

**MORPHOLOGY OF SELLA TURCICA IN SUBJECTS WITH HIGHLY PLACED CANINES**

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Abstract:**Objective:** to study the morphology of sella turcica in subjects with highly placed canines**Materials and Methods:** Cephalograms of 30 subjects in Class I malocclusion (Group1) and 30 subjects with highly placed canines (Group 2) were examined for *Sella turcica* morphology. A template was prepared as per description of Axelsson¹⁶ (2004).**Results:** 53.33% of subjects in Group 2 had normal *Sella turcica* morphology. The proportion of normal *Sella turcica* was statistically significant among Group1 as compared to the Group 2. 13.33% of the subjects with highly placed canines had bridging of *Sella turcica* and another 13.33% showed notching of posterior wall.**Conclusion:** Bridging of *Sella turcica* morphology and notching of posterior wall was more in Group 2 than in Group 1.**Key Words:** *Sella turcica*; Morphology Of Sellae; Highly Placed Canines; Buccally Placed Canines; Sella Bridging**INTRODUCTION**

Sella morphology in skeletal Class III¹, cleft², severe craniofacial deviations³, dental anomalies⁴, and in syndromes^{5,6,7,8,9,10,11} has been reported in previous studies. Morphology of *Sella turcica* in skeletal Class II malocclusion has also been studied¹². Morphology of *Sella turcica* in skeletal Class III malocclusion has been studied extensively^{13,14,15}. But the morphology of *Sella turcica* in subjects with highly placed canines has not been reported. So this study was undertaken.

MATERIALS AND METHODS

The study population in this cross sectional study included cephalometric records of 30 subjects with highly placed canines and 30 subjects in Class I malocclusion, who reported to the Dept. of Orthodontics, Government Dental College, Thiruvananthapuram for orthodontic treatment. The total sample size was 60. This study was conducted from November 2014 to February 2015. Cephalograms of subjects with no history of orthodontic or orthodontic-surgical treatment, no history of cleft lip repair, craniofacial deviations or other syndromes were included in this study. Cephalograms of subjects in Class I malocclusion satisfying the above mentioned inclusion criteria were designated as Group 1. Cephalograms of subjects with highly placed canines, with no space for eruption of canine into the arch, and satisfying the above inclusion criteria, were included for the study group with highly placed canines and were designated as Group 2. The exclusion criterion was the presence of proximal caries. A template was prepared as per description of Axelsson¹⁶ (2004), this included the normal and the 5 variations. The cephalograms available with patients reporting to the department of orthodontics were examined for *Sella*

turcica morphology. The study population included males and females.

RESULTS

Of the cephalograms evaluated, 43.3% of the cephalograms in Group 1 and 43.3% cephalograms in Group 2 were of males and 56.7% of Group 1 and 56.7% of Group 2 were of females [Table 1] (Fig. 1). The mean age of group 1 was 15.43 and that of group 2 was 17.2 (Table 2). 53.33% of the subjects in 'highly placed canines group' and 73.33% of the subjects in Group 1 had normal *Sella turcica* morphology. 10% of Group 2 and 6.7% of the Group 1 had an oblique anterior wall. 33% of the 'highly placed canines group' and 10% of the Group 1 had a double contour of floor. 6.66% of Group 2 and 6.66% of Group 1 had a pyramidal shape of dorsum sellae. 13.33% in highly placed canines group presented with *Sella turcica* bridging whereas only 3.33% of Group 1 showed *Sella turcica* bridging. 13.33% of the highly placed canines group presented with notching of posterior wall whereas none of Group 1 had notching of posterior wall, this was statistically not significant. Table 3, Fig. 1 and Fig. 2.

Table 1: Patient Characteristics Age and Gender

Variables	Group 1 (n=30) # (%)	Group 2 (n=30) # (%)
Age		
Mean (SD)	21.2 (3.5)	15.8 (3.4)
Minimum – Maximum	17 – 30	12 – 29
Gender		
Male	13 (43.3)	13 (43.3)
Female	17 (56.7)	17 (56.7)

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Table 2: Patient Characteristics –Mean Age

Variables	Group 1 (n=30)	Group 2 (n=30)
	#	#
Gender		
Male	13	13
Mean age (SD)	21.2 (3.5)	16.6 (4.4)
Min - Max	17 – 30	12 - 29
Female		
Mean age (SD)	21.2 (3.5)	15.1 (2.3)
Min - Max	17 – 27	12 - 21

Table 3: Patient Characteristics – Sella Morphology

Variables	Group 1 (n=30)	Group 2 (n=30)	P_value*
	#(%)	#(%)	
Sella Morphology			
Normal <i>Sella turcica</i>	22 (73.3)	16 (53.3)	0.159
Oblique anterior wall	2 (6.7)	3 (10.0)	
Double contour of floor	3 (10.0)	1 (3.3)	
<i>Sella turcica</i> bridge	1 (3.3)	4 (13.3)	
Notching of posterior wall	0	4 (13.3)	
Pyramidal shape	2 (6.7)	2 (6.7)	

* Fisher’s exact test

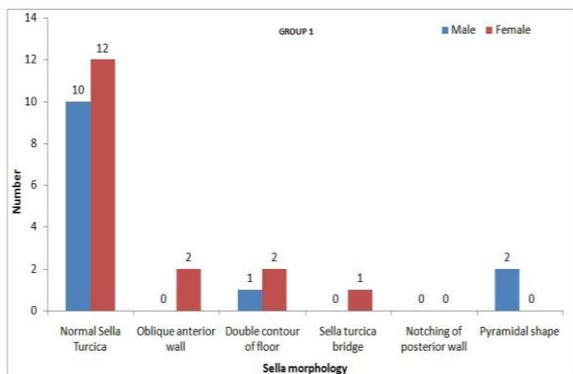


Figure 1: Sella morphology in Group 1

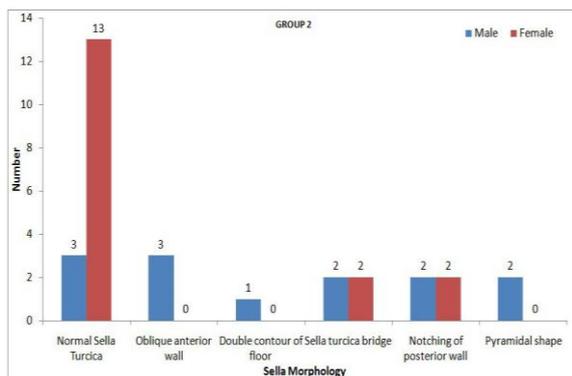


Figure 2: Sella morphology in Group 2

In gender wise classification, there was not a statistically significant difference in the normal *Sella turcica* morphology between males and females in group 1. In group 2, significant difference was observed between males and females in the normal *Sella turcica* morphology ($p < .01$) (Table 4).

Table 4: Distribution according to gender

Cell Morphology	Group 1			Group 2		
	Male	Female	P_value*	Male	Female	P_value
Normal <i>Sella turcica</i>	10	12	0.791	3	13	0.009
Oblique anterior wall	0	2	0.471	3	0	0.237
Double contour of floor	1	2	1.0	1	0	1.0
<i>Sella turcica</i> bridge	0	1	1.0	2	2	0.603
Notching of posterior wall	0	0	–	2	2	0.603
Pyramidal shape	2	0	0.471	2	0	0.471

* Fisher’s exact test

DISCUSSION

This cross sectional study describes the morphology of *Sella turcica* with subjects in highly placed canines and in Class I malocclusion subjects. The study sample included pre-treatment records of 60 orthodontic patients in the age group 12-30 years. Frontal, and right and left lateral views of intraoral photographs showing the highly placed canines in a subject are shown in Figures 3, 4 and 5.



Figure 3: Highly placed canine: frontal view



Figure 4: Highly placed canine - left lateral view



Figure 5: Highly placed canine - right lateral view

Appraisal of *Sella turcica* morphology is a valuable tool in assessing the pathology of the pituitary gland¹⁷. Classifications of *Sella turcica* morphology are available in literature.

Gorden¹⁹ classified the *Sella turcica* morphology into the circular, the oval or the flat/saucer shaped, their study sample included children of 1 year to 12 years and most of them had either circular or an oval shaped *Sella turcica*. The term J shaped sella was introduced by Davidoff and Epstein²⁰. Fournier and Denizet²¹ put forward the term omega sella. Teal²² classified the sella anatomy into round, oval and flat. The normal variants of *Sella turcica* of adults were studied by Bruneton et al.,²³. Axelsson et al.,¹⁶ classified the *Sella turcica* shapes into 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 Norwegian sample of 6-12 years from Oslo University Craniofacial Growth Archive and reported 71% of males and 65 % of females to have normal *Sella turcica* morphology.

Variations from the normal morphology of the *Sella turcica* were reported in cases with severe craniofacial deviations³, genetic disorders², syndromes⁵⁻¹¹ and also in dental anomalies^{4,18}. 75% of subjects in Silverman³¹'s study had presented with a normal morphology for *Sella turcica*, the remaining 25% showed an abnormal morphology. 67% of the subjects in Alkofide³²'s study (Saudi); 80% of adults in skeletal Class III malocclusion and 70% of adults in skeletal Class I malocclusion in Hadeel et al.,²⁰'s study (Iraqi adults); 65% of skeletal Class I patients and 72% of skeletal Class III patients in the Shah et al.,²¹'s study (from Islamabad); 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) and 50% of skeletal Class II subjects and 71% of skeletal Class I subjects in the study¹² on Class II subjects (in Kerala, South Indian population) 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 in the study report¹² on Class II subjects. In the present study, 53.33% of the subjects in 'highly placed canines' group and 73.3% of the Group 1 also showed a normal morphology of *Sella turcica*; there was a statistically significant difference in the normal *Sella turcica* morphology between males and females in the 'highly placed canines' group ($p = .009$) (table 2), but no statistically significant difference was observed between males and females in Group 1. The proportion of normal *Sella turcica* did not differ significantly between these two groups; $p = 0.159$. The value in the present study, of 73.3% of the Group 1 showing a normal morphology of *Sella turcica* is close to the report of Silverman³¹ where 75% of subjects had presented with a normal morphology for *Sella turcica*.

More than double the incidence of *Sella turcica* bridging that was reported in previous studies was observed by Beक्टर et al.,³ (18.6% of subjects) and Jones et al.,²⁵ (16.7%); Subjects with severe craniofacial deviations requiring combined surgical orthodontic treatment were included in their study.

Prevalence of *Sella Turcica* Bridge with a frequency of 1.75 to 6% in the 'normal' population was reported by Busch²⁶, Muller²⁷ and Platzer²⁸. In another study report¹² on Class II subjects, 4% of skeletal Class I subjects had *Sella turcica* bridging. Abdel Kader et al.,²⁹ (2007) reported a higher incidence of *Sella turcica* bridging in Saudi Arabian subjects with skeletal Class III malocclusion than in skeletal Class II and skeletal Class I malocclusions. Study reports¹² on Class II subjects (2015) showed 15% of the Class II subjects with *Sella turcica* bridging. 16.8% of skeletal Class III patients and 9.4% of skeletal Class I patients included in the investigations by Marcotty et al.,¹ on Caucasian individuals, were found to have *Sella turcica* bridging. No incidence of *Sella turcica* bridging was reported in Islamabad orthodontic patients by Shah et al.,¹⁴. Sathyanarayana et al.,²⁴ reported on *Sella turcica* bridging in skeletal Class III and skeletal Class I subjects in South Indian population, 15% of subjects in skeletal Class III subjects and 5% of skeletal Class I subjects in his study had *Sella turcica* bridging. Also many authors had reported the prevalence of *Sella turcica* bridging as higher in subjects with dental anomalies, cleft lip and palate and various other anomalies. In the present study 3.3% of group 1 and 13.3% of group 2 presented with *Sella turcica* bridging. The proportion of bridging of *Sella turcica* did not differ significantly between these groups; $p = 0.159$. The value in the present study, of 3.3% of the Group 1 showing bridging of *Sella turcica* is in agreement to the report of the frequency of 1.75 to 6% in the 'normal' population reported by Busch²⁶, Muller²⁷ and Platzer²⁸; and is also close to the reported

value of 5% for skeletal Class I subjects in Sathyanarayana et al.,²⁴ study.

Axelsson et al.,¹⁶ in their study reported 23 % of males and 3% of females to have an oblique anterior wall morphology in subjects from Oslo University Craniofacial Growth Archive. Sathyanarayana et al.,²⁴ reported 7% of skeletal Class III subjects and 3% skeletal Class I subjects of their sample (South Indian population), whereas Hadeel et al.,³⁰ reported 3.3% of skeletal Class III and 4% of skeletal Class I subjects of their study population (Iraqi adults) to have oblique anterior wall morphology of *Sella turcica*. In a study¹² on Class II subjects, 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 did not differ significantly between these skeletal Class I and skeletal Class II malocclusion groups. In the present study 6.7% of group 1 and 10% of group 2 subjects presented with an oblique anterior wall. The proportion of oblique anterior wall morphology of *Sella turcica* did not differ significantly between these groups.

Alkofide³² reported 8.9% of their study population (Saudi Arabia) and Axelsson et al.,¹⁶ reported 3% of females in their study (Oslo University Craniofacial Growth Archive) Shah et al.,¹⁴ reported 1.6% of skeletal Class III and 5% of skeletal Class I subjects of their study sample (Islamabad), Sathyanarayana et al.,²⁴ reported 7% of skeletal Class III and 3% of skeletal Class I subjects (South Indian population), and Hadeel et al.,³⁰ reported 10% of skeletal Class III and 14% of skeletal Class I subjects (Iraqi adults), to have double contour of floor. In a study report¹² on sella morphology in Class II subjects, 8% of the Class I and 4% of the Class II presented with double contour of floor. In the present study 10% of group 1 and 3.3% of group 2 presented with double contour of floor; the proportion of double contour of floor morphology of *Sella turcica* did not differ significantly between these groups.

A pyramidal shape morphology of dorsum sella was seen in 2.8% of the Saudi Arabians in Alkofide³²'s study, 5% of the females in Axelsson et al.,¹⁶'s study, 10% of skeletal Class III and 8.3% of skeletal Class I subjects in Shah et al.,¹⁴'s study, 7% of the skeletal Class III and 2% of skeletal Class I South Indian subjects 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. In another study¹² in an orthodontic patient population in an academic setup, 11% of skeletal Class II and 4% of skeletal Class I subjects had a pyramidal shape for the *Sella turcica*. In the present study 6.7% of group 1 and 6.7% of group 2 presented with pyramidal shape morphology of

dorsum sella; the proportion of pyramidal shape morphology of dorsum sella did not differ significantly between these groups.

17% of Skeletal Class III subjects and 12% of Skeletal Class I subjects of South Indian population in Sathyanarayana et al.,²⁴'s study, 3.3% of the skeletal Class III and 6% of skeletal Class I subjects Hadeel et al.,³⁰'s study, 10% of the skeletal Class III and 13.3% of skeletal Class I subjects of the Islamabad population in Shah et al., study, 11.1% of the Saudi Arabian orthodontic patient population in Alkofide³²'s study and 11% of females from the Oslo University Craniofacial Growth Archive in Axelsson et al.,¹⁶'s study and had irregularities of posterior part of dorsum sella. In a report¹² on the sella morphology of Class II subjects, 11% of skeletal Class II subjects showed notching of posterior part of *Sella turcica*. In the present study 0% of group 1 and 13.3% of group 2 showed notching of posterior part of *Sella turcica*; the proportion of notching of posterior part of *Sella turcica* did not differ significantly between these groups.

CONCLUSION

73.3% of Class I and 53.3% of the highly placed canines group of the present study had normal *Sella turcica* morphology. Fisher's exact test showed that the proportion of normal *Sella turcica* showed no statistically significant difference among Class I when compared to the highly placed canines group. 13.33% in the highly placed canines group and 3.3% of the Class I showed bridging of *Sella turcica* morphology. 13.3% of the group 2 and 0% of the group 1 showed notching of posterior wall.

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