Original Research Article

COMPARISON OF GLENOID FOSSA POSITION IN SKELETAL CLASS I AND SKELETAL CLASS II MALOCCLUSION

ABSTRACT

OBJECTIVE

To assess the mean position of the glenoid fossa in subjects with skeletal class I and skeletal class II malocclusions in a tertiary care hospital.

STUDY DESIGN

A descriptive cross-sectional study

PLACE AND DURATION OF STUDY

Out Patients Department of Orthodontics, Margalla Institute of Health Sciences Rawalpindi from 1-12-2013 to 30-05-2014

METHODOLOGY

Patient`s history was taken and clinical examination was performed. Lateral Cephalogram was taken with the patient's Frankfurt horizontal plane parallel to floor, mandible in centric occlusion and lips at rest. Patients were divided into 2 groups based on skeletal class I and class II relationships. On Cephalogram, SNA, SNB, ANB, GF-S on FHP and GF-FMN were measured.

The data was analyzed on statistical package for social sciences (SPSS version 14). Descriptive statistics were used to calculate the frequency and percentages for qualitative variables like gender. Means and standard deviation were calculated for quantitative variables like SNA, SNB, ANB, GF-S on FHP, and GF-FMN for skeletal class I and class II groups. Independent sample t-test was used to compare the means and SD for GF-S on FHP and GF-FMN in millimeters for both the groups.

RESULTS:

On conduct of various descriptive statistics / sample tests, results were achieved. $P < 0.05$ was considered significant. Mean position of glenoid fossa was the outcome of the study which was compared in both skeletal class I and skeletal class II groups. Mean GF-S on FH in skeletal class I was 17.47±3.45 mm and in skeletal class II it was 17.01±3.79 mm, which was statistically not

significant (p = 0.528). Similarly Mean GF-FMN in skeletal class I was 80.50±6.17 mm and in skeletal class II it came out to be 77.72±7.69 mm, which was statistically significant (p=0.048).

CONCLUSION:

These results suggest that there is a statistically significant difference between glenoid fossa and FMN point in skeletal class I and Class II malocclusions.

KEY WORDS: Glenoid fossa, skeletal class II, Mandibular retrusion, cranial base, FMN.

INTRODUCTION:

The profile of the face has various horizontal and vertical parameters. Balanced facial profiles are achieved only when there is a balance between the horizontal and vertical growth.[1] Unbalanced facial profiles due to malocclusion are the result of various combinations of underlying skeletal and dental disharmonies that involve several different components of the craniofacial region**.[**2]

Since the relationship of the mandible to the cranial base influences both sagittal and vertical facial disharmonies, the position of the glenoid fossa in relation to surrounding skeletal structures deserves to be included in the analysis of the skeletal features of the individual patient.[2] It has been well established that the maxilla and mandible grow differently. Maxillary growth occurs in three ways: through deposition of bone at the circummaxillary sutures; by periosteal deposition of bone on various anatomic surfaces; and by dental eruption producing vertical alveolar bone height.[4,5] The mandible also increases in size by a combination of three growth processes: endochondral bone growth at the condyle; periosteal bone remodeling on the posterior border of the ramus; and dental eruption.[6,7 **]**

In Skeletal Class II patients, there is either maxillary excess, mandibular deficiency or a combination of both. The treatment goal of a patient with skeletal class II malocclusion having mandibular deficiency is an increase in mandibular growth. This can be accomplished by changes in the components of the TMJ, i.e. (1) condylar modeling, (2) glenoid fossa modeling, (3) anterior condylar displacement in the fossa. Changes can be performed in each component separately or all three in combination.[8]accetti et al stated that a posterior positioning of the glenoid fossa may be one of the diagnostic criteria in class II malocclusions.[9] The positioning of glenoid fossa is directly dependent on the development of cranial base. The change in length of the posterior cranial base during development alters the spatial orientation of the fossa. Relative change in position of the glenoid fossa during facial development can occur as a result

of local remodeling within the fossa or as a result of spatial repositioning of the entire temporal bone.[8,10,11**]**

On the contrary an anterior displacement of fossa during growth was noted in class III individuals. This was attributed to the more upright posterior cranial base. Baccetti et al [12] identified some significant elements regarding glenoid fossa position in different sagittal and vertical facial types

• Class II skeletal disharmony is associated with a more posterior position of the glenoid fossa when compared to Class III skeletal disharmony.

• Subjects presenting with high angle vertical relationships show a more cranial position of the glenoid fossa in relation to the cranial base when compared to subjects with either normal or low angle vertical relationships.

For a correct diagnosis and treatment planning, the relation of glenoid fossa and condyle is very important to understand. Information on growth in various types of malocclusions and dento-skeletal disharmonies is vital to plan orthodontic treatment properly. Despite the important role of the glenoid fossa that has been established from the currently available literature in the etiology of malocclusion and its diagnosis, there is only limited data originating mainly from the western world with no research of the sort conducted in Pakistan.

The rationale of this study is to better clarify the role of glenoid fossa position in Class II skeletal disharmony which can become a therapeutic target for dentofacial orthopedics.

METHODOLOGY:

A cross sectional study with 100 subjects (16 males and 84 females) was conducted. Written consent was taken from all participants. Patients' history was taken and clinical examination was performed. Lateral Cephalogram was taken with the patient's Frankfurt horizontal plane parallel to floor, mandible in centric occlusion and lips at rest. On Cephalogram, ANB angle was measured. Patients were divided into 2 groups based on skeletal class I and class II relationships.

On cephalogram, following readings were done:

1. SNA, SNB and ANB angle were measured with the help of protractor.

2. GF-S on FHP: The distance (in mm) between the projections of point glenoid fossa (GF) and point sella (S) onto the Frankfort horizontal plane. (Measured with the help of ruler).

3. GF-FMN: The linear distance (in mm) between glenoid fossa (GF) and frontomaxillary nasal suture (FMN) point. Measured with the help of a ruler)

INCLUSION CRETRIA:

- Patients of either gender
- Patients having CVM stage 5,
- Patients having skeletal class I or class II malocclusion with normal SNA angle.

EXCLUSION CRITERIA:

- Patients having previous orthodontic/orthopedic treatment.
- Patients with any asymmetry of jaws.

STATISTICAL ANALYSIS

The data was analyzed on statistical package for social sciences (SPSS version 10). Descriptive statistics were used to calculate the frequency and percentages for qualitative variables like gender. Means and standard deviation were calculated for quantitative variables like SNA, SNB, ANB, GF-S on FHP, and GF-FMN for skeletal class I and class II groups. Independent sample t-test was used to compare the means and SD for GF-S on FHP and GF-FMN in millimeters for both the groups.

Table 1 : Independent Samples Test Of Patients In Class I And Class Ii Skeletal Relations

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
GF-S on FH	Equal variances assumed	0.498	0.482	0.634	98	0.528	0.4600	0.7260	-0.9808	1.90
	Equal variances not assumed			0.634	97.118	0.528	0.4600	0.7260	-0.9810	1.90
GF-FMN	Equal variances assumed	0.499	0.482	2.000	98	0.048	2.7900	1.3952	0.0214	5.55
	Equal variances not assumed			2.000	93.597	.048	2.7900	1.3952	.0197	5.56

RESULTS:

Independent-samples t-test was conducted to compare GF-S in Group A and Group B, skeletal relation. There was no significant difference in the scores for Group A, (Mean = 17.47, standard deviation = 3.45) and Group B (Mean=17.01, standard deviation = 3.79), T-value of t = 0.634 and P value, p = 0.528, was calculated. These results suggest that there is no statistically significant difference between GF-S on FHP in Class I and Class II skeletal relations.

DISCUSSION:

In the present study, the position of the glenoid fossa was evaluated according to its distance from sella (on Frankfort horizontal line, mm) and from frontomaxillary nasal suture (GF-FMN, mm), and it was compared in subjects with Class I and class II malocclusion. The values for SNA, SNB and ANB used in the study showed the absence of maxillary protrusion in the Class II sample and the presence of mandibular retrusion. This data reflected the selection criteria for the Class II group (normal maxilla). Enlow[4] has shown the growth of the maxilla to be under the influence of the cranial base. Various studies in the past have reported a tendency to a skeletal Class II pattern in subjects presenting with a large cranial base angle in association with a distal position of the temporomandibular joint within the skull.[3,12]

In this study subjects with Class II malocclusion presented with a significantly more distal position of the glenoid fossa, when compared with the class I as measured by means of two parameters (GF-S on FH and GF-FMN).[6]

In the current study, GF-FMN in skeletal class II group is 80.50+6.17 and 77.72+7. in skeletal class I group which was statistically significant ($p < 0.048$). Similarly, GF-S in both the groups was 17.47+3.45 and 17.01+3.79, but it was statistically not significant ($p < 0.528$). Giuntini et al**9** performed a study in class II malocclusion patients and concluded that glenoid fossa position in class II group is 71±4.1mm compared to class I which is 67.6±3.5mm and $p < 0.00$. The average distance from the glenoid fossa to FMN in the present study, as measured in the Class II group, was 3.2 mm longer than the same average distance in the class I group. This finding corroborates a previous report by Droel and Isaacson1 who found approximately 2.5 mm of posterior displacement of the glenoid fossa in skeletal Class II subjects when compared with skeletal Class I subjects. It should be noted, however, that, in the study by Droel and Isaacson1

Class II subjects included both cases with maxillary protrusion and cases with mandibular retrusion/deficiency. By focusing on Class II malocclusion associated exclusively with mandibular retrusion, the present study was able to find a significant difference in glenoid fossa position between the two groups.

Miranda et al mentioned that the upper distance between the condyle and fossa is increased in short facial types and reduced in long facial type. Therefore, both vertical patterns (long or short) should also be considered in determining Glenoid fossa position clinically and radiographically in order to achieve more reliable results. In another study Baccetti et al[15] concluded that the vertical measurements for glenoid fossa position represent a more sensitive diagnostic tool in the evaluation of facial vertical features than the sagittal measurements for glenoid fossa position in the appraisal of antero-posterior skeletal relationships. It deserves to be highlighted that the distal position of the glenoid fossa, as an anatomical condition predisposing to Class II malocclusion, can become a therapeutic target for dentofacial orthopedics. The literature reports significant changes that can be induced in the structural features of the posterior wall of the glenoid fossa following mandibular advancement and mechanical stimulation of condylar growth.[18,19,20,21] These changes can contribute significantly to the correction of Class II malocclusion associated with mandibular retrusion

CONCLUSION:

The present investigation identified some significant elements regarding glenoid fossa position in skeletal class II malocclusion.

• A posterior position of the glenoid fossa is a possible diagnostic anatomic feature of Class II malocclusion associated with mandibular retrusion.

• An effective measurement to evaluate glenoid fossa position within the craniofacial relationships is the cephalometric distance from the glenoid fossa to the frontomaxillarynasal suture (GF-FMN).

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