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The Re-Establishment of a Synchronized Canine Guided Occlusion in a Case with an Early Extracted Lower Canine Using Orthodontic Mini-Implants

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Abstract

One of the salient aims of orthodontic treatment is to acquire a well-established functional bite. This could be reached through having what is called a "canine guided occlusion". In this type of occlusion the upper and lower canines guide the bite of the rest of the teeth especially during lateral movements. This aids to attain robust masticatory functions and to secure a convenient environment for the health of the Temporo-mandibular joint. In this study a case with early extraction of a permanent lower canine is presented. The recreation of a "canine guided occlusion" was done by orthodontic treatment. Orthodontic mini-screws were placed in the upper arch and some frictionless mechanics in the lower canine guided occlusion was finally re-established by moving the lower 1st premolar in place of the lower canine with some modifications in its angulation and vertical position. The creation of a harmonious canine guided occlusion was checked and confirmed before the removal of the orthodontic appliance. The orthodontic treatment of the current case not only aided in establishing "canine guided occlusion" but also helped to enhance the facial appearance of the patient in terms of reducing facial convexity, aligning the teeth and reducing the incisal show at rest.

Keywords: Canine guidance; Extracted canine; Deep bite; Intrusion; Class II camouflage

Introduction

One of the main targets of oral rehabilitations is to establish a synchronized occlusion between the upper and lower teeth. This creates a healthy environment that aids to attain better speech and masticatory functions. Moreover this aims at avoiding many of the temporo-mandibular joint disorders. Loss or extraction of any of the four permanent canines can have its detrimental effects on the bite due to the loss of what is named "canine guided occlusion". In this type of occlusion the contact between the upper and lower canines guides the rest of the teeth during lateral movements in order to avoid any interferences or jerky movements; that may endanger the masticatory apparatus [1].

One of the ways of oral rehabilitation is through orthodontic treatment that aligns mal-aligned teeth and moves the teeth into their correct position. This case report presents a case with an early extracted lower canine and loss of "canine guided occlusion", where by the aid of orthodontic treatment alone a harmonized occlusion was established; by moving the lower premolar in the place of the extracted canine.





Figure 2: pre-treatment intra-oral photos.

Moreover there was an enhancement of the patient's facial and dental aesthetics after treatment that could have never been reached without the insertion of an orthodontic appliance [2,3].

Case Diagnosis

A fifteen years old Egyptian male with a class II division 1 incisor relationship on a skeletal Class 2 base with a bimaxillary protrusion pattern, and increased vertical proportions. This was complicated by a 10 mm overjet, missing (previously extracted lower right canine), crowded and proclined upper incisors, anterior deep overbite, and a 3 mm lower midline shift to the right. The lower incisors were proclined (Figures 1-3). An informed consent was signed by the patient before the start of

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treatment. This is a routine protocol which is done for all the patients in our department so that we can use their records for scientific purposes.

Treatment Plan

The patient was treated on extraction basis, where three units were extracted (the 2 upper first premolars in addition to the lower left first premolar). The treatment was accomplished through the use of fixed preadjusted edgewise orthodontic appliance (0.022" x 0.028" slot) with Roth prescription, With 2 mini-screws in the upper arch (Figures 4 and 5).

Treatment Results

Overall a well-intercuspated and well-aligned class I occlusion







VARIABLE	PRE- TREATMENT	POST- TREATMENT	CHANGE
SNA	87°	85°	-2°
SNB	82°	83°	+1°
ANB	5°	2°	-3°
SN to maxillary plane	4°	6°	+2°
Wits appraisal	9 mm	3 mm	-6 mm
Upper incisor to maxillary plane angle	118°	102°	-16°
Lower incisor to mandibular plane angle	98°	93°	-5°
Interincisal angle	114°	134°	+20°
MM angle	35°	33°	-2°
Upper anterior face height	51 mm	51 mm	0
Lower anterior face height	78 mm	72mm	+2 mm
Face height ratio	60%	58%	-2%
Lower incisor to APo line	15 mm	10 mm	-5 mm
Lower lip to Ricketts E Plane	7 mm	6 mm	-1 mm
Nasolabial angle	108°	122°	+14°

Table 1: Pre-treatment and post-treatment cephalometric readings.



Figure 6: confirmation of the establishment of canine guided occlusion.



Figure 7: post-treatment extra-oral photos.

was achieved with Class I molar, canine & incisor relationships. Overbite was reduced to normal and the over-jet was also normalized. However there was a slight retroclination of the upper incisors 102°. This was mandatory in order to close the over-jet and to get the upper incisors within the control of the lower lip. While the lower incisors proclination was greatly improved. The upper and lower incisors showed good inter-incisal contact at 134° (Table 1), (Figures 6-10). The patient was fully informed before the start of the treatment about the







need for long term retention of the corrected over-jet with upper and lower bonded retainers (Figures 7-9). The settling of the upper right canine was slightly less than optimal due to the width and anatomical differences between the lower right 1st premolar that substituted the early extracted lower right canine. But yet, a canine guided occlusion was confirmed at this side prior to removal of the appliance (Figure 6).

Discussion

Anchorage reinforcement

This was a high anchorage demanding case in the upper arch to reduce the overjet. Also to create Space for the intrusion of the upper incisors, and avoid Closure of extraction spaces in long face cases which occurs quickly [4,5]. Therefore anchorage was reinforced with miniscrews in the upper arch. The upper canines were retracted separately, followed by upper incisors retraction in order to control the intrusive mechanics on the upper incisors [6,7].

Deep over-bite correction

Intrusion of the upper incisors during retraction on T-loop was beneficial; as it helped in reducing the upper incisors show at rest and on smile. Intrusion of the lower incisors was also done during their retraction on T-loop. We avoided extrusion of the buccal segments in order not to aggravate the long face pattern8. Thus, both the use of inter-maxillary elastics and banding of the second molars was avoided [5,6].

Appliance modifications

Replacing the early extracted lower right canine with lower right premolar (LR4). A lower canine bracket was bonded on the LR4 to give the required tip and torque. Gradual grinding of the lingual cusp of the lower right premolar was done throughout the treatment [7-9]. Canine guided occlusion on the right side between the upper right canine and the LR4 was confirmed at the finishing stage and just prior to removal of the appliance (Figure 6).

Conclusion

Orthodontic treatment is capable of re-creating "canine guided occlusions" in cases with extracted permanent canines. This could be accomplished provided the application of well-designed treatment mechanics that may necessitate the use of orthodontic mini-screws to control the movements of the anchorage units.

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