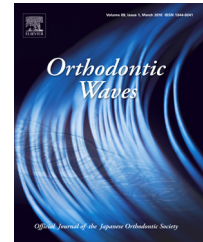


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The use of temporary anchorage devices for orthodontic treatment of high-angle Class III malocclusion in a patient with impacted upper canine teeth

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ARTICLE INFO

Article history:

Received 11 May 2018

Received in revised form
20 June 2018

Accepted 10 July 2018

Available online xxx

ABSTRACT

This case report describes the orthodontic treatment of a 13-year-old female patient with high-angle Class III malocclusion, including anterior open bite and impacted upper canine teeth with a convex soft tissue profile. In this case, preadjusted edgewise appliances were placed after the extraction of the upper deciduous canine teeth, impacted upper canine teeth and lower first premolars. The upper and lower dental arches were aligned using a temporary anchorage device (TAD) for retraction and intrusion of the lower incisors avoiding the extrusion of the lower molars. A good facial profile and occlusion were achieved after active treatment.

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1. Introduction

The treatment strategy for Class 3 malocclusion is a trade-off between reducing the antero-posterior prominence of the chin and increasing the face height [1]. In addition, dento-alveolar compensation by labial tipping of the upper incisors and/or lingual tipping of the lower incisors is usually involved. However, these changes are often undesirable for the facial profile. For this reason, camouflage treatment of Class 3 high-angle cases remains a major challenge for orthodontists. Furthermore, a deficient maxilla often results in crowding. Severe crowding or missing teeth in the upper arch may require the extraction of the counterpart teeth in the lower arch, which poses major difficulties with regard to space closure and maintaining an appropriate degree of axial

inclination of the lower incisors. Recently, temporary anchorage devices (TADs) have been effectively applied in camouflage treatment for Class 3 malocclusion [2–4].

The present case report describes the application of camouflage treatment in a patient with Class 3 malocclusion with a high mandibular plane angle. Additionally, the bilateral maxillary canines were horizontally impacted with apparent follicle enlargement. The treatment involved the extraction of the upper impacted canines and lower premolars using TADs.

2. History

The patient was a girl (age: 13 years and 6 months) with chief complaints of crowding and impaction of the upper canine teeth on both sides. With regard to her growth stage, it was assumed

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<https://doi.org/10.1016/j.odw.2018.07.001>

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that she was at the end of the pubertal growth spurt because she had already obtained peak height velocity and menarche had occurred at 12 years of age. Furthermore, fusion of the third finger distal phalanx was observed on a hand-wrist radiograph.

A clinical examination showed a convex soft tissue facial profile with retrograded chin, lower lip protrusion, shallow labiomental fold, lip incompetency and a long facial height (Fig. 1A). An intraoral examination showed crowding of the upper and lower anterior teeth and prolonged retention of the deciduous upper canine teeth on both sides (Fig. 1B).

An Angle Class III molar relationship was observed with a tight overjet (1.8mm) and anterior open bite (overbite, -0.6mm) (Table 1). The curve of Spee was steep (3.0mm). A panoramic radiograph showed horizontally impacted canine teeth with circumferential follicular cysts on both sides (Fig. 2B). A lateral cephalometric analysis revealed a skeletal Class 1 jaw base relationship ($\text{ANB}=1.5^\circ$) with a well-positioned and sized maxilla (Fig. 2A and Table 1). While the mandibular body length was long ($\text{Go-Me}=74.1\text{mm}$), the mandibular plane angle was steep ($\text{FMA}=41.8^\circ$) and the mandibular anteroposterior position was normal ($\text{SNB}=75.9^\circ$). The inclination of the upper incisors was normal ($\text{U1-SN}=108.7^\circ$) and the lower incisors were lingually inclined ($\text{L1-Mp}=80.6^\circ$).

3. Treatment plan and progress

3.1. The diagnosis and treatment objectives

An Angle Class III molar relationship with a high mandibular plane angle was diagnosed. The treatment objectives were as follows: (1) clockwise rotation of the mandible in order to improve the convex facial profile with a retrograded chin and long facial height, (2) to achieve a good functional Class I molar relationship and establish ideal incisor relationships with retroclination of the mandibular incisors, and (3) the alignment of the upper and lower dental arches, including the impacted upper canine teeth.

3.2. Treatment alternatives

The treatment alternative was orthognathic surgery. Maxillary and mandibular counterclockwise rotation could improve the retrograded chin and the long facial height. We decided that the plan was unfavorable because the skeletal problem was not severe enough to warrant orthognathic surgery.

With regard to the impacted canines, an alternative treatment was to extract the upper and lower premolars and



Fig. 1 – Pre-treatment photographs (age: 13 years and 6 months). (A) Facial photographs. (B) Intraoral photographs.

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