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Research Article

Morphology of Sella Turcica in Skeletal Class II Subjects

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Abstract

A study on the morphology of sella turcica in skeletal Class II subjects in an orthodontic patient population showed 50% of the Class II subjects to have normal sella turcica morphology. The proportion of normal sella turcica was statistically significant among Class I as compared to Class II. 15% of the Class II subjects had bridging of sella turcica morphology and 11% of the Class II showed notching of posterior wall.

Keywords: Sella turcica, morphology of sellae, Class II malocclusion, skeletal Class II.

Introduction

The sella turcica is a saddle-shape depression in the sphenoid bone of the human skull. The anterior border of the sella turcica is represented by the tuberculum sellae and the posterior border by the dorsum sellae. The pituitary gland is surrounded by the sella turcica. Two anterior and two posterior clinoid process project over the pituitary fossa. The anterior clinoid processes are formed by the medial and anterior prolongations of the lesser wing of sphenoid bone, and the posterior clinoid process by the endings of dorsum sellae. During embryological development, the sella turcica is a key point for the migration of the neural crest cells to the fronto nasal and maxillary development fields.

The morphology of sella turcica is of importance in determining the cephalometric position of reference point sella. Variations in sella morphology have been discovered in skeletal Class III subjects1, cleft subjects2, in subjects with severe craniofacial deviations3, in dental anomalies4, and in syndromes5,6,7,8,9,10,11. Morphology of sella turcica in skeletal Class III malocclusion has been studied by various authors12,13,14,15. But the morphology of sella turcica in skeletal Class II subjects has not been reported. So this study was undertaken.

Materials and Methods

This was designed as a cross sectional study. The study population included cephalometric records of 100 skeletal Class

II subjects and 100 Class I subjects, who reported to the Dept. Of Orthodontics, Govt. Dental College, Thiruvananthapuram for orthodontic treatment. This study was conducted in November 2013. The inclusion criteria were adults with no history of orthodontic or orthodontic-surgical treatment, no history of cleft lip repair, craniofacial deviations or other syndromes; For Class II subjects the inclusion criteria included ANB angle that should be more than 5 degree. The exclusion criterion was the presence of proximal caries. A template as per description of Axelsson16 (2004) was prepared, this included the normal and the 5 variations. The cephalograms were available with patients reporting to the dept. Both Class II and Class I study population included males and females.

Result

42% of Class I and 52% Class II subjects included in the study were males and 58% of Class I and 48% of Class II subjects were females [Table I] (Fig 1). The mean age of study population was 18.69±2.7 years(18.26 for males and 19 years for females) for Class II and 21.12±3.46 years (21.26 for males and 20.75 for females) for Class I subjects [Table 2 and Table 3].

50% of Class II subjects included in the study presented with a normal sella turcica whereas 71% of the subjects in Class I malocclusion had a normal sella turcica morphology ($p < .05$). 9% of Class II subjects and 11% of Class I subjects had an oblique anterior wall. 4% of Class II subjects and 8% of Class I subjects had a double contour of floor. 11% of Class II subjects and 4% of

Class I subjects had a pyramidal shape of dorsum sellae ($p > .05$). 15% of Class II subjects presented with sella turcica bridging whereas only 4% of Class I subjects showed sella turcica bridging; this was statistically significant ($p = .014$). 11% of Class II subjects presented with notching of posterior wall whereas only 2% of Class I subjects included in the study had notching of posterior wall, this is statistically significant ($p < .05$) [Table 4 and Table 5] (Fig 2).

The proportion of oblique anterior wall, double contour of floor and pyramidal shape did not differ between skeletal Class I and skeletal Class II subjects [Table 3].

In gender wise classification, there was not a statistically significant difference in the normal sella turcica morphology

between males and females [Table 6]. The data on ANB angle of the study population is presented in Table 7 and Table 8.

Socio Demographic Profile:

Table 1: Gender Wise Distribution

Gender	Class I		Class II	
	Count	Percent	Count	Percent
Male	42	42	52	52
Female	58	58	48	48
Total	100		100	

Table 2: Descriptive Statistics for Age

Group	N	Minimum	Maximum	Mean	Std. Deviation
Class I	100	16	33	21.12	3.462
Class II	100	15	29	18.69	2.718

Table 3: Descriptive Statistics for Age Based on Gender in Each Group

Group	Sex	N	Minimum	Maximum	Mean	Std. Deviation
Class I	Male	42	16	30	21.46	3.269
	Female	58	16	33	20.75	3.658
Class II	Male	52	15	25	18.26	2.153
	Female	48	15	29	19.00	3.044

Table 4: Sella Turcica Morphology Based on Group

ST Morphology	Class I		Class II	
	Count	Percent	Count	Percent
Normal Sella Turcica	71	71	50	50.0
Oblique anterior wall	11	11	9	9
Double contour of floor	8	8	4	4
Sella turcica bridge	4	4	15	15
Notching of posterior wall	2	2	11	11
Pyramidal shape	4	4	11	11

Table 5: Comparison of ST Morphology Based on Group

Sella Turcica Morphology		Class I		Class II		p#
		Count	Percent	Count	Percent	
Normal Sella Turcica	No	29	29	50	50	0.004
	Yes	71	71	50	50	
Oblique anterior wall	No	89	89	91	91	0.814
	Yes	11	11	9	9	
Double contour of floor	No	92	92	96	96	0.373
	Yes	8	8	4	4	
Sella turcica bridge	No	96	96	85	85	0.014
	Yes	4	4	15	15	
Notching of posterior wall	No	98	98	89	89	0.018
	Yes	2	2	11	11	
Pyramidal shape	No	96	96	89	89	0.105
	Yes	4	4	11	11	

#: Fisher's Exact Test

Table 6: Distribution According to Gender

ST Morphology	Class I				Class II			
	Count	M	F	p	Count	M	F	p
Normal Sella Turcica	71	36	35	0.826	50	18	32	0.311
Oblique anterior wall	11	5	6	0.754	9	8	1	0.004
Double contour of floor	8	4	4	1.00	4	1	3	0.637
Sella turcica bridge	4	3	1	0.679	15	7	8	0.719

Notching of posterior wall	2	1	1	1.00	11	2	9	0.113
Pyramidal shape	4	3	1	0.619	11	6	5	0.519

Table 7: ANB Values in Class I Subjects

Class	N	Minimum	Maximum	Mean	Std. Deviation
I	100	1	2	1.55	0.500

Please see table 8 in PDF version

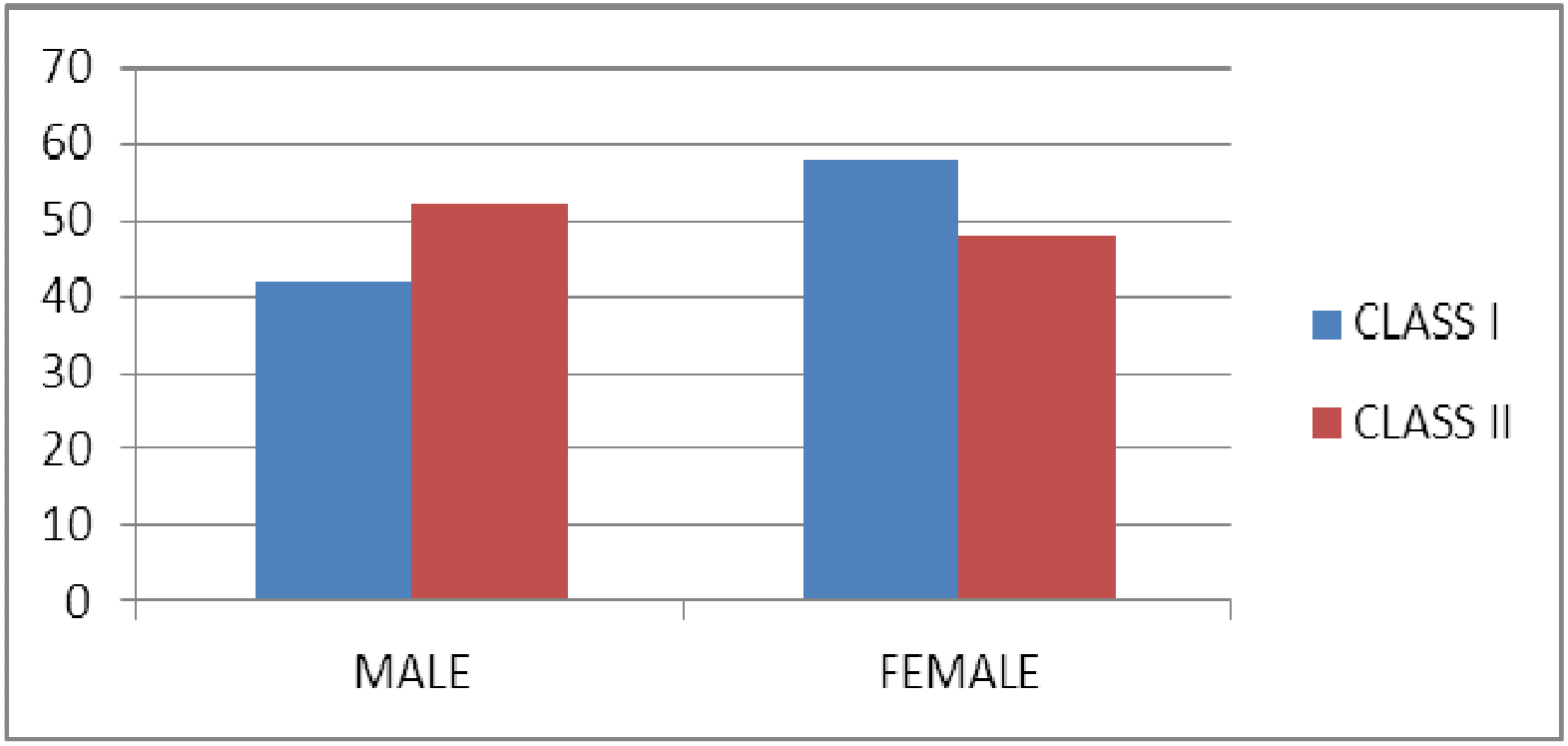

Figure 1: Distribution According to Gender

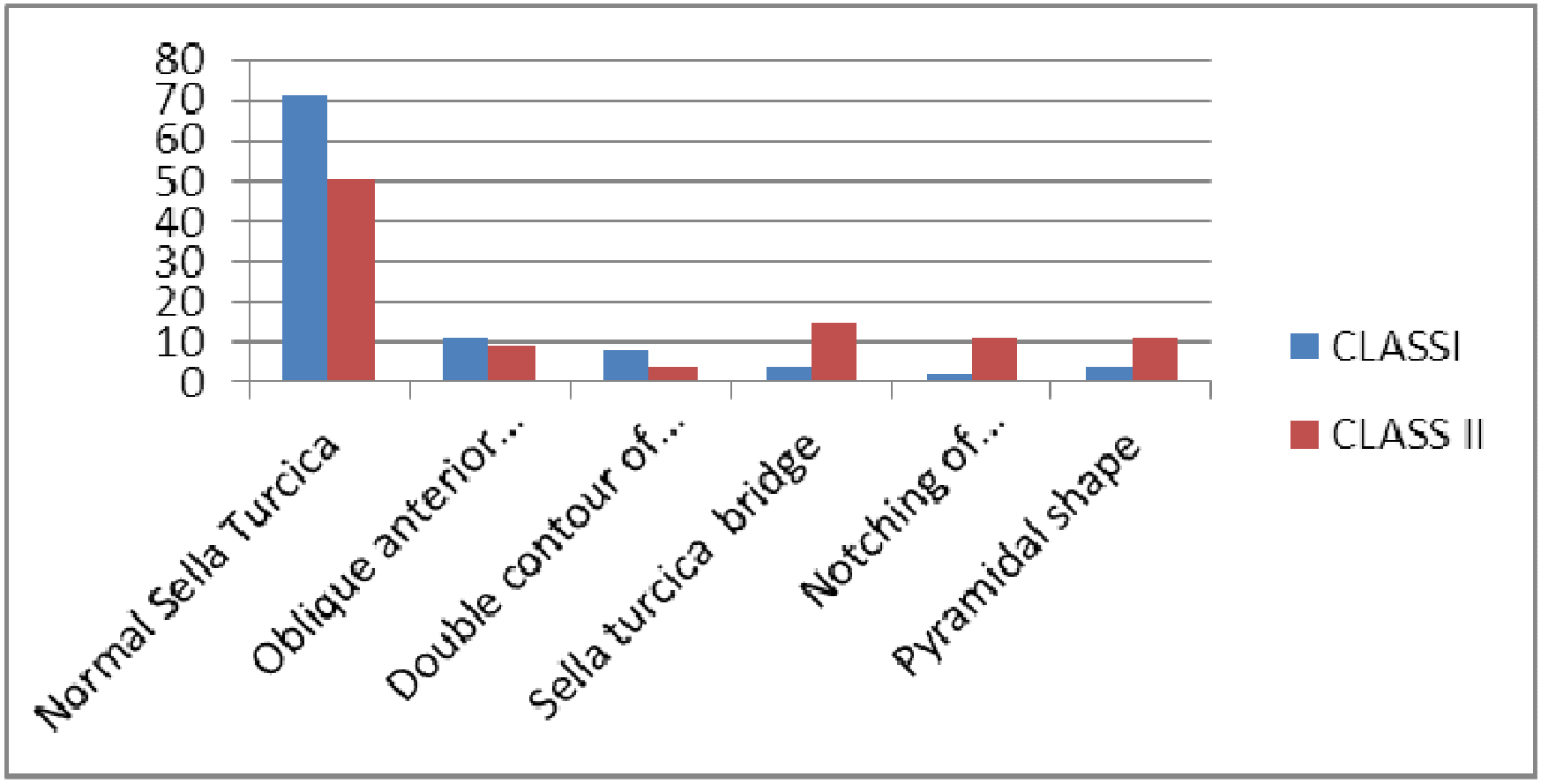

Figure 2: Comparison of ST Morphology Based on Group

Discussion

This cross sectional study describes the morphology of sella turcica in skeletal Class II and skeletal Class I subjects. The study sample included adult patients with skeletal Class II malocclusion.

Morphology: Classifications of sella turcica morphology were attempted in literature. Appraisal of sella turcica morphology is a valuable aid in assessing the pathology in the pituitary gland[17]. Abnormal sella turcica morphology was reported in cases with severe craniofacial deviations[3], various genetic disorders[2], syndromes[5-11] and in dental anomalies[4, 18]. Variations in sella turcica morphology have been reported by different authors. 75% of subjects in Silverman[31]'s study had a normal morphology

for sella turcica and remaining 25% had an abnormal morphology. In the present study 50% of the adults with skeletal Class II showed a normal morphology of sella turcica.

Gorden[19] (1922) classified the sella turcica morphology into 3 shapes, the circular, the oval or the flat/saucer shaped, their study sample included children of age ranging from 1 year to 12 years and most of them had either circular or oval shaped sella turcica. Davidoff and Epstein[20] (1950) put forward the term J shaped sella while Fournier and Denizet[21] (1965) used the term omega sella. Teal[22] (1977) classified the sella anatomy into round, oval or flat. Bruneton et al[23] (1979) studied the normal variants of sella turcica of adults.

Axelsson et al[16] (2004) classified the sella turcica shapes into six types; normal sella turcica, oblique anterior wall, double contoured sella, sella turcica bridge, irregularity (notching) in the posterior part of the sella and pyramidal shape of the dorsum sellae. They analysed a sample from Oslo University Craniofacial Growth Archive (Norwegian 6-12 years) and reported that 71% of males and 65 % of females presented with a normal sella turcica morphology.

67% of the Saudi subjects in Alkofide[12]'s study; 80% of adults in skeletal Class III malocclusion and 70% of adults in skeletal Class I malocclusion in Iraqi adults in Hadeel et al[20]'s study; 65% of skeletal Class I patients and 72% of skeletal Class III patients from Islamabad in the Shah et al[21]'s study; and 48% of skeletal Class III and 75 % of skeletal Class I subjects included in

Sathyanarayana et al[24]'s study in South Indian population had a normal sella turcica morphology. In the present study, 50% of skeletal Class II subjects and 71% of skeletal Class I subjects had a normal sella turcica morphology. The proportion of normal sella turcica morphology was statistically significant among skeletal Class I as compared to skeletal Class II.

18.6% of subjects in Becktor et al[3]'s study and 16.7% of subjects in Jones et al[25]'s study showed sella turcica bridging which was more than double the incidence of bridging previously reported.

Busch[26], Muller[27] and Platzer[28] reported the prevalence of sella turcica bridge with a frequency of 1.75 to 6 % in the 'normal' population. Becktor et al[3]'s and Jones et al[25]'s study was on patients with severe craniofacial deviations who required

combined surgical orthodontic treatment. In the present study 4% of skeletal Class I subjects had sella turcica bridging.

Abdel Kader et al[29] (2007) showed significantly higher incidence of sella turcica bridging in subjects from Saudi Arabia with skeletal Class III malocclusion when compared to skeletal Class II and skeletal Class I malocclusion. The present study showed 15% of the Class I subjects with sella turcica bridging.

Marcotty et al[1], in their investigations on Caucasian individuals, found 16.8% of skeletal Class III patients and 9.4% of skeletal Class I patients to have sella turcica bridging. Shah et al[14] reported no incidence of sella turcica bridging in Islamabad orthodontic patients.

In a recent study by Sathyanarayana et al[24] in South Indian population, 15% of subjects in skeletal Class III subjects and 5% of skeletal Class I subjects were reported to have sella turcica bridging. In the present study 15% of subjects with skeletal Class II malocclusion had sella turcica bridging (Table 5).

Also many authors had concluded that, the prevalence of sella turcica bridging is higher in subjects with dental anomalies, cleft lip and palate and various other anomalies.

Axelsson et al[16] in their study on subjects from Oslo University Craniofacial Growth Archive reported 23 % of males and 3% of females to have an oblique anterior wall morphology. Sathyanarayana et al[24] reported 7% of skeletal Class III subjects and 3% of skeletal Class I subjects (in South Indian population)

and Hadeel et al[30] reported 3.3% of skeletal Class III subjects and 4% of skeletal Class I subjects included (Iraqi adult population) to have oblique anterior wall morphology of sella turcica. In the present study 9% of skeletal Class II and 11% of skeletal Class I subjects presented with an oblique anterior wall. The proportion of oblique anterior wall morphology of sella turcica did not differ significantly between skeletal Class I and skeletal Class II malocclusion groups included in the study.

In the study on double contour of floor morphology of sella turcica, Alkofide[12](study on orthodontic patient population from Saudi Arabia) reported 9.4% of the study sample, Shah et al[14] reported 1.6% of skeletal Class III subjects and 5% of skeletal Class I subjects of study sample (Islamabad), Sathyanarayana et al[24] reported 7% of skeletal Class III subjects and 3% of skeletal

Class I subjects (South Indian population), Hadeel et al[30] reported 10% of skeletal Class III subjects and 14% of skeletal Class I subjects(Iraqi adults), Alkofide[12] reported 8.9% of orthodontic patient population (Saudi Arabia) and Axelsson et al[16] reported 3% of females included in the study (Oslo University Craniofacial Growth Archive) to have double contour of floor. In the present study, 8% of Class I and 4% of Class II presented with double contour of floor.

2.8% of orthodontic population (Saudi Arabia) in Alkofide[12]'s study, 5% of females in Axelsson et al[16]'s study, 10% of skeletal Class III subjects and 8.3% of skeletal Class I subjects included in Shah et al[14]'s study, 7% of skeletal Class III subjects and 2% of skeletal Class I subjects (South Indian population) in Sathyanarayana et al[24]'s study, 3.3% of skeletal Class III and 4%

of skeletal Class I subjects in Hadeel et al[30]'s study presented with a pyramidal shape morphology of dorsum sella. In the present study 11% of skeletal Class II and 4% of skeletal Class I subjects presented with a pyramidal shape of sella turcica.

In the present study 11% of skeletal Class II subjects showed notching of the posterior part of sella turcica. 17% of Skeletal Class III subjects and 12% of Skeletal Class I subjects in Sathyanarayana et al[24]'s study (South Indian population), 3.3% of skeletal Class III subjects and 6% of skeletal Class I subjects Hadeel et al[30]'s study, 10% of skeletal Class III subjects and 13.3% of skeletal Class I subjects of Shah et al's study (Islamabad), 11.1% of the orthodontic patient population (Saudi Arabia) in Alkofide[12]'s study and 11% of females (Oslo University

Craniofacial Growth Archive) in Axelsson et al[16]'s study had irregularities of posterior part of dorsum sella.

Conclusion

The present study showed 71% of Class I and 50% of Class II subjects to have normal sella turcica morphology. The variation in proportion of normal sella turcica was statistically significant among Class I as compared to Class II. Bridging of sella turcica and the notching of posterior wall were seen to be significantly more among Class II subjects than among Class I subjects.

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