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Original Research Article

Changes in transverse tooth and bone dimensions during transversal maxillary hypoplasia treatment by maxillary distraction osteogenesis using a device installed on a bone

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ABSTRACT

Introduction: A transverse maxillary hypoplasia is a deformation often observed in orthodontic patients. Various techniques are used to treat this problem.
Aim: The aim is to present results of transversal maxillary hypoplasia treatment with a bone-borne device.
Material and methods: A retrospective analysis included 27 patients, age 17–26 years (17 ± 2.6). Dental casts and X-ray were made before operation period (T1), and post distraction (T2). On the casts were determined points: on cusps of maxillary canines (3-3), first maxillary premolars (4-4) and first maxillary molars (6-6). Angles and distances were measured on standard posterior-anterior (PA) images.
Results and discussion: At the 3-3 level, the average expansion was 5.8 mm, at the 4-4 level the average expansion was 7.3 mm, at the level of 6-6 palatial cusps the average expansion was 6.11 mm. Measurements in the PA X-ray were performed at the nasal cavity, with the average dimensions being 29.03 mm before treatment, and 31.95 mm post-treatment. The angle was measured between first molars (6-6_ang) and the anterior nasal spine before and after treatment, with a significant change in that angle from 98.93° on average to 102.89° after distraction.
Conclusions: Use of maxillary distraction osteogenesis with bone-borne device in maxillary expansion is an effective treatment method. Maxillary expansion results in increase of the nasal cavity. Used distractor is easy to operate for the patient.

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1. Introduction

A transverse maxillary hypoplasia is a deformation often observed in orthodontic patients.[1,2] For the first time, the maxillary correction was introduced as a treatment method by Angel in 1860. Through the years, various techniques for treatment of transversal maxillary hypoplasia were developed. For example, Hass used acrylic plates supported on soft tissues and teeth, to ensure perpendicular expansion.[3] With time, other orthopedic procedures using Hyrax screws have been widely applied. Treatment of transverse maxillary deformities prepares the dental arch for orthodontic treatment, improves the appearance (buccal corridors), the occlusal and mastication function, as well as enlarges the nasal cavity. Various techniques are used for treatment of transverse maxillary hypoplasia, starting with slow orthodontic expansion (SOE),[4] through rapid palatal expansion (RPE) using devices anchored on teeth and recommended in treatment of narrowings about 5 mm and young patients.[5–10] Another technique is surgically assisted rapid maxillary expansion (SARME). This group covers procedures with expanding devices, installed on teeth or bones. Also, the scope of surgical intervention can vary, from partial osteotomy to complete cutting of bone connections around the osteotomy site.[11,12] Another group includes multisegmental maxillary osteotomy, a corrective treatment of facio-occlusal deformities during one procedure.[13,14] Each method bears a risk of specific complications. With SOE and RPE, there is a risk of damage to peridontium, abutment teeth, bones, as well as of deformation recurrence.[15–19] To avoid complications resulting from specific orthopedic treatment limited to young patients and narrowings not more than 5 mm, SARME is used. In 1999, Mommaerts described a method using a device anchored on maxillary bones (transpalatal distractor – TPD).[20] The advantage of this method is gradual expansion of the cut bone and soft tissues, including hard palate tissue, mastication muscles and fascia. This should guarantee stable treatment results during final correction of deformation. Also the effect of SARME-TPD on a transverse dimension of the nasal cavity by expanding its bottom is of importance.

2. Aim

The aim of this paper is to present results of transversal maxillary hypoplasia treatment with a device installed on bones using transpalatal distraction osteogenesis.

3. Material and methods

A retrospective analysis in a group consisting of 27 patients (9 female and 18 male) was conducted. Patients' age was

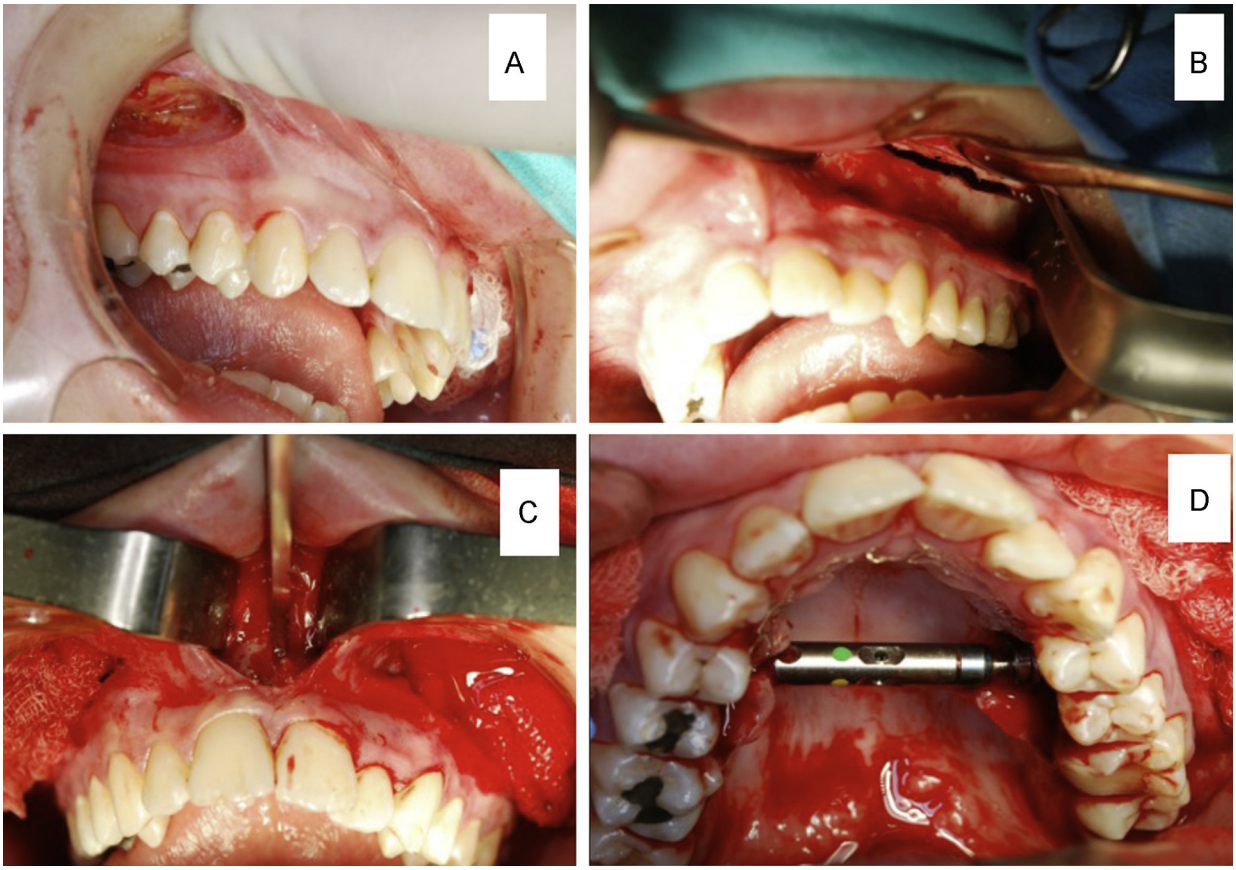

Fig. 1 – Intraoperative view. (A) Soft tissue incision; (B) lateral wall osteotomy line; (C) midline osteotomy; (D) distractor device in situ.