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Anterior Open Bite - Cephalometric Evaluation of the Dental Pattern

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The purpose of this study was to compare the dental pattern of patients with anterior open bite malocclusion to that of individuals with normal overbite by utilization of lateral cephalograms, panoramic radiographs and study casts. The findings showed that there was no significant difference in the inclination of the occlusal plane (SN.PlO) and position of the maxillary and mandibular incisors (1-NA, 1-NB) between both groups of individuals; but the angles of inclination of the maxillary and mandibular incisors (1.1, 1.NA and 1.NB) differed statistically between patients with anterior open bite of the individuals that presented normal overbite, which suggests that the anterior open bite may be of dental origin.

Key Words: open bite, overbite, malocclusion, cephalometrics.

INTRODUCTION

The anteroposterior positioning and axial inclination of the maxillary and mandibular incisors are important in the diagnosis and orthodontic treatment planning of Class I malocclusions with anterior open bite. Anterior open bite is a malocclusion characterized by a deviation in the vertical relationship between the maxillary and mandibular dental arches, with absence of contact between the incisal edges of the maxillary and mandibular teeth in the vertical plane (1-4). It may be a disturbance in skeletal development (5-8) or only malpositioning of the anterior teeth, caused by thumb or pacifier sucking, infantile swallowing, speech disturbances and/or tongue thrusting (9-12).

The influence of oral habits on the incisors may lead to alterations in the occlusal plane, which may be inclined upward and forward, altering the ratio between the upper and lower anterior facial heights (13-15).

Trouten et al. (16) observed that, in the presence of anterior open bite, the curve of Spee was absent or negative. However, there was an accentuated curve in the presence of deep bite.

The purpose of this study was to compare the dental pattern of patients with anterior open bite malocclusion to that of individuals with normal overbite by utilization of lateral cephalograms, panoramic radiographs and study casts.

MATERIAL AND METHODS

The sample comprised two groups of children of both genders aged 7 to 10 years, attending to the Orthodontics Clinic of the Faculty of Dentistry of Ribeirão Preto, USP, Brazil. Group 1 consisted of 30 patients with Class I anterior open bite malocclusion,

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and Group 2 consisted of 30 children with normal overbite.

Both groups were selected according to the following criteria: the children should present dental and skeletal Class I malocclusion in the mixed dentition stage, so as the permanent maxillary and mandibular incisors should be in stage 8 of root formation, according to the classification of Nolla (17). Lateral cephalogram, panoramic radiograph and study casts were obtained from all patients.

Anterior open bite and overbite were measured on the study casts, following the criterion adopted by Graber (1). Panoramic radiographs were used to exclude cases of congenital absence of permanent teeth or supernumerary teeth, as well as to confirm that root formation was in stage 8 according to Nolla (17). Cephalometric tracings were performed on the lateral cephalograms, using the following cephalometric measurements (Fig. 1): SN.PlO, 1.1, 1.NA, 1.NB, 1-NA and 1-NB.

Data were submitted to statistical analysis by Wilcoxon nonparametric test at 5% significance level using the SAS software version 8.0 (SAS Institute, Cary, NC, USA).

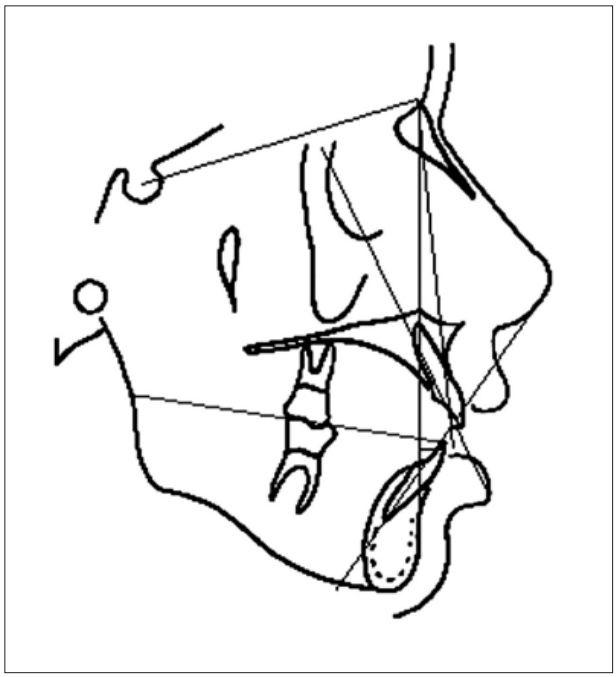

Figure 1. Tracing illustrating the lines, angles, linear and angles measurements used in this study for evaluation of the dental pattern.

RESULTS AND DISCUSSION

Data obtained from the measurements of dental patterns of the anterior open bite and normal overbite groups are given in Table 1.

The results of Wilcoxon test showed that 1.1, 1.NA and 1.NB cephalometric measurements applied to the anterior open bite group were statistically significant with regard to inclination of the maxillary and mandibular incisors. There was statistically significant difference ($p<0.05$) between the anterior open bite and normal overbite groups.The alteration in the inclination of anterior teeth of the patients evaluated in this study may have been yielded by the presence of non-nutritive sucking habits, infantile swallowing, speech disturbances and/or tongue thrusting (9-12,18).

Table 1. Comparison of the dental pattern of the patients with anterior open bite and normal overbite.

Cephalometric measurements	Anterior open bite			Normal overbite			*p*
	Median	Min	Max	Median	Min	Max	
SN.PlO	18.0	10.0	24.5	18.75	9.0	26.0	n.s
1.1	129.5	117.0	140.0	122.0	108.0	127.0	*
1.NA	21.5	17.0	29.5	28.5	20.5	44.0	*
1.NB	25.0	18.5	32.0	30.0	23.0	38.5	*
1-NA	4.0	2.5	8.5	5.5	3.5	12.0	n.s
1-NB	4.0	1.5	7.5	5.0	2.5	11.0	n.s

n.s. = non-significant; * = significant at 5% ($p<0.05$).

Statistical analysis of the measurements of maxillary and mandibular incisor positioning (1-NA, 1-NB) did not show significant difference between subjects with normal overbite and open bite ($p>0.05$), indicating that the position of the maxillary and mandibular incisors in relation to their bone bases was similar for both groups.

The fact that the measurements of the occlusal plane (SN.PlO) between the groups did not differ statistically ($p>0.05$) revealed a large variation of values within the studied patient samples. However, some authors have observed increased values in individuals with open bite (16). This disagreement might be assigned to the fact that the present study was conducted on a small and rather young sample (6 to 10 years old), with patients who had not achieved the pubertal growth period, therefore not presenting a defined mandibular morphology.

The results obtained from cephalometric evaluation of the skeletal pattern of patients with anterior open bite malocclusion and patients with normal overbite allowed the following conclusions: there was no significant difference in the inclination of the occlusal plane (SN.PlO) and position of the maxillary and mandibular incisors (1-NA, 1-NB) between both groups of individuals evaluated in this study; the angles of inclination of the maxillary and mandibular incisors (1.1, 1.NA and 1.NB) differed statistically between patients with anterior open bite or normal overbite.

It should be highlighted that the main cause of anterior open bite in young children is the presence of non-nutritive sucking habits such as thumb sucking, use of bottle or pacifier, tongue thrusting and/or infantile swallowing, which appear combined in many cases. Persistence of these habits tends to worsen the malocclusion over time. Therefore, the cause of the habit should be investigated, as well as the psychosocial behavior of the patient, and speech therapy should be conducted in association with the orthodontic treatment, and psychological follow-up if required.

RESUMO

O propósito deste estudo foi comparar o padrão dentário de pacientes com maloclusão de mordida aberta anterior com indivíduos que apresentavam sobremordida normal usando radiografias cefalométrica lateral, panorâmica e modelos de estudos ortodônticos. Os achados mostraram que não houve diferença estatisticamente significante na inclinação do plano oclusal (SN.PlO) e na posição dos incisivos superiores e inferiores (1-NA, 1-NB) entre ambos os grupos dos indivíduos, mas os ângulos de inclinação dos incisivos superiores e inferiores (1.1, 1.NA e 1.NB) diferiram estatisticamente entre pacientes com mordida aberta anterior dos indivíduos que apresentavam sobremordida normal, o que sugere que a mordida aberta anterior poderia ser de origem dentária.

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