



RESEARCH ARTICLE

Skeletal Facial Pattern Usually Associated With Congenitally Missing Upper Lateral Incisor in Saudi Orthodontic Patients Jeddah, KSA

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Abstract

Objectives: The aim of this study was to investigate any correlations between the skeletal facial patterns and the congenital absence of upper lateral incisors in Saudi orthodontic patients.

Material and methods: The files of 960 orthodontic patients who presented seeking orthodontic treatment at King Abdulaziz University Hospital, Jeddah, Saudi Arabia between 1995 and 2014 were reviewed. Selection was done by a trained orthodontic resident based on the presence of full patient record that includes a pre-treatment lateral cephalogram and orthopantomogram. A sample of fifty-two patients having either unilateral or bilateral congenitally missing maxillary lateral incisors (MML) was collected. All subjects included in this study had no developmental anomalies or syndromes. All lateral cephalometric radiographs were traced using Dolphin software. Cephalometric readings obtained were: SNA, SNB, ANB, Wits, PMA, U1-NA angle, U1-NA mm, L1-NA angle, L1-NA mm, Facial Angle, Angle of Convexity, NLA, UL/E plane, LL/E plane, A-B plane, CO-A, CO-GN and CO-A CO-GN differential. The Statistical Package for Social Sciences (SPSS) was used for analysis. Student's T-test was used to determine if there is statistical significance in gender. Also, (ANOVA) Test was used to determine if there is any correlation between MML and cephalometric characteristics.

Results: Our study included 33 females (63.5%) and 19 males (36.5%), mean age 19.94 years. T-test revealed that there is no significant difference in gender nor between unilateral and bilateral MML. Statistical evaluation showed no high correlation between MML and skeletal pattern. However, NLA, UI-NA and LI-NB showed a statistically significant increase when compared to normal standard values for the same population.

Conclusion: There was no statistically relevant correlation between skeletal pattern and MML. Although the presence of obtuse nasolabial angle, protruded upper incisors were more frequent with congenitally missing upper incisors.

Introduction and Background

One of the most common developmental anomalies is the congenital absence of one or more teeth [1]. Orthodontists often face patients with hypodontia in their clinics.

Therefore, many studies have been conducted to evaluate the craniofacial growth patterns in patients with congenitally missing permanent teeth.

Among the research conducted in Southern Chinese hypodontia patients in a cross sectional analytical study Doreen WS Chan, et al. [2] investigated whether hypodontia is associated with changes in the sagittal skeletal profile. They also assessed the relationships between the skeletal profile and the severity of hypodontia. The researcher concluded that hypodontia was associated with a shorter face, a flatter mandibular plane, a more pronounced chin, and a Class III skeletal profile. In severe hypodontia subjects, the maxilla was more retrognathic with a greater predilection to a Class III skeletal relationship.

Moreover, the analysis of skeletal relationships in a group of young people with hypodontia in a cross sectional analytical study, Chung, et al. [3] assessed

whether cephalometric analysis confirmed the clinical assumption of a reduced lower face height. 59 patients were included in the study, mean age was 13.1 years. Estman standard values were used as the norm for comparison. They found the mean cephalometric values for the whole sample were within the normal range but patients with more severe hypodontia showed tendencies to class III skeletal relationship and reduced maxillary-mandibular planes angle.

Furthermore, Natascha Bauer, et al. [4] conducted a study to establish whether there is a correlation between growth pattern and the type of tooth agenesis present. They got an access to 101 lateral cephalograms of patients diagnosed with various congenitally missing teeth randomly selected from orthodontic practice of one of the authors. Mean age was 11.60 years. The lateral cephalograms were analysed using the Hasund method of cephalometric analysis. They demonstrated there was no statistically relevant correlation between craniofacial growth pattern and the congenital absence of certain permanent teeth, although horizontal growth is more frequent in patients with congenitally missing second premolars.

Regarding dentofacial characteristics of patients with hypodontia, Marijn Créton, et al. [5] conducted a study to identify distinctive dentofacial characteristics of hypodontia patients. They concluded that the anterior-posterior relationship between the jaws, the interincisal angle and the lower anterior face height are discriminative parameters of dentofacial form in hypodontia patients. Patients with hypodontia can be clustered in four groups, each with distinctive vertical-skeletal, dentoalveolar and sagittal-skeletal characteristics. This categorisation of patients with hypodontia into meaningful groups may be useful for treatment planning, interdisciplinary communication and as a means of identifying groups of patients that qualify for reimbursement of costs. Other dental factors should be appreciated as well during restorative clinical decision making in patients with hypodontia.

Jörg A. Lisson & Sandra Scholtes [6] conducted a study to qualify and quantify differences between the craniofacial morphology in persons with congenitally missing teeth (hypo- and oligodontia) in comparison with the craniofacial morphology in persons without missing teeth. They found that patients with congenitally missing teeth compared to those with complete dentition showed reduced maxillary and mandibular length. The mandible was prognathic, the chin positioned more anteriorly. The overall anterior face height was noticeably lower as a result of the shortening of both upper anterior and lower anterior face heights. Additional differentiation between oligodontia and hypodontia revealed only few differences.

Regarding the prevalence of teeth number anomalies in orthodontic patients, there is a study

conducted by Giedrė Trakinienė, et al. [7] to determine if the prevalence of teeth number anomalies (TNA) is more frequent in orthodontic patients than in common population and what is TNA clinical manifestation. The prevalence of hypodontia was 17.11% with no statistically significant difference between the genders. More frequently teeth were missing in the lower jaw without statistically significant difference. Unilateral occurrence of dental agenesis was 1.5 times more common than bilateral occurrence. It was found that 17.96% of orthodontic patients had teeth number anomalies. The results confirm that TNA are more often found in orthodontic patients.

Gap of knowledge

To the best of our knowledge there were many studies that have assessed and identified the distinctive dentofacial characteristics of hypodontia patients generally. But no study investigated the skeletal facial pattern that is usually associated with only congenitally missing upper lateral incisors. As we noticed that congenitally missing maxillary lateral incisors are usually associated with skeletal class III pattern. The clinical application of doing this study lies in predicting a dentofacial pattern in cases of congenitally missing maxillary lateral incisors. Consequently, early intervention may be of great value in such cases by doing any indicated growth modification.

The objectives of the research

Our objective was to investigate any correlations between the skeletal facial patterns and the congenital absence of upper lateral incisors in Saudi orthodontic patients.

Material and Methods

The files of 960 orthodontic patients who presented seeking orthodontic treatment at King Abdulaziz University Hospital, Jeddah, Saudi Arabia between 1995 and 2014 were reviewed.

Selection was done by a trained orthodontic resident based on the presence of full patient record that includes a pre-treatment lateral cephalogram and orthopantomogram.

A sample of fifty-two patients having either unilateral or bilateral congenitally missing maxillary lateral incisors (MML) was collected. All subjects included in this study had no developmental anomalies or syndromes.

All lateral cephalometric radiographs were traced using Dolphin software. Cephalometric readings obtained were: SNA, SNB, ANB, Wits, MPA, U1-NA angle, U1-NA mm, L1-NA angle, L1-NA mm, Facial Angle, Angle of Convexity, NLA, UL/E plane, LL/E plane, A-B plane, CO-A, CO-GN and CO-A CO-GN differential.

The Statistical Package for Social Sciences (SPSS) was used for analysis. Student's T-test was used to determine if there is statistical significance in gender.

Also, (ANOVA) Test was used to determine if there is any correlation between MML and cephalometric characteristics. The standard value that we used as norms is North America Caucasian Standard.

Results

Our study constituted a sample of 33 females (63.5%) and 19 males (36.5%), mean age 19.94 years (Appendix 1) Results were found to be as follows:

- T-test revealed that there is no significant difference in gender (Appendix 2).
- Additional differentiation between unilateral and bilateral missing laterals revealed no significant differences (Appendix 3).
- The mean value of most cephalometric measurements of the treated samples were within the normal range of standard values were used as the norm for comparison (Appendix 4).

Cephalometric measurements in the congenitally missing upper lateral incisor Patients in comparison to the control Group by Independent t-test reveal the follows (Table 1):

- The SNA angle, SNB angle and ANB angle were not significantly different amongst the study sample.
- There were significant differences between patients with congenitally missing upper laterals and control sample at NLA, UI NA mm, LI NB mm and UL/E line. The mean value of NLA, UI NA mm

and LI NB mm were increased while UL/E line was decreased.

- McNamara Analysis showed a significant increase in maxillomandibular differential length indication a tendency toward increasing effective length of mandible.

Discussion

In our study the sagittal position of the maxilla and mandible in patients with MML was evaluated and found to be within normal range and not correlated to a specific skeletal pattern. Our results are in accord with the findings of Bauer, et al. [4] when they failed to identify any significant correlations between individual growth patterns and the absence of specific permanent teeth in patients with congenitally missing teeth.

In addition, we are in a disagreement with the findings obtained by Woodworth, et al. [8] when they found a significant mandibular retrognathism in patients with bilateral MML. Also, in contrast with the findings of Øgaard and Krogstad [9], Chan, et al. [2] and Nodal, et al. [10] when they found a significant reduction in SNA with the increase of severity of hypodontia.

As regards McNamara analysis, our findings revealed a significant increase in maxillomandibular differential that indicates a tendency towards an increase in effective mandibular length. This finding supports the finding of Chung, et al. [3] who reported a link between severe hypodontia with a Class III skeletal relationship.

Table 1: Cephalometric measurements in the congenitally missing upper lateral incisor patients and control group.

	Treatment (n = 52)		Control (n = 20)		P value
	Mean	SD	Mean	SD	
SNA (°)	82.283	4.574	82.000	3.300	0.77203
SNB (°)	80.758	4.156	80.000	3.100	0.40330
ANB (°)	1.883	2.747	2.000	1.700	0.82851
WITS (M)	-2.340	4.403	-1.170	1.900	0.12026
WITS (F)	-2.340	4.403	-0.100	1.770	0.00297*
MPA (°)	32.762	8.114	32.000	3.500	0.58001
UI NA (°)	23.850	8.004	22.000	6.100	0.29641
UI NA (mm)	6.769	3.867	4.000	1.200	0.00002*
LI NB (°)	24.619	6.408	25.000	4.500	0.77739
LI NB (mm)	6.740	3.485	4.000	1.500	0.00001*
Facial Angle	88.856	3.366	87.800	3.600	0.26033
Angle of Convex	2.288	6.131	0.000	5.100	0.11222
NLA (°)	113.106	11.981	100.000	14.142	0.00047*
UL/E	-5.917	4.310	-4.000	0.000	0.00202*
LL/E	-1.031	4.059	-2.000	0.000	0.08956
A-B Plane	-3.187	3.825	-4.600	3.700	0.15494
CO-A	97.693	35.459	94.000	0.000	0.42301
CO-GN	132.050	48.459	120.000	0.000	0.07727
Differential	33.658	15.175	26.500	2.120	0.00144*

Independent t-test; SD: Standard Deviation; *p < 0.05

The clinical background of doing such study is to predict any future growth modification needed for those young adults having MML, but according to our conclusions we could not do any anticipation of future craniofacial features for children with congenitally missing maxillary lateral incisors.

Further studies with larger sample size need to be conducted to establish a stronger correlation between skeletal pattern and the congenitally missing upper lateral incisors.

Conclusion

There was no statistically relevant correlation between skeletal pattern and the congenitally missing upper lateral incisors. Although protruded upper lip and flared upper incisors were more frequent with congenitally missing upper incisors. In addition, patients with congenitally missing lateral incisors showed tendency toward increased mandibular effective length thus indicating skeletal class III tendency.

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