



Bilateral substitution of extracted canines by mandibular first premolars: A case report

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Abstract

A 16-year-old boy came with the chief complaint of an unaesthetic dental appearance. His first maxillary premolars were extracted prior to the consultation, mandibular canines were periodontally compromised with the absence of attached gingiva and the presence of severe anterior crowding.

Treatment included extraction of both mandibular canines and first maxillary molars to correct anterior crowding. The case was treated successfully with orthodontic space closure and the substitution of the premolars into canines.

Our main treatment objective was: Restoring a functional occlusion, by treating anterior crowding. Improving the periodontal environment, thus extracting both mandibular canines bringing healthy premolars, with better periodontal tissues, to take place.

The mandibular first premolars were substituted for the canines. After 26 months of active treatment, the patient had a Class I molar relationship and ideal overbite and overjet. His profile was improved, lips were competent, and gingival levels were acceptable. Cephalometric evaluation showed acceptable maxillary and mandibular incisor inclinations.

Keywords: esthetics, orthodontics, canine substitution, cephalometric

1. Introduction

Permanent canines are essential to both functional occlusion and the dentofacial aesthetics due to their shape and position in the dental arch. They also play an important role in providing guidance and achieving the mutually protected occlusion scheme, due to their larger root surface areas, better crown-root ratio, and greater capacity to tolerate high occlusal forces compared with other teeth. However, some situations require canine extraction for reasons related to severe malposition, ankylosis compromised periodontal health, impaction or congenital defects.

In some cases where canine extraction is required, orthodontic space closure is a possible treatment option for achieving better peri-odontal health. Several clinical factors can help determine the treatment of choice, such as age, facial profile, presence or absence of crowding in both dental arches, and tooth morphology ^[1, 2] or by patient-related factors such as financial capabilities and esthetic desires ^[3].

2. Case report

A 16-year-old in definitive dentition boy came with the chief complaint of irregularly erupted teeth with severe anterior crowding. On extra oral examination, convex profile with an oval long face, symmetrical and proportional face, slightly marked mento-labial sulcus. On Intra-oral examination, molars are in angle's class I relation, canine class III on both sides, middle line shifted on patient's right side in the maxillary arch. In the mandible, canines are in important mesial version, Lingoposition of the maxillary lateral incisors and right mandibular central incisor.

3. Diagnosis

3.1 Skeletal

Maxillary retrusion, retrusive mandible (SNA 78o, SNB 74o, ANB 4).

3.2 Dental

Component Class I molar relationship, middle line shift on right side.

Class III canine relationship on both sides.

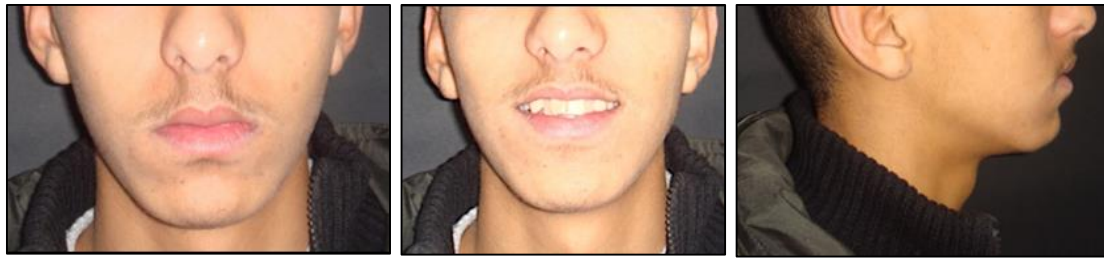


Fig 1: Pretreatment photographs



Fig 2: Pretreatment panoramic radiograph

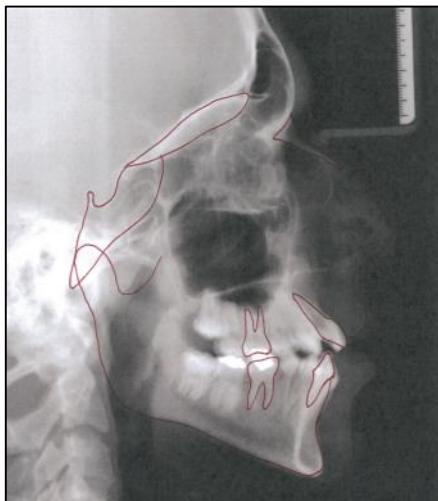


Fig 3: Pretreatment lateral headfilm and tracing

Table 1

	Pretreatment	Posttreatment
FMA	35°	31°
FMIA	59°	66°
FMPA	86°	83°
SNA	78°	75°

4. Treatment objectives

According to the diagnosis, the aim of treatment of this clinical case included: space closure after extraction of both mandibular canines, (the patient’s chief complaint), smile’s line and gingival level improvement, premolars transformation/reanatomization, lower arch midline, overjet and overbite maintenance.

5. Treatment Plan

Based on the clinical situation and obtained cephalometric and model analysis values, it was planned to treat the case by space closing method. Thus, we planned for fixed orthodontic appliances.

First maxillary premolars were extracted before the patient came to consult; thus the space was closed, mandibular canines were extracted because of their position in the dental arch.

The extraction of first molars was performed in order to correct anterior crowding and to reposition the incisors. Both wisdom teeth were maintained because of their good volume and form.



Fig 4: After the extraction of both canines, crowding is always important which led to the extraction of first molars.

6. Treatment progress

After extraction of the mandibular canines and the first maxillary and mandibular molars, preadjusted fixed appliances were placed, and alignment in the maxillary and mandibular dental arches was achieved by a 0.012, 0.014, 0.016-in thermal nickel-titanium wire.

Then, leveling was obtained in both arches with 0.016, 0.017x0.025, 0.018x0.025, 0.019 x 0.025- in stainless steel. Intermaxillary traction elastic were placed in the leveling phase to control the vertical dimension.

The finishing stage of treatment was started. Finishing bends were placed to correct any abnormal root position and

achieve marginal ridge leveling.



Fig 5: Placement of miniscrews to obtain molar mesialization



Fig 6: Posttreatment Photographs



Fig 7: Post treatment panoramic radiograph.

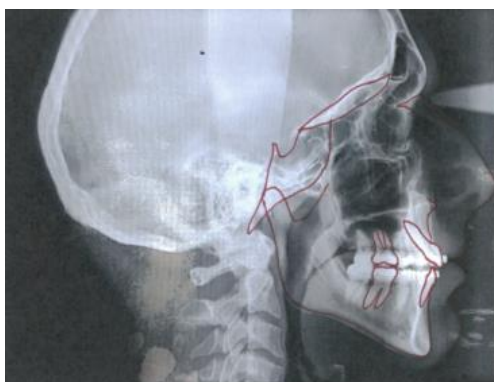


Fig 8: Post treatment lateral and tracing tracingheadfilm

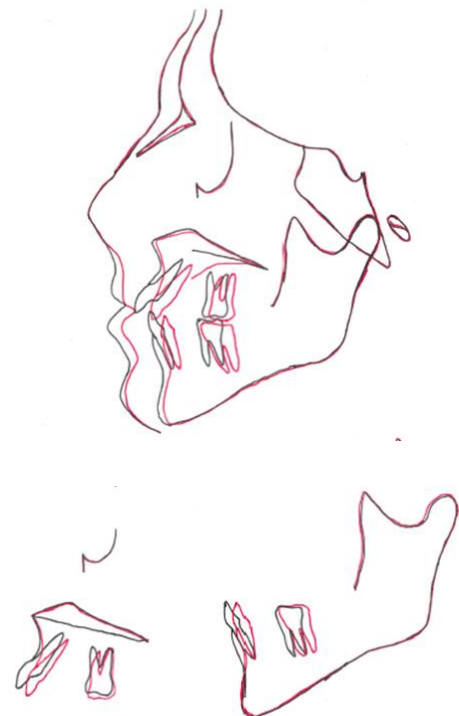


Fig 9: Superimposed tracings.

Discussion

In our case, mandibular canines were extracted, and space was closed, extraction of first maxillary molars was decided to correct anterior crowding.

The canines extraction was performed in order to prevent any further hyperdivergence, furthermore they present a compromised periodontal state with little attached gingiva.

On the other hand, an eventual transformation into an open bite remains possible which lead us to adapt preventive measures by performing molars extraction.

The case was treated successfully with orthodontic space closure and transformation of the premolars into canines, along with maintaining occlusion, overjet, and overbite within the norms with molars and canine in class I.

We can highlight some advantages of this treatment option, such as better periodontal conditions of patients treated with space closure compared to patients treated with space maintenance and prosthetic rehabilitation, obtaining excellent esthetic and functional results.

We think that the best treatment option for extracted canines is, whenever possible, the orthodontical closing of spaces. Based on literature [4, 5, 6] and clinical evidence, Robertsson and Mohlin [4] (2000) pointed three advantages of space closure orthodontic treatment.

They found that

- The space-closure patients were patients that had space opening for prosthetics rehabilitation,
- There was no difference between the two groups in prevalence of signs and symptoms of temporomandibular joint dysfunction.
- Patients with prosthetic replacements had impaired periodontal health with accumulation of plaque and gingivitis.

So, they concluded that orthodontic space closure produces results that are well accepted by patients, does not impair temporomandibular joint function, and encourages periodontal health in comparison with the prosthetic replacements.

In cases of space closure the following should be considered:

- Careful correction of the crown torque of mesially relocated premolars to mirror the optimal canine crown torque, along with providing optimal torque and rotation for the mesially moved premolars,
- Canines bleaching, as these teeth are normally more yellowish than the premolars,
- Regarding canines mechanics, special attention should be given to the torque that the canines should receive, namely lingual root brackets for canines occupying an appropriate buccolingual and mesiodistal position, as they can be intruded and torqued to increase the gingival margin, similar to the canines. Later they must be transformed into canines with esthetic dentistry procedures., Rosa and Zachrisson [7] recommended intruding the first premolars to level the gingival margins and restoring the premolars with composite resin buildups or porcelain veneers to resemble natural canines and produce a balanced smile.

Clinical experience has shown us that a good clinical outcome depends on various factors such as:

- Knowledge and professional skills involved in the treatment as well as the combination of orthodontic and esthetic dentistry techniques
- Patient's cooperation and age.
- Teeth's shape and color.
- The possible involvement of a periodontist may be necessary to obtain an adequate level and gingival contour.

The occlusion of a patient with extracted canines orthodontically treated with posterior teeth's mesialization is satisfactory from the aesthetic and functional point of view. Long-term studies evaluated the periodontal status and occlusal function from 2 to 25 years post treatment [7], concluding that there is no functional alterations.

Conclusion

The substitution of canines by first premolars could be a valid alternative to traditional orthodontic treatment when maxillary premolar extraction is a treatment option.

Good functional and esthetic results can be achieved, if an accurate and detailed anterior tooth position is managed during orthodontic finishing. Some factors such as the need for extractions, the sagittal relationship of dental arches, the occlusal relationship of the posterior teeth, the position, shape and color of the canines, the amount of remaining space, patient age and patient's face must be considered in treatment planning.

For all that was reported in this clinical case with a successful long-term follow-up, it is concluded that bilateral substitution of extracted canines can be treated satisfactorily with space closure involving orthodontics and esthetic dentistry procedures.

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