Unilateral canine extraction for correction of malocclusion in a hyperdivergent case – A case report**Bhushan Jawale^{1*}, Lishoy Rodrigues², Rohan Hattarki³, Amit Nehete⁴, Anil Agrawal⁵, Amit Chaudhary⁶**

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Abstract

This case report is of a 17 year old female patient who presented with unfavorably impacted maxillary left canine and a palatally placed maxillary right canine. This case was corrected merely by employing simple mechanics with the help of Fixed Orthodontic Mechanotherapy. The unfavorably impacted left canine was extracted and the palatally placed maxillary right canine was brought into the arch using Piggy-back NiTi wires. Following fixed orthodontic treatment, marked improvement in patient's smile was achieved and there was a remarkable increase in the patient's confidence and quality of life. The treatment results were demonstrated with proper case selection and good patient cooperation with fixed appliance therapy. The patient was extremely satisfied with the results and there was significant improvement in her smile at the end of the treatment.

Keywords: Unilateral canine extraction, Hyperdivergent case, Vertical grower, Orthodontic treatment, Fixed Orthodontic Mechanotherapy, Non-consonant smile arc, Piggy-back NiTi, Impacted canine, Unfavorable canine impaction, Palatally placed canine, Case report.

Introduction

Fixed Appliance treatment can significantly alter and improve facial appearance in addition to correcting irregularity of the teeth. The number of patients seeking orthodontic treatment has increased significantly.^[1,2,9-14] Treatment alternatives of correction of impacted teeth eventually depends mainly upon the severity of the malocclusion^[3,4] and the amount of needed tooth movements.^[3,5,15-17] If the skeletal discrepancy^[6] cannot be corrected by camouflage, any dental compensation may produce a reasonably good occlusion^[7] but at the expense of compromised esthetics.^[8,18] Over the last few decades, there are increased number of patients who have become aware of orthodontic treatment and are demanding high quality treatment in the shortest possible time with increased efficiency and reduced costs.^[11-22] Class I malocclusion patients frequently show a combination of skeletal and dento-alveolar components.^[23,24] Many cephalometric peculiarities have been reported in class I malocclusion patients, such as a prognathic maxilla and mandible, proclined maxillary and mandibular incisors. This case presents the correction of a Class I malocclusion with palatally placed upper right canine and impacted upper left canine in a 17 year old female patient merely simply by executing extraction of a single canine. The single canine extraction protocol shown in this case is indicative of how an unaesthetic smile can be converted into a pleasant smile by routine Fixed Orthodontic treatment.

Case Report**Extra-oral examination**

A 17 year old female patient presented with the chief complaint of irregularly placed upper front teeth with a missing canine tooth. On Extra-oral examination, the patient had an orthognathic facial profile, grossly symmetrical face on both sides with competent lips, moderately deep mentolabial sulcus and an obtuse Nasolabial Angle, a Mesoprosopic facial form, Dolicocephalic head form, Average width of nose and increased width of mouth, increased buccal corridor space arc, an upwardly tipped nose and an orthognathic divergence of face. The patient had no relevant prenatal, natal, postnatal history, history of habits or a family history. On Smiling, there was excessive show of maxillary anterior teeth and the patient had a toothy smile with missing upper left canine with upper dental midline slightly shifted to the patients right. The patient had an unaesthetic smile arc and was very dissatisfied with her smile.

Pre-treatment extra-oral photographs

Nasolabial angle	101°
U1 to na degrees	27°
U1 TO NA mm	4mm
L1 TO NB Degrees	26°
L1 TO NB mm	3mm
U1/L1 ANGLE	128°
Saddle angle	134°
Articular angle	146°
Gonial angle	125°
FMA	28°
Y AXIS	74°

Intra-oral examination

Intraoral examination on frontal view showed presence of an average overbite and slight shift of upper dental midline to the patients right. On lateral view the patient showed the presence of Class I incisor relationship with an average overjet and a Class I Molar relationship bilaterally. Patient also showed presence of palatally erupted maxillary right canine and a missing/impacted maxillary left canine and presence of slight crowding in mandibular anterior region. Occlusal view showed presence of rotated and palatally erupted upper right canine and a “U” shaped upper and lower arch.

Pre-treatment intra-oral photographs

Pre-treatment cephalometric summary

Parameters	Pre- treatment
SNA	82°
SNB	81°
ANB	1°
WITS	1mm(AO ahead of BO)
Max. Length	89mm
Man. Length	107mm
IMPA	99°

Diagnosis

This 17 year old female patient is diagnosed with a Class I malocclusion and Class I skeletal pattern with a vertical growth pattern, palatally erupted maxillary right canine and an impacted maxillary left canine with slight crowding in mandibular anterior region.

Problem List

1. Palatally erupted maxillary right canine
2. Unfavorably impacted maxillary left canine
3. Maxillary midline shift to the right
4. Mild mandibular anterior crowding

Treatment goals

1. To get palatally erupted maxillary right canine into alignment
2. To manage the unfavorably impacted maxillary left canine
3. To correct the shifted maxillary midline
4. To maintain a Class I Incisor and Molar relationship
5. To achieve a pleasing smile and a pleasing profile

Treatment progress

Complete banding, followed by bonding in both maxillary and mandibular arch was 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. 0.016” x 0.022” NiTi wire was then used with an underlying Piggy back NiTi wire for correction of the palatally erupted maxillary right canine. A decision was made to extract the unfavorably impacted upper left canine as there was no means by which this canine could be brought into alignment in the arch even with surgical intervention. Moreover the upper dental midline was slightly shifted to the right of the patient, so extraction of upper left canine would favor correction of the shifted upper dental midline as well. After 6 months of alignment and leveling NiTi round wires were discontinued. Proximal stripping was done in mandibular anterior region. Use of 0.019” x 0.025” rectangular NiTi with accentuated Anchor sweeps in the upper and lower stiff arch wires were given to prevent the bite deepening during retraction in the upper arch followed by 0.019” x 0.025” rectangular stainless steel wires for retraction and closure of spaces. Midline Elastics were given for

correction of the deviated and non-coincident dental midlines and space closure on the left side was done with the help of Elastomeric chains. Finally light settling elastics were given with rectangular steel wire in lower arch and 0.012" light NiTi wire in upper arch for settling, finishing, detailing and proper intercuspation. The lower incisor crowding was unraveled with the help of proximal stripping in the mandibular anterior region. Hawley's removable retainers were given to the patient followed by fixed lingual bonded retainers in the upper and lower arch. The treatment changed the patients overall smile and helped her feel more confident. She was very happy and satisfied with the treatment. A pleasing smile and a pleasing profile were achieved.

Mid-treatment cephalometric summary

Parameters	Mid-treatment
SNA	82°
SNB	81°
ANB	1°
WITS	1mm(AO ahead of BO)
Max. Length	89mm
Man. Length	108mm
IMPA	94°
Nasolabial angle	103°
U1 to na degrees	26°
U1 TO NA mm	3mm
L1 TO NB DEGREES	24°
L1 TO NB mm	2mm
U1/L1 ANGLE	131°
Saddle angle	132°
Articular angle	143°
Gonial angle	124°
FMA	28°
Y AXIS	73°

Mid-treatment intra-oral photographs

Discussion

The patient's chief complaint was irregularly placed upper front teeth with a missing canine tooth. 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 fixed appliance therapy with extraction of single canine appropriately resulted in an improvement in the patient's smile in this case. Alongside fixed orthodontic treatment, proximal stripping was done in lower anterior region to correct the mild lower anterior crowding. Piggy back NiTi wire was used for correction of the palatally erupted maxillary right canine. A decision was made to extract the unfavorably impacted upper left canine as there was no means by which this canine could be brought into alignment in the arch even with surgical intervention. Moreover the upper dental midline was slightly shifted to the right of the patient, so extraction of upper left canine would favor correction of the shifted upper dental midline as well. 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 smile arc of this 17 year old female patient improved significantly as seen in the post treatment Extra-oral photographs. Removable Hawley's retainers followed by fixed lingual bonded retainers were then delivered to the patient. The crowding in the lower arch was corrected and the smile arc of the patient improved drastically to being more consonant and pleasant. The patient was very happy and satisfied with the results.

Post-treatment cephalometric summary

Parameters	Post-treatment
SNA	82°
SNB	81°
ANB	1°
WITS	0mm
Max. Length	88mm
Man. Length	108mm
IMPA	93°
Nasolabial angle	105°
U1 to na degrees	25°
U1 TO NA mm	2mm
L1 TO NB DEGREES	23°
L1 TO NB mm	2mm
U1/L1 ANGLE	131°
Saddle angle	132°
Articular angle	143°
Gonial angle	124°
FMA	28°
Y AXIS	74°

Comparison of pre and post treatment cephalometric readings

Parameters	Pre- treatment	Mid-treatment	Post- treatment
SNA	82°	82°	82°
SNB	81°	81°	81°
ANB	1°	1°	1°
WITS	1mm(AO ahead of BO)	1mm(AO ahead of BO)	0mm
Max. Length	89mm	89mm	88mm
Man. Length	107mm	108mm	108mm
IMPA	99°	94°	93°
Nasolabial angle	101°	103°	105°
U1 to na degrees	27°	26°	25°
U1 TO NA mm	4mm	3mm	2mm
L1 TO NB Degrees	26°	24°	23°
L1 TO NB mm	3mm	2mm	2mm
U1/L1 ANGLE	128°	131°	131°
Saddle angle	134°	132°	132°
Articular angle	146°	143°	143°
Gonial angle	125°	124°	124°
FMA	28°	28°	28°
Y AXIS	74°	73°	74°

Post-treatment extra-oral photographs **Post-treatment intra-oral photographs** **Conclusion**

This case report shows how palatally erupted and unfavorably impacted canines can be managed alongside fixed orthodontic treatment with extraction of a single canine, thus lowering the treatment time and enhancing the profile of the patient. The planned goals set in the pretreatment plan were successfully attained. Good intercuspation of the teeth

was obtained and the maxillary and mandibular teeth were found to be aesthetically satisfactory in the line of occlusion with a pleasing consonant smile arc at the end of treatment. The correction of malocclusion was achieved and lower anterior crowding was unraveled with a significant improvement in the patient aesthetics and self-esteem. The patient was very satisfied with the results of the treatment.

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None.

Conflict of Interest

None.

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