

Correction of A Palatally Positioned Maxillary Canine by Conventional Fixed Appliance Orthodontic Treatment for Improvement of Smile Arc - A Case Report

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Abstract

Maxillary canines are both commonly impacted and susceptible to ectopic development. With the exception of third molars, maxillary canines are most likely to develop ectopically with a reported frequency of between 0.8% and 3%¹. Other commonly impacted teeth include maxillary central incisors and those terminal in their series including second premolars and third molars. Traditionally, management of ectopic and

unerupted teeth centers on the orthodontist; this approach allows the full range of options including interceptive approaches, space recreation, autotransplantation and orthodontic mechanical eruption to be considered.

However, successful management of impacted or ectopic teeth may require an integrated approach between orthodontists, oral surgeons, periodontists and prosthodontic specialists. Inter-disciplinary input is particularly important in the planning stages with

implications for extraction decisions and operative procedures, and ultimately influencing the duration and outcome of subsequent orthodontic treatment, and the longevity and esthetics of the final outcome. These interactions will be discussed in this review, with particular emphasis on the management of ectopic or impacted maxillary canines. This case report evaluates the management of an adult female patient with palatally erupted canine in the 1st quadrant. Clinical and cephalometric evaluation revealed skeletal Class I malocclusion with moderate maxillary incisor proclination, orthognathic profile, average mandibular plane angle, competent lips, increased overjet and overbite. Following fixed orthodontic treatment marked improvement in patient's smile arc was achieved and there was a remarkable increase in the patient's confidence and quality of life. The profile changes and treatment results were demonstrated with proper case selection and good patient cooperation with Fixed appliance therapy.

Keywords: Improvement of Smile Arc, Management of Palatally placed canine, Fixed Appliance Orthodontic treatment.

Introduction

The orthodontist is the central member of a team dealing with the management of impacted or ectopic teeth with the knowledge and ability to either avert or simplify treatment with relatively simple measures such as interceptive primary extractions or orthodontic space redistribution. However, in many cases, ectopic and impacted teeth may present complex treatment planning decisions requiring the integrated expertise of a range of dental specialists to produce lasting functional and esthetic improvements with minimal short-term or long-term biologic cost. Fixed Appliance treatment can significantly alter and improve facial appearance in addition to correcting irregularity of the teeth. Over the last few decades, there are increased

number of adults who have become aware of orthodontic treatment and are demanding high quality treatment, in the shortest possible time with increased efficiency and reduced costs. This case presents the correction of a Class I malocclusion in an adult female patient with a palatally erupted maxillary canine in the 1st quadrant merely simply by executing a non extraction protocol. The Non Extraction protocol shown in this case is indicative of how the smile arc of the patient can be improved by routine Fixed Orthodontic treatment

Case Report

Extra-Oral Examination: A 22 year old female patient presented with the chief complaint of malaligned teeth on the right side of the mouth. On Extraoral examination, the patient had an orthognathic profile, grossly symmetrical face on both sides with an orthognathic chin, competent lips, moderate mentolabial sulcus and a average Nasolabial Angle, a Mesoprosopic facial form, Dolicocephalic head form, Average width of nose and mouth, minimal buccal corridor space, a non consonant smile arc and orthognathic divergence of face. The patient had no relevant prenatal, natal, postnatal history, history of habits or a family history. On Smiling, there was moderate show of maxillary anterior teeth. However, mandibular teeth were not visible on smile. The patient had a toothy smile. Also due to the spaced dentition, the patient was checked for tongue thrusting, however on examination the patient had no Tongue thrust habit. Patient had a flat smile arc and was hesitant on smiling due to the palatally placed maxillary right canine which looked unesthetic and was the chief complaint of the patient. Patients profile was good, only dental correction and alignment was required.

Pre Treatment Extraoral Photographs



Intra-Oral Examination

Intraoral examination on frontal view shows presence of an average overbite with coinciding upper and lower dental midlines. On lateral view the patient shows the presence of Class I incisor relationship, a Class I Canine relationship on left side and a Class I molar relationship Bilaterally. Canine relation on the right side could not be assessed due to the palatally erupted canine tus forminf a canine crossbite in that area. Patient has an average overjet and overbite. The upper and lower arch are moderately well aligned. A Unilateral single tooth crossbite bite with the maxillary right canines is seen. The upper and lower arch shows the presence of a U shaped arch form . OPG of the patient shows presence of all four 3rd molars in a developing stage and a well aligned anterior dentition.

Pre Treatment Intraoral Photographs



Pre Treatment Cephalometric Readings

Parameters	Pre- Treatment
SNA	83°
SNB	81°
ANB	2°
WITS	1mm
MAX. LENGTH	76mm
MAN. LENGTH	97mm
IMPA	97°
NASOLABIAL ANGLE	98°
U1 TO NA DEGREES	27°
U1 TO NA mm	3mm
L1 TO NB DEGREES	24°
L1 TO NB mm	1mm
U1/L1 ANGLE	129°
FMA	24°
Y AXIS	68°

- 1) Steiners analysis shows an average maxilla and mandible, Class I Skeletal pattern, an Average to Horizontal growth pattern, averagely inclined maxillary and mandibular anteriors,
- 2) Tweeds analysis shows a Horizontal growth pattern and average mandibular incisors
- 3) Wits appraisal shows AO ahead of BO by 1 mm indicating Skeletal Class I pattern
- 5) McNamara analysis shows an average maxilla and mandible, a horizontal growth pattern, decreased lower anterior facial height and averagely inclined mandibular incisors
- 6) Rakosi Jaraback analysis shows a Horizontal growth pattern and average maxillary and mandibular incisors
- 7) Holdaway soft tissue analysis shows increased maxillary and mandibular sulcus depth and no strain of lips

8) Downs analysis shows a Class I Skeletal pattern, a horizontal growth pattern and average maxillary and mandibular anterior teeth

Diagnosis

This 22 years old Adult female patient was diagnosed with Angle’s Class I malocclusion with an average maxilla and mandible and a horizontal growth pattern, average overjet and overbite, average upper and lower incisors, moderate mentolabial sulcus, competent lips with a palatally erupted maxillary right canine with rest of the dentition well aligned

Treatment Objectives

1. To correct palatally erupted maxillary right canine
2. To maintain the overjet and overbite
3. To maintain the class I molar and canine relationship
4. To correct the smile arc
5. To achieve a pleasing smile
6. To achieve a pleasing profile

Treatment Plan

- Fixed appliance Therapy with MBT 0.022 inch bracket slot
- Initial leveling and alignment with 0.012”, 0.014”, 0.016”, 0.018”, 0.020” Niti archwires following sequence A of MBT
- Use of 0.019” x 0.025” rectangular NiTi followed by 0.019” x 0.025” rectangular stainless steel wires
- Final finishing and detailing with 0.014” round stainless steel wires
- Retention by means of vacuum formed clear invisible retainers

Treatment Progress

Complete bonding & banding in both maxillary and mandibular arch done, using MBT-0.022X0.028”slot. Initially a 0.012” NiTi wire was used which was followed by 0.014 , 0.016”, 0.018”, 0.020” Niti archwires following sequence A of MBT. After 6 months of alignment and

leveling NiTi round wires were discontinued. Treatment was then continued by use of 0.019” x 0.025” rectangular NiTi followed by 0.019” x 0.025” rectangular stainless steel wires. Anchorage was conserved by constantly monitoring the already well settled molar relation. This is the most important step in a non extraction case wherein anchorage conservation is of utmost importance. The palatally positioned canine was aligned after reaching a heavy wire by incorporating an 0.012” Piggy back NiTi archwire along with the rectangular heavy steel archwire for getting the canine in the line of occlusion and also to correct the already existing canine crossbite. Bite turbos were given bilaterally over the mandibular molars at this stage. Finally light settling elastics were given with rectangular steel wires in lower arch and 0.012” light NiTi wire in upper arch for settling , finishing, detailing and proper intercuspation

Mid Treatment Intraoral Of Fixed Appliance Therapy



Post Treatment Cephalometric Readings

Parameters	Post-Treatment
SNA	82°
SNB	80°
ANB	2°
WITS	0mm
MAX. LENGTH	75mm
MAN. LENGTH	97mm
IMPA	97°
NASOLABIAL ANGLE	99°

U1 TO NA DEGREES	25°
U1 TO NA mm	2mm
L1 TO NB DEGREES	22°
L1 TO NB mm	2mm
U1/L1 ANGLE	130°
FMA	25°
Y AXIS	67°

Post Treatment Extraoral Photographs



Post Treatment Intraoral Photographs



Discussion

It has been stated and taught for many years that the maxillary permanent canine by virtue of its long path from initial development to its final position at the occlusal level is subject to displacements or degrees of ectopia that might result in impactions. The patient's chief complaint

was malaligned teeth on the right side of the mouth. The selection of orthodontic fixed appliances is dependent upon several factors which can be categorized into patient factors, such as age and compliance, and clinical factors, such as preference/familiarity and laboratory facilities. The execution of only Fixed appliance therapy appropriately resulted in an improvement in the patient's profile in this case. Patient had a satisfactory facial profile along with a good pretreatment occlusion. Only issue was the palatally erupted maxillary right canine which led to an unesthetic smile arc which was the patient's chief complaint. Successful results were obtained after the fixed MBT appliance therapy within a stipulated period of time. The overall treatment time was 14 months. After this active treatment phase, the profile of this 22 year old adult female patient improved significantly as seen in the post treatment Extra oral photographs. A pleasant smile was seen with a consonant smile arc. Removable Vacuum formed clear retainers were then delivered to the patient.

Comparison of Pre and Post Treatment Cephalometric Readings

Parameters	Pre- Treatment	Post-Treatment
SNA	83°	82°
SNB	81°	80°
ANB	2°	2°
WITS	1mm	0mm
MAX. LENGTH	76mm	75mm
MAN. LENGTH	97mm	97mm
IMPA	97°	97°
NASOLABIAL ANGLE	98°	99°
U1 TO NA DEGREES	27°	25°
U1 TO NA mm	3mm	2mm
L1 TO NB	24°	22°

DEGREES		
L1 TO NB mm	1mm	2mm
U1/L1 ANGLE	129°	130°
FMA	24°	25°
Y AXIS	68°	67°

Retention with Vacuum Formed Clear Retainer



Comparison of Pre and Post Treatment Frontal Smiling Photographs



Conclusion

This case report shows how the unaesthetic smile arc can be corrected in a patient simply by using conventional and simplified orthodontic mechanics. Good intercuspation of the teeth was maintained with class I molar relationship. Treatment of the palatally erupted canine included the use of a piggy back NiTi along with the heavy archwire. The maxillary and mandibular teeth were found to be esthetically satisfactory in the line of occlusion at the end of treatment. Patient had an improved smile and Profile

without the need for extractions. The correction of the malocclusion was achieved, with a significant improvement in the patient aesthetics and self-esteem. The patient was very satisfied with the result of the treatment.

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