

Evaluation of skeletal asymmetry of nasomaxillary complex in normal symmetrical face

Khudair A AL-SALMAN*
Saad S GASGOOS**

ABSTRACT

This study was intended to evaluate the symmetry of nasomaxillary complex. It was carried on the sample of 100 Iraqi adults (50 males and 50 females) aged 18-25 years with Angle class I normal occlusion was selected according to certain criteria from the students in Mosul University.

Statistical analysis of the data indicated that in both sexes the left and right sides of nasomaxillary complex had no significant differences with slight left side dominance over right side, except the canine area was slightly larger in the right side.

Key words: Symmetry, facial asymmetry, nasomaxillary complex, class I occlusion.

الخلاصة

الهدف من هذه الدراسة تقييم مدى التناظر في المعقد الأنفي الفكوي العلوي وقد أجريت على عينة مؤلفة من ١٠٠ شخص عراقي بالغ (٥٠ ذكر و ٥٠ أنثى) تتراوح أعمارهم ما بين ١٨-٢٥ سنة ذوي النوع الأول من الأطباق الطبيعي للأسنان وقد اختيرت هذه العينة من طلبة في جامعة الموصل. أثبتت التحليلات الإحصائية بأن كلا الجنسين لا يوجد فروقات معنوية ما بين الجهة اليمنى واليسرى بالرغم من أن الجهة اليسرى كانت أكبر قليلاً من الجهة اليمنى ما عدا منطقة البعد ما بين النابين كانت أكبر قليلاً في الجهة اليمنى.

INTRODUCTION

Since the advent of cephalometric radiography, orthodontists have focused on the lateral x-ray as their primary source of patient skeletal and dento-alveolar data. However, the frontal views also contain valuable information for diagnosis and treatment planning procedure. Various skeletal widths and skeletal asymmetries that are not available from the lateral cephalogram can be quantified from frontal radiograph^(1,2).

Clinically, symmetry means balance while significant asymmetry means imbalance⁽³⁾. Facial asymmetry being a common phenomenon, was probably first observed by the artists of early Greek statuary who recorded that found in nature normal facial asymmetry⁽⁴⁾.

Mulick⁽⁵⁾ could not find in his study heredity as a controlling agent in the production of craniofacial asymmetry. He also stated that although age differences of mean asymmetry exist in cross sectional evaluation, the serial evaluation does not show any effect of age on the individual mean asymmetry.

*Khudair Adday AL-SALMAN; BDS, CES, DSO: Assistant Prof.

**Saad Sami GASGOOS: BDS, MSc: Assistant Lecturer.

Department of Pedodontics, Orthodontics, and Preventive Dentistry, College of Dentistry, University of Mosul, Mosul, IRAQ.

In an attempt to find additional landmarks for measurements in the frontal plane, Vogel⁽⁶⁾ stated that the right landmarks were located closer to the mid-sagittal plane than the left. Letzer and Kronmon⁽⁷⁾ also find asymmetry as a dominant feature, but they did not mention which side was larger.

Vig and Hewitt⁽⁸⁾ and Shah and Joshi⁽⁹⁾ have shown that in normal occlusion the dento-alveolar region shown less asymmetry than the skeletal areas of the face, they suggested that an adaptive mechanism may be presented to explain this. On the other hand, Vig and Hewitt⁽⁸⁾ find that the left side was larger than the right side in their study. Whereas Shah and Joshi⁽⁹⁾ in their triangulation study of the P-A cephalometric radiograph found that the total facial structure was bigger on the right than on the left and the difference was statistically significant at the 5% level.

Although many faces may appear symmetrical and well-balanced on clinical soft tissue examination, cephalometric x-ray studies have revealed varying degrees of craniofacial asymmetry as a characteristic of all faces⁽¹⁰⁾.

The purpose of this study is to assess the degree of transversal skeletal and dental asymmetry of nasomaxillary complex in normal symmetrical face.

MATERIALS AND METHODS

This study is carried out on 100 adult subjects (50 males and 50 females), and are selected according to the following criteria.

- bilateral class I molar and canine relationships based on Angle classification.
- Normal overbite and overjet (2-4 mm.).
- Very mild spacing or crowding.
- Full set of normal permanent teeth in both jaws (excluding third molars).
- No supernumerary teeth.
- No history of orthodontic treatment, maxillofacial surgery, extensive restorative dentistry or carious teeth.
- Normal symmetrical face as assessed clinically with harmonious facial features.
- No history of habits in oronasal region with normal nasal breath (No nasal obstructio).
- Competent lips.
- Good medical history.
- No history of facial trauma.
- All the subject are Iraqi in origin.

All radiographs are taken using S.S. white cephalometric machine with a Wehmer cephalostat (Model W-105A). For each subject in this study one frontal cephalometric radiograph is taken, and all radiographs are exposed under standardized conditions.

The tracing included the orbital rims, the pyriform aperture and the nasal septum, the maxillary and mandibular incisors, the greater and lesser wings of sphenoid, the most lateral cross section of the zygomatic arch, the coronoid process, the maxillary and mandibular first permanent molars, maxillary canines and the body of the mandible the tracing also included the upper surface of the petrous portion of the temporal bone and the mastoid process with arch of temporal and parietal bones connecting them^(11,12,13,14,15,16)

- Frontal cephalometric landmarks:

1. point GL: Intersection point between the greater and lesser wings of the sphenoid bone (L. & R.).
2. point Zy (Zygomatic arch): The center of the root of the zygomatic arch (L. & R.).

3. point Nc (Nasal cavity): The point located at the widest area of the out line of the nasal cavity (L. & R.).
 4. point J (Jugal): The intersection of the tuberosity and zygomatic butress on the jugular process (L. & R.).
 5. point U₆ (Upper first molar): The point on the occlusal plan perpendicular to the buccal surface of the crown of the maxillary permanent first molar (L. & R.).
 6. point U₃ (Upper Canine): The tip of the maxillary permanent canine (L. & R.).
- The length of perpendicular line from each bilateral points on to sagittal geometrical axis is measured and compared between left right sides.

RESULTS

The descriptive statistics including mean, standard deviations, minimum and maximum values of the transversal linear measurement of both right and left sides (from the bilateral landmarks to the sagittal geometrical axis) for the total sample, males and females are presented in tables (1,2,3).

Table (1): Means and standard deviations for bilateral transversal linear measurements of the total sample with comparison between left and right sides

Side	Mean	SD	Minimum	Maximum	T-Value	Sig.
Zyg (R)	68.375	3.465	61	80	3.13	S
Zyg (L)	69.07	3.296	62	78		
Nc (R)	17.005	1.368	13.5	22	1.08	N.S
Nc (L)	17.125	1.571	14	23		
J (R)	33.41	4.15	30	39	-0.21	N.S
J (L)	33.72	1.891	30	40		
U6 (R)	30.845	1.532	28	35.5	4.22	S
U6 (L)	31.38	1.728	27	35		
U3 (R)	17.745	1.27	14	21	0.99	N.S
U3 (L)	17.375	1.334	14	21		

Table (2): Means and standard deviations for bilateral transversal linear measurements of the males with comparison between left and right sides

Side	Mean	SD	Minimum	Maximum	T-Value	Sig.
Zyg (R)	70.34	3.158	64	80	2.7	S
Zyg (L)	71.19	2.764	64	78		
Nc (R)	17.35	1.492	14	22	1.46	N.S
Nc (L)	17.58	1.742	14	23		
J (R)	34.17	1.42	32	39	-0.51	N.S
J (L)	34.54	1.79	30	40		
U6 (R)	31.43	1.552	28	35.5	3.98	S
U6 (L)	32.1	1.498	28	35		
U3 (R)	18.06	1.132	16	21	-0.47	N.S
U3 (L)	17.99	1.372	15	21		

Table (3): Means and standard deviations for bilateral transversal linear measurements of the females with comparison between left and right sides

Side	Mean	SD	Minimum	Maximum	T-Value	Sig.
Zyg (R)	66.41	2.531	61	73	1.72	N.S.
Zyg (L)	66.95	2.266	62	73		
Nc (R)	16.66	1.145	13.5	19	0.06	N.S.
Nc (L)	16.67	1.236	14	20		
J (R)	32.65	1.661	3	36	1.44	N.S.
J (L)	32.9	1.629	3	36		
U6 (R)	30.26	1.279	28	33	2.11	S.
U6 (L)	30.66	1.652	27	35		
U3 (R)	16.89	1.131	14	19	2.02	N.S.
U3 (L)	16.76	1.167	14	19.5		
U3 (L)	17.99	1.372	15	21		

The comparison between right and left transversal linear measurements indicated that there are no significant differences between the right and left sides. However, the left side of nasomaxillary complex demonstrated a slight dominance over the right side, except the canines that showed slight non-significant dominance in the right side.

DISCUSSION

The frontal skeletal analysis of normal symmetrical face demonstrates that in both sexes the differences between the left and right landmarks (Zy, J, Nc, U₆, U₃) to the sagittal geometrical axis are statistically not significant, however the left side is very slightly larger than the right side. This is similar to the finding of Vogel⁽⁶⁾, Vig and Hewitt⁽⁸⁾, but it is not supported by the observation of other^(9,10) who reported that the right side was larger in their study.

Asymmetry of the face may be due to an asymmetrical development of the brain for functional reasons or due to an asymmetrical muscular habit such as unilateral mastication^(11,12).

REFERENCES

1. Grummons DC, Kappeyne MA. A frontal asymmetry analysis. *J Clin Orthod.* 1987; 21(7): 448-465.
2. Brown T, Abbott AH. Computer-assisted location of reference points in three dimensions for radiographic cephalometry. *Am J Orthod Dentofac Orthop.* 1989; 95: 490-508.
3. Fischer B. Asymmetries of the dentofacial complex. *Angle Orthodont.* 1954; 24: 179-192.
4. Lundstrom A. Some asymmetries of the dental arches, jaws and skull and their etiological significance. *Am J Orthodont.* 1961; 47(2): 81-106.
5. Mulik, JF. An investigation of craniofacial asymmetry using the serial twin study method. *Am J Orthodont.* 1965; 5: 112-129.
6. Vogel CT. Correction of frontal dimensions from head x-ray. *Angle Orthodont.* 1967; 37(1): 1-8.

7. Letzer GM, Kronman JH. A posteroanterior cephalometric evaluation of craniofacial asymmetry. *Angle Orthodont.* 1967; 37(3): 205-211.
8. Vig PS, Hewitt AB. Symmetry of the human facial skeleton. *Angle Orthodont.* 1975; 2: 45.
9. Shah SM, Joshi MR. An assessment of asymmetry in the normal craniofacial complex. *Angle Orthodont.* 1978; 48(2): 141-148.
10. Peck S, Peck L, Kataja M. Skeletal asymmetry in esthetically pleasing faces. *Angle Orthodont.* 1991; 1: 43-48.
11. Yen PK. Identification of landmarks in cephalometric radiographs. *Angle Orthodont.* 1960; 30: 35-41.
12. Chebib FS, Chamma AM. Indices of craniofacial asymmetry. *Angle Orthodont.* 1981; 51(3): 214-228.
13. Ricketts RM, Chaconas SJ, Schullof RJ, Engel GA. Introduction to cephalometrics. In: *Orthodontic Diagnosis and Planning*. Vol. (1), Chapter 1, P:13. 1982
14. Frank SW, Engel GA. The effect of maxillary quad-helix appliance expansion on cephalometric measurements in growing orthodontic patients. *Am J Orthodont.* 1982; 81(5): 378-389.
15. Grayson BH, McCarthy JG, Bookstein F. Analysis of craniofacial asymmetry by multiplane cephalometry. *Am J Orthodont Dentoface Orthop.* 1983; 84(1): 217-224.
16. El-Mangoury NH, Shaheen SI, Mostafa YA. Landmark identification in computerized postero-anterior cephalometrics. *Am J Orthodont Dentoface Orthop.* 1987; 91(1): 57-61.
17. Woo TL. On the asymmetry of the human skull. *Biometrika*, 1931; 22: 324. Cited by: Shah SM, Joshi MR. An assessment of asymmetry in the normal craniofacial complex. *Angle Orthodont.* 1978; 48(2): 141-148.
18. Brash JC, Mckeage HT. The Aetiology of Irregularity and Malocclusion of the teeth. Dental Board of U.K. London 1956. Cited by: Shah SM, Joshi MR. An assessment of asymmetry in the normal craniofacial complex. *Angle Orthodont.* 1978; 48(2): 141-148.