

ORTHODONTIC MANAGEMENT OF UNILATERAL LABIAL IMPACTION OF MAXILLARY CANINE: A CASE REPORT

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ABSTRACT

Maxillary canines are the cornerstone of the occlusion. A fully erupted maxillary canine supports the facial muscles and lip of an individual. Thus, it plays a pivotal role in providing aesthetic facial harmony and aids in oral function. Its position is a turning point in the occlusion and act as guidepost by virtue of its location. Sometimes canine may fail to erupt in time and those unerupted canines are designated as 'impacted canine'. Impaction of maxillary canines is a frequently encountered clinical problem in orthodontic therapy. When a preventive approach fails, treatment involves surgical exposure of the impacted tooth, followed by orthodontic traction to guide and align it into the dental arch. The aim of the present report was to demonstrate by case reports of an adult patient from Dr R Ahmed Dental College and Hospital, Kolkata with unilateral impacted maxillary canines treated with surgical exposure and orthodontic treatment.

KEY WORDS

canine, impacted tooth, orthodontic anchorage preparation

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INTRODUCTION

The term functional appliance refers to a removable or fixed appliance designed to alter the mandibular position both sagittally and vertically, resulting in orthodontic and orthopedic changes in the jaws.¹

CASE REPORT

A female patient of 19 years age, came to the Department of Orthodontics and Dentofacial Orthopaedics, Dr. R Ahmed Dental College and Hospital, Kolkata with a complaint of missing tooth in upper front teeth region. She had no relevant medical history so as to contraindicate any orthodontic or surgical treatment.

On extra oral examination, she had a convex profile with a typical mesoprosopic face. Lips were competent. Face was apparently symmetrical. Her temporomandibular joint appeared to be normal on examination. There was no deviation on opening and closing of mandible. (Fig1A-C)

On intra-oral examination, end on molar relationship and class I canine relationship on left side. On right side upper canine is missing. The occlusion was having 3 mm of overjet and 3 mm of deep bite. A complete deep bite was noted. The maxillary dental midline appears to be coincident with the facial midline but there is a deviation of 2 mm of lower midline towards left side. There were retained maxillary deciduous canines. There was lower anterior crowding, distolingual rotation of both side canine. (Fig 2A-E.).

The panoramic radiograph showed a complete permanent dentition with right maxillary canine impaction. CBCT has also been done for evaluation and position of impacted canine. There was no pathology observed radiographically associated with the impacted canine. (Fig.3A-D).

DIAGNOSIS

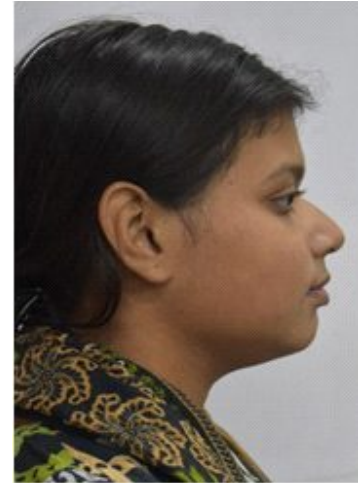
A 19 year old female patient with Endon malocclusion on class II skeletal bases with average growth pattern, lower anterior crowding with



1A



1B



1C



2A



2B



2C



2D



2E

impacted right upper canine and with 3 mm of overjet and convex profile with protrusive upper and lower lip.

Problem list

1. Skeletal class II
2. Impacted 13.
3. Mesially tipped 22.
4. Distolingual rotation of 33 & 43.
5. Inadequate space for canine.

TREATMENT OBJECTIVE

1. To surgically expose followed by clinical traction for 13.
2. To establish the class, I molar relation and class I canine relation bilaterally.
3. To correct the inclination and align of the upper and lower anterior in the basal bone.
4. To improve the smile and aesthetics and overall appearance

CLINICAL EVALUATION

Clinical assessment and visual inspection revealed the presence of canine bulge between the lateral incisor and first premolar on the left side. However, the canine bulge was not so prominent and there was a mesial and labial angulation of the left maxillary lateral incisor. Prognostic evaluation of canine position was assessed by radiograph. The prognostic factors investigated by McSherry⁹, Pitt, Hamdan and Rock¹⁰ and Counihan, Al-Awadhi and Butler were used as references. The prognosis of the impacted canine was calculated to be favourable.

TREATMENT PLAN

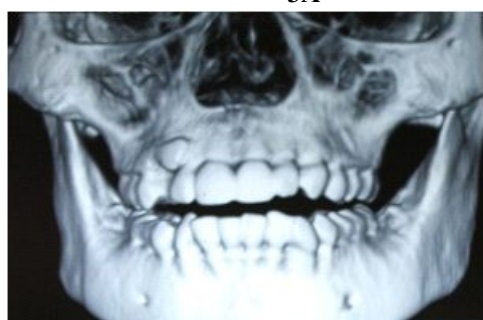
Patient was planned to be treated with non-extraction. The right impacted canine was decided to expose surgically followed by orthodontic guided eruption. The case was decided to be treated by MBT preadjusted edgewise mechanics using .022 SLOT in continuous arch mechanics.



3A



3B



3C



3D

High anchorage was needed. Banding to be done on all upper permanent 2nd molar teeth and placing Nance palatal button in upper arch. In retention phase a spiral wire retainer to be fixed in upper arch.

TREATMENT PROGRESS

Treatment was started with levelling process assisted by 0.016 NiTi wire. Open coil spring was used between right first lateral incisor and first premolar to regain the canine space. The crown of the maxillary right impacted canine was exposed by raising a full thickness flap under local anaesthesia in Oral and Maxillofacial Surgery Department of our Institution and a Begg's bracket was bonded to an accessible site on the tooth before suturing the flap. 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 on 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 left lateral incisor and canine was closed by elastomeric chain in 0.019"×0.025"SS.

At the end of the treatment period, a functional occlusion was observed. The clinical results included normal overjet and overbite, adequate intercuspation, nearly coincident midlines, normal maxillary and mandibular incisor proclination with class I molar relation and class I canine relation bilaterally. The patient was satisfied and the case was finalized. The

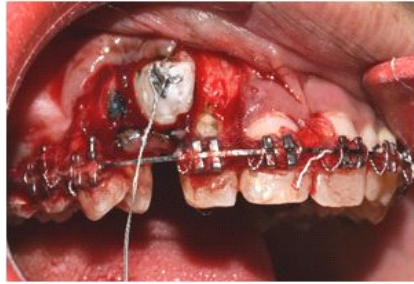
radiographic and clinical changes (intraoral and extraoral) achieved with the treatment. The patient was referred to the Dept. of Periodontology for regaining periodontal health. After closing the space, the brackets were removed and a fixed retainer was given for retention purpose. Surgical exposure of canine along with mid treatment photographs (Fig.4 A-F).

TREATMENT RESULT

The upper and lower arch were properly aligned. Ideal overjet and overbite were also achieved. Class I canine relationship with a functional occlusion were established. The cephalometric radiograph analysis has shown non-significant change in dental parameter. The treatment goals and objectives were accomplished, and the patient and her parents were pleased with the final result (Fig.5 A-K) (table-1)

DISCUSSION

Maxillary canines develop laterally to the piriform fossa and follow the deepest and longest eruption path. According to Coulter and Richardson the maxillary canines move almost 22 mm from 5 to 15 years of age in the three-dimensional planes of space¹². Any tooth eruption comprises of complex and coordinated developmental process that needs a series of signalling effects between the dental follicle and osteoblast, and osteoclast cells found in the alveolar bone¹³. Owing to their long and tortuous path



4A



4B



4C



4D



4E



4F

of eruption, maxillary canines are the most frequently impacted teeth after the third molars, with a prevalence of approximately 2%¹⁴. The impaction of maxillary canines can be due to broad range of localized, systemic, genetic and environmental factors, ranging from delayed eruption to a total failure of eruption¹⁵. In such cases, the local hard tissue obstruction, presence of a local pathology, deviation from or disturbance of the normal development of the incisors and hereditary or genetic factors are important causes to be counted¹⁶.

Scenarios like febrile diseases, endocrine disorders, irradiation, arch length discrepancies, prolonged retention, tooth size, early loss of the deciduous canine, supernumerary teeth, ankylosis, alveolar cleft and apical periodontitis of deciduous teeth are also to be considered¹⁵.

In this case report, vital evaluations on the prognostic criteria for impacted maxillary canines like the horizontal overlap of the canine crown over the lateral incisor, vertical height of the canine crown, canine angulation to the midline, position of the canine root apex and sector analysis, were carried out prior to the start of the treatment (Fig. 3A to 3C). The only favourable prognostic factor identified in this patient was the correct position of the canine root apex. Based on this finding, it is decided not to extract the impacted left canine. The orthodontic guided eruption was chosen for this case. Moreover, the treatment of this impacted maxillary canine is

completed along with alignment and levelling of the complete dentition. Another important point is that the final periodontal health is essential to assess the success of therapy for impacted maxillary canines¹⁷. In this patient, the periodontal health in the left maxillary canine region was restored after orthodontic treatment via periodontal therapy.

The combined treatment performed in our Institution was divided into six phases. These steps are indispensable for the success of any impacted maxillary canines and should be followed meticulously. The steps or phases are:

- Phase 1: Initial orthodontic treatment aimed at maintaining the space on the maxillary arch and alignment and levelling by means of fixed appliance therapy.
- Phase 2: Anchorage preparation by banding to be done on all upper permanent 2nd molar teeth and placing Nance palatal button in upper arch.
- Phase 3: Surgical exposure and orthodontic traction of the impacted maxillary canine towards the center of the alveolar ridge.
- Phase 4: Final orthodontic treatment to align the impacted tooth in the maxillary arch.
- Phase 5: Periodontal treatment after orthodontic therapy to restore the periodontal health.
- Phase 6: Placement of permanent retainer.



5A



5B



5C



5D



5E



5F



5G



5H



5I



5J



5K

CONCLUSIONS

The management of impacted canines is important in terms of aesthetics and function. Impaction of a maxillary canine is a frequent occurrence and requires a multi-disciplinary approach for proper management. Awareness of the prevalence, aetiology, associated anomalies and techniques for diagnosis allow for early recognition

and implementation of interceptive treatment. Careful selection of surgical and orthodontic techniques is essential for the successful alignment of impacted maxillary canines. It is concluded that surgical and orthodontic treatment can be considered as an effective therapy for impacted canine correction.

Cephalometric value	pre	post
SNA (degree)	91	91
SNB (degree)	86	84
ANB (degree)	5	7
WITS (mm)	+2	+4.5
UI-NA (degree)	21	26
UI-NA (mm)	3	4
LI-NB (degree)	30	33
LI-NB (mm)	6	7
UI-SN (degree)	105	114
IMPA (degree)	98	104
NA perp A (mm)	7	7
NA perp POG (mm)	4	2.5
FMA (degree)	18	19
LAFH (mm)	52	55
INTERINCISAL ANGLE (degree)	123	101
Y AXIS (degree)	56	57
NASOLABIAL ANGLE (degree)	99	97

(TABLE-1)

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