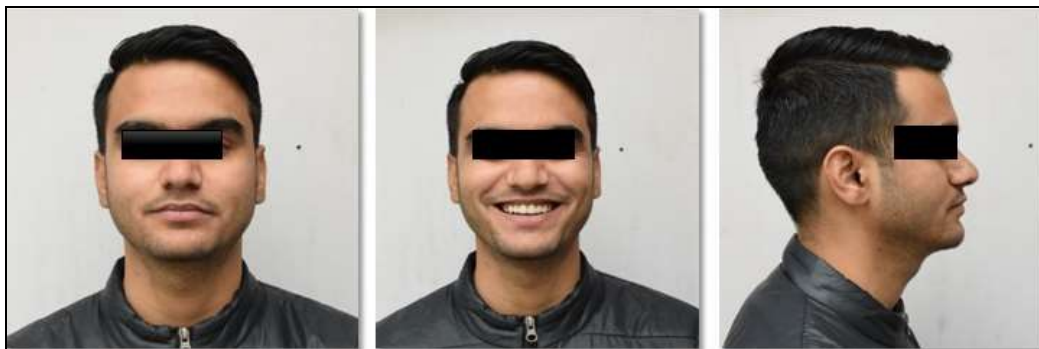


Fig 6: Post- treatment clinical photographs



Fig 7: Post- treatment (a): panoramic radiograph (b): lateral cephalogram



Fig 8: Retainer photographs

Discussion

The most important step in the management of such cases is localization of impacted teeth [7]. Necrosis of pulp, ankylosis and apical root resorption are some of the highly undesirable sequelae of impaction whose onset is difficult to predict. Root resorption can be diagnosed using radiographic examination. Commonly, Orthopantomograph is used to check the status of impacted teeth [8]. But now a days, with advent of CBCT, it is easier to predict the accurate position of impacted tooth and its effects on adjacent teeth. There was no need of CBCT in our case as the canine's position was favourable.

Both mandibular canines were brought into the dental arch with orthodontic treatment. Deep bite correction was done and a proper occlusion achieved. The original profile remained unaffected and the smile was improved greatly.

Closed- eruption or open- eruption techniques have been used for surgical exposure of the impacted canines [9]. In this case, closed eruption using apically repositioned flap was used as it provides better periodontal tissues around the guided erupted teeth [10]. A rigid stainless steel working wire should be in place and adequate space for the impacted tooth should be created prior to application of traction forces to it.

To avoid deleterious intrusive effects and canting of occlusal plane during extrusion of impacted teeth, a stable anchorage unit is needed [11]. Skeletal anchorage using mini implants has

shown to provide reliable anchorage in various clinical situations. In this case, mini implant was placed and traction force was applied [12]. The arch length deficiency in mandibular arch was resolved and slight arch widening took place. Proper anatomy of all the teeth is necessary for ideal arch relationship and aesthetics. So, in this case, build-up of peg shaped lateral incisors was done after debonding.

Conclusion

Mandibular canine impaction is an unusual event. So proper diagnosis and proper localization using different aids is important step in its management. Regarding treatment planning, skeletal anchorage is an efficient way to avoid undesirable side effects.

Conflict of Interest

Not available

Financial Support

Not available

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