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Case Report

Interception of developing class III malocclusion with temporary anchorage devices: A case report

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ARTICLE INFO

Article history:
Received 1 July 2014
Accepted 24 July 2014
Available online 15 August 2014

Keywords:
Class III malocclusion
Anterior crossbite
Temporary anchorage devices
Miniplates
Class III elastics

ABSTRACT

Introduction: Class III malocclusion is a result of maxillary deficiency, mandibular prognathism or a combination of both, often accompanied by an anterior crossbite and a concave profile.
Aim: The aim of this work was to report and analyze a case of class III malocclusion.
Case study: The patient, a 12-year-old boy, attended Maxillo-Facial Clinic with the complaint of his lower jaw being in front. The pre-treatment examination showed a slight flattened subnasal area and the reverse overjet. For the maxillary protraction, de Clerck method of bone anchors and class III elastics were applied. After previous palatal expansion, the bone-anchored maxillary protraction was applied. The surgery was performed under general anesthesia. The surgical procedure consisted in placing four miniplates – one in each infrazygomatic buttress of the maxilla, and one in the anterior mandible between, and inferior to the left and right permanent lateral incisor and canine. The miniplates were loaded 3 weeks after the surgical procedure. After 7 months of treatment, the anterior crossbite was corrected.
Results and discussion: Cephalometric evaluation between the beginning of treatment and the end of maxillary protraction showed marked increase in ANB and Wits. A counter-clockwise rotation of the mandible was observed, as well as a slight clockwise rotation of the maxillary bone. The obtained results correspond to de Clerck's cephalometric investigations in class III patients who were treated with the use of bone-anchored maxillary protraction.
Conclusions: Temporary anchorage devices application enabled correction of the anterior crossbite and enhanced midfacial growth in young maxillary-deficient patient.

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http://dx.doi.org/10.1016/j.poamed.2014.07.014

1. Introduction

Class III malocclusion is a result of maxillary deficiency, mandibular prognathism or a combination of both, often accompanied by an anterior crossbite and a concave profile.[1,2]

The prevalence of this malocclusion differs among various ethnic groups. The frequency among Caucasian individuals reaches 4%, and within the Asian population, it ranges between 4% and 14% as a result of a high percentage of patients with maxillary deficiency.[3]

For a long time, orthodontists have been trying to modify facial growth by application of orthopedic forces to the teeth to be farther transmitted to the skeletal base of the maxillary and mandibular bone.[1] Typical treatments of class III malocclusion include the use of a protraction facemask to advance the maxilla.[4] By the use of such an appliance, heavy anterior traction is applied on the maxillary bone to stimulate its growth and to limit or redirect mandibular bone growth.[1,5] On the other hand, the abovementioned devices often have unwanted side effects[4] including maxillary incisor proclination and clockwise rotation of the mandible contributing to increased vertical dimension of the face.[1,5,6] Furthermore, the time of wearing a facemask is usually reduced to 14 hours per day at best.[1]

To eliminate the aforementioned disadvantages of a facemask, Hugo de Clerck proposed the use of temporary anchorage devices in maxillary protraction. In this innovative technique bone anchors and class III elastics are applied.[7,8] Bone anchors used for anchorage allow applying pure bone-borne orthopedic forces between the maxillary and the mandibular bone for 24 hours, avoiding any dentoalveolar compensations.[1] The original de Clerck's bone anchor consists of a miniplate with 2–3 holes, a round connecting bar and a fixation unit with a blocking screw or a hook to fix the elastics directly. Within the maxilla, a 3-hole miniplate is used, whereas in the area of mandible only 2-hole miniplates are used.[4]

2. Case study

The patient, a 12-year-old boy, attended Maxillo-Facial, Reconstructive and Esthetic Clinical Department in Children Hospital in Olsztyn with the complaint of his lower jaw being in front. The pre-treatment examination showed that the patient had slightly flattened subnasal area, regular vertical proportions, facial symmetry and lip competence. Intraorally, reverse overjet (−2.5 mm) was observed (Fig. 1). Left upper first premolar had been extracted due to severe caries and there was a partial lack of space in the dental arch for the right upper permanent canine (Fig. 2). The cephalometric analysis confirmed a class III skeletal relationship with maxillary deficiency.

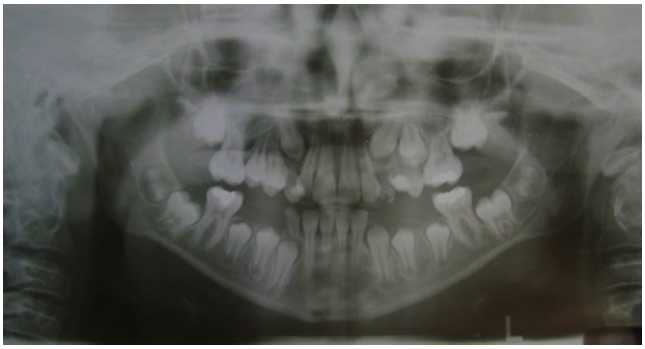

Fig. 2 – Pre-treatment panoramic radiograph.

The treatment purposes include the prevention of progressive unchangeable soft tissue and bony changes as well as the improvement of skeletal discrepancy and occlusal function. In the case of mild and moderate class III malocclusions, early orthopedic treatment allows eliminating the necessity for future orthognathic surgery treatment. Maximizing the growth potential of the maxilla coupled with correction of its transverse dimension may minimize the extent of the possible orthognathic procedures.

To achieve these objectives in a patient, after previous palatal expansion, the method of bone-anchored maxillary protraction was applied. The surgery was performed under general anesthesia. As the anchor, we used a 5-hole titanium miniplate for the maxilla and a 4-hole miniplate for the mandible (Synthes, Switzerland) (Fig. 3). The surgical procedure consisted in placing four miniplates – one in each infrazygomatic buttress of the maxilla, and one in the anterior mandible between and inferior to the left and right permanent lateral incisor and canine. Flaps were reflected in these sites, and the devices were fastened to the bone by using titanium miniscrews (1.55 mm diameter, 6 mm length). The titanium miniplates combined an intraoral attachment with a locking

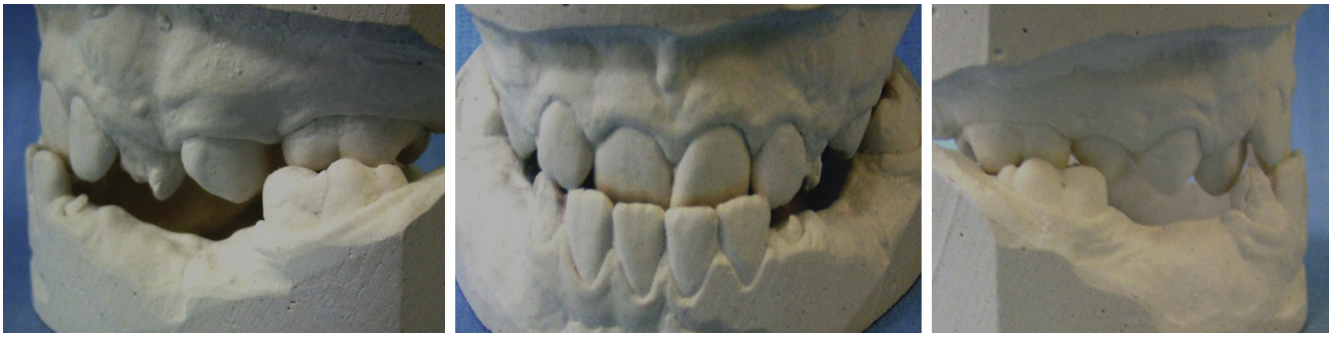

Fig. 1 – The reverse overjet before the treatment.