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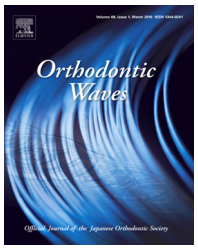

Research paper

Dentoalveolar compensation in Iranian adult skeletal open bite subjects

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ABSTRACT

Purpose: The aim of present study was to compare skeletal and dentoalveolar features of compensated and noncompensated adult open bite subjects with each other and also with those of control group.

Materials and methods: A total of 100 lateral cephalograms were included in the study and were divided according to skeletal vertical characteristics into two groups: control group (CG) and open bite group (OBG). The OBG further divided into two subgroups based on amount of overbite: dentally compensated open bite group (COBG) and non compensated open bite group (NCOBG). Twenty skeletal and dentoalveolar variables were evaluated and compared between OBG and CG and also between open bite subgroups by means of Student t-test. Association between different variables and overbite was assessed using Pearson's correlation coefficient.

Results: Increased molar and incisor height in both jaws were observed in OBG compared to CG. In NCOBG lower anterior facial height and lower posterior dentoalveolar height were significantly higher than COBG.

Conclusion: Dentoalveolar compensatory mechanisms in skeletal open bite patients consist of increased anterior and posterior dentoalveolar heights in upper and lower jaws compared to CG, while decreased mandibular molar height and shorter anterior face height are the most important determinants of adequate compensation in skeletal open bite subjects in our sample.

1. Introduction

Skeletal open bite malocclusion is difficult and challenging problem in orthodontics. Subjects with this malocclusion may have positive or negative open bite according to adequacy of dentoalveolar compensatory mechanisms [1]. Dentoalveolar compensation can help to attain and maintain normal overbite in various skeletal patterns [2]. In planning treatment for a patient with skeletal open bite a decision should be made whether to choose surgical approach or nonsurgical option for the patient. Dental decompensation is a prerequisite for surgical approach, while in non surgical treatment; we should mask the skeletal problem with dentoalveolar compensation.

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In the case of camouflage of malocclusion, uncompensated parameters can be successfully compensated, but pre-existing compensations should be determined and every effort should be made not to exaggerate these compensations since it lead to poor stability and esthetics [3]. A good understanding of the limits of dentoalveolar compensation is therefore a key to appropriate treatment [4].

Previous studies offer contradictory results regarding dentoalveolar features in high angle patients. While some investigators have shown increased maxillary anterior dentoalveolar dimensions in hyperdivergent patients [5–7], others reported no difference [8]. Regarding mandibular anterior dentoalveolar dimensions, once again there is little agreement; some authors reported reduction of aforementioned parameter in skeletal open bite, while others found no differences [5,7,9]. There is also disagreement about posterior dentoalveolar height in skeletal open bite patients; many investigators state that increased molar height is common finding in the high angle patients [10–15], however others do not support it [8,16–18].

Since craniofacial morphology differ according to ethnicity and racial differences [19], the aim of our study was to compare skeletal characteristics and dentoalveolar features in Iranian female skeletal open bite subjects with those of normal vertical subjects and further compare these features in compensated vs noncompensated skeletal open bite patients.

2. Materials and methods

The sample for this study consisted of 100 pretreatment lateral cephalograms of Iranian adult female. The cephalogerams of subjects who were in permanent dentition stage, aged over 15 years and have passed their adolescence growth spurt based on menarche were included in the study. Positive history of craniofacial anomalies or traumas and respiratory problems as well as previous orthodontic treatment history were exclusion criteria because of possible influence on vertical development of dentoalveolar processes. Information about menarche, anomalies and traumas and respiratory problems were accessible and retrieved from patient's medical histories. All records were selected from achieve of the Department of orthodontics at the Isfahan University of Medical Sciences.

The samples were divided into two groups named CG (control group) and OBG (open bite group) according to mandibular plane angle (ML/SN). OBG further divided into two sub groups (compensated open bite group (COBG) and noncompensated open bite group (NCOBG)) based on amount of overbite. Subjects in the control group (CG; $n = 50$, mean age; 18.6 years) were females with bilateral class I angle occlusion, normal overbite (between 1 and 4 mm) and mandibular plane angle within the range of $33 \pm 6^{\circ}$. Subjects in dentally compensated open bite group (COBG; $n = 25$, mean age; 17.5 years) had ML/SN angle greater than 40° with positive overbite and non-compensated open bite group (NCOBG; $n = 25$; mean age; 17.8 years) consisted of subjects with negative overbite and ML/SN angle greater than 40°.

Lateral cephalograms of all subjects were hand traced by one investigator on acetate paper over view box. The reference points and planes used in this study are shown in Fig. 1. Some skeletal variables are illustrated in Fig. 2. In Fig. 3 dentoalveolar variables are depicted. The following skeletal and dentoalveolar variables were measured and compared between groups.

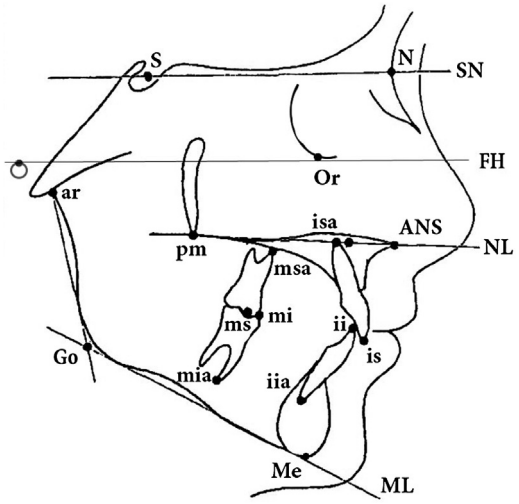

Fig. 1 – Cephalometric reference points and reference lines used in this study.

Skeletal variables:

ML/SN (degrees): inclination of mandibular jaw base (ML) to cranial base (SN) or mandibular plane angle.

ML/FH (degrees): inclination of mandibular jaw base (ML) to Frankfort horizontal plane (FH).

NL/SN (degrees): inclination of maxillary jaw base (NL) to cranial base (SN) or maxillary plane angle.

ML/NL: (degrees): inclination of mandibular jaw base (ML) to maxillary jaw base (NL) or inter jaw base angle.

S–Go (mm): total posterior facial height.

N–Me (mm): total anterior facial height.

N–ANS (mm): upper anterior facial height.

ANS–Me (mm): lower anterior facial height.

N–ANS/ANS–Me: upper anterior facial height to Lower anterior facial height or UAFH/LAFH.

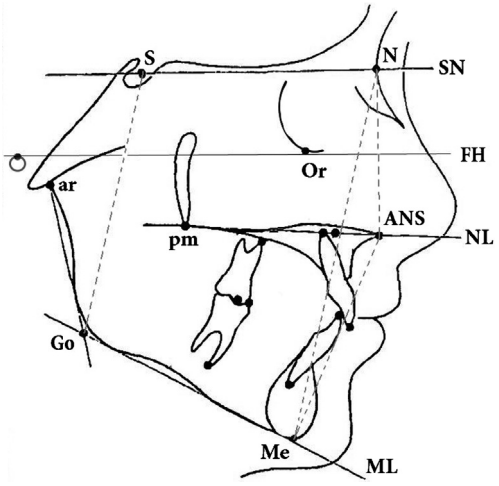

Fig. 2 – Skeletal variables.