ORTHODONTICS

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DIFFERENT SELLA SHAPES IN ORTHODONTIC PATIENTS WITH OR WITHOUT HYPODONTIA

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ABSTRACT

The current study assessed the frequency of different sella shapes that are encountered in orthodontic patients and found the association between sella shapes and patient parameters. A cross-sectional study was done in Altamash Institute of Dental Medicine, Karachi. All patients with skeletal class I, II or III with or without hypodontia were included in the study. Sella shapes were traced on lateral cephalograms. Frequency and percentage for the different sella shapes were calculated. The data was stratified as per sociodemographic characteristics, hypodontia, and skeletal class. 240 individuals with a mean age ± SD of 17.33 ± 4.1 years were enrolled in the study. Sella turcica bridging was present in 42 (17.5%). The occurrence of irregularity of the posterior part of sella was significantly correlated with the younger age group (p=0.035). Oblique anterior wall was found in 9 (52.9%) skeletal class I, 7 (41.1%) in class II, while 1 (5.8%) in class III. However, the difference was statistically insignificant (p=0.456). Out of the 15 patients with hypodontia 9 had normal sella, one had double contour of the floor, three had sella turcica bridge, and two had pyramidal shape of dorsum sellae. Our research demonstrated the significance of various shapes of sella turcica and its impact on the developmental process of teeth, albeit it failed to find an association with hypodontia. Thus, future studies should be carried out with a large sample of patients having hypodontia.

Keywords: *Sella turcica, morphology of sellae, hypodontia.*

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INTRODUCTION

Sella turcica is considered to be of paramount anatomical significance in orthodontics because of its cephalometric position. It is invaluable in aiding the diagnosis of pituitary gland pathology.[1] However, evidence suggests that the sella turcica is associated with many dental issues.[2]

Morphology of sella turcica may differ among persons belonging to different castes and ethnicities. The shape of the sella emerges very early in the development stages of life. Studies have shown the embryologic connection between sella, teeth and vertebrae neural crest origin.[3-4] The shape of sella turcica is normal in 46.5% of the population while morphological differences were seen in 53.5% of the study population.[2] The size of sella was found to be significantly linked with increase in age. In a Tunasian study, it was found that in 59.6% patients had sella anomalies, with most common anomaly being oblique anterior wall and incomplete bridge.[3]

Recent evidence suggests that sella turcica bridge may be associated with increased risks of palatal canine impaction (OR = 2.8 times) however, the study was based on a very limited sample size therefore, limiting the interference of the findings.[5] In a Polish study, it was found that the incidence of dental deformities and problems was 17% in those with sella turcica mal structure as compared to the three percent in patients with normal sella. Age and sella abnormality were also significantly associated (p=0.002).[6]

In local literature, the frequency of sella turcica shapes and its association with hypodontia have not been reported before, whereas its embryological connection suggests otherwise. Despite no elaborate

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research on the sella turcica bridge, an association between the dental anomalies and sella turcica have been reported.[7-10] There is a considerable gap in this area of research as far as the Pakistani population is concerned. Therefore, the current research was planned to contribute to the literature and enhance our understanding of current magnitude and frequency of different sella shapes in our set up. Furthermore, the authors believe that the present study would aid in establishing the diagnosis of identification of certain conditions such as impactions, hypodontia which are positively associated with the variance in shape of sella turcica.

METHODOLOGY

A cross-sectional study design was used and the study was performed at the Altamash Institute of Dental Medicine, Karachi. After approval from the ethics committee, a total of 240 patients were included through consecutive sampling (177 females, 63 males). subjects' age ranged from 11 years to 25 years. All three skeletal classes i.e. I, II, III,with or without hypodontia were included in this study. All the patients had no history of trauma, caries, periodontal disease and tooth loss due to extraction. Patients with any syndromic presentation or presenting with cleft lip or palate were excluded. Any systemic disease involving renal, cardiac abnormalities, metabolic disorders or neurological disorder was ruled out.

Informed consent was taken for all the patients who met the inclusion criteria. All patients were advised to have radiographs. All radiological assessments were reported by blinded radiologists with over five year of experience. Both lateral cephalogram and Panoramic radiographs were obtained and assessed. The findings of the sella turcica were documented in a pre-designed pro forma. The morphological features of the sella were observed.

Data analysis was performed using statistical software for social sciences (version 26). For qualitative variables like gender, shape of sella, skeletal class I, II, III, hypodontia; frequency and percentage was calculated. For continuous variables including the age of the patients, mean and standard deviation (SD) were calculated. Association between sella shape and variables including age, gender, skeletal class I, II, III, hypodontia was assessed via chi-squared test. A $p < 0.05$ was considered to be the limit for statistical significance.

RESULTS

A total of 240 patients were included with a mean age of 17.33 ± 4.095 years. Females were predominant. Skeletal class II had a frequency of 126 (52.5%) while skeletal class I had a lower frequency of 93 (38.8%). The shape of sella was found to be normal in the majority of the patients 112 (46%). Sella turcica bridging was present in 42 (17.5%) while pyramidal shape of dorsum sellae was present in 32 (13.3%) (Table 1).

The occurrence of irregularity of the posterior part of sella was significantly linked with the younger age group (p=0.035) (Table 2). Other shapes of sella turcica were not significantly correlated with age groups. No association was found between the shape of sella turcica and gender (Table 3).

In skeletal class I, pyramidal shape of dorsum sellae was the second most common followed by sella turcica bridge, and double contour. Similarly, Oblique anterior wall was found in 9 (52.9%) skeletal class I, 7 (41.1%) in class II, while 1 (5.8%) in class III. However, the difference was statistically insignificant (p=0.456) (Table 4).

In this study, 15 patients (6.3%) having hypodontia were also included, out of these 10 were females and 5 were males. 9 (8.04%) of patients with hypodontia had normal sella, one patient had double contour of the floor, 3 (7.14%) had Sella turcica bridge, and the two (6.25%) had pyramidal shape of dorsum sellae (Table 5).

TABLE 1: FREQUENCY DISTRIBUTION OF GENDER, SKELETAL CLASS, HYPODONTIA AND SHAPES OF SELLA

Characteristics	Frequency
Gender	
Female	177 (73.8%)
Male	63 (26.3%)
Skeletal Class	
I	93 (38.8%)
II	126 (52.5%)
III	21 (8.8%)
Hypodontia	
No	225 (93.8%)
Yes	15 (6.3%)
Shapes of Sella	
Normal	112 (46.7%)
Oblique anterior wall	17 (7.1%)
Double contour of the floor	29 (12.1%)
Irregularity in the posterior part of sella	8 (3.3%)
Sella turcica bridge	42 (17.5%)
Pyramidal shape of dorsum sellae	32 (13.3%)

TABLE 2: ASSOCIATION OF SHAPES OF SELLA WITH AGE GROUPS

Shape of Sella	Age Group		Total	P-value
	11-18 yrs	19-25 yrs		
Normal sella turcica	74 (66.1%)	38 (33.9%)	112	0.745
Oblique anterior wall	10 (58.8%)	7 (41.2%)	17	0.58
Double contour of the floor	19 (65.5%)	10 (34.4%)	29	0.95
Irregularity of the posterior part of sella	8 (100%)	0	8	0.035
Sella turcica bridge	23 (54.7%)	19 (45.2%)	42	0.126
Pyramidal shape of dorsum sellae	22 (68.7%)	10 (31.3%)	32	0.633
Total	156	84	240	

TABLE 3: ASSOCIATION OF SHAPES OF SELLA WITH GENDER

Shape of Sella	Gender		P-value
	Female	Male	
Normal	88 (78.5%)	24 (21.4%)	0.112
Oblique anterior wall	13 (76.4%)	4 (23.6%)	0.791
Double contour of the floor	18 (62.1%)	11 (37.9%)	0.127
Irregularity in the posterior wall	4 (50%)	4 (50%)	0.12
Sella turcica bridge	31 (73.8%)	11 (26.2%)	0.992
Pyramidal shape of dorsum sellae	23 (71.8%)	9 (28.2%)	0.796

TABLE 4: ASSOCIATION OF SHAPES OF SELLA WITH SKELETAL CLASS

Shape of Sella	Skeletal Class			P-value
	I	II	III	
Normal	47 (41.9%)	55 (49.1%)	10 (8.9%)	0.598
Oblique anterior wall	9 (52.9%)	7 (41.1%)	1 (5.8%)	0.456
Double contour of the floor	11 (37.9%)	17 (58.6%)	1 (3.45%)	0.522
Irregularity in the posterior part of sella	2 (25%)	5 (62%)	1 (12.5%)	0.707
Sella turcica bridge	11(26.1%)	26 (61.9%)	5 (11.9%)	0.173
Pyramidal shape of dorsum sellae	13 (40.6%)	16 (50%)	3 (9.3%)	0.954

TABLE 5: ASSOCIATION OF SHAPES OF SELLA WITH HYPODONTIA

Shapes of Sella	Hypodontia		P-value
	No	Yes	
Normal	103 (91.96%)	9 (8.04%)	0.285
Oblique anterior wall	17 (100%)	0	0.269
Double contour of the floor	28 (96.55%)	1 (3.45%)	0.506
Irregularity in the posterior part of sella	8 (100%)	0	0.458
Sella turcica bridge	39 (92.86%)	3 (7.14%)	0.792
Pyramidal shape of dorsum sellae	30 (93.75%)	2 (6.25%)	1

DISCUSSION

We conducted the study to determine the frequency of different sella shapes in our set up and to find the association between the shape of sella turcica and the patient characteristics. We found that the shape of sella was defined as "normal" in the majority of the patients while the most common abnormality was the sella turcica bridging followed by pyramidal shape of dorsum sella. Shah et al[11] also revealed similar findings reporting that the sella shape was normal in more than half of the study population. However, in contrast to our study, the authors revealed that the most common abnormality was the irregular shape of dorsum sellae which was found in 16.7% patients with a succeeding abnormal pyramidal shape in 7.7%, and oblique anterior wall of sella in four percent patients. Interestingly, sella turcica bridge was not found in any of the subjects unlike the current study. [11]

In a separate study carried out in Aga Khan University Hospital, Karachi, the association between palatally impacted canine and sella turcica bridging was addressed and a positive correlation was found.[12] Our study indicates that the younger patients had a substantial relationship with the abnormal posterior part of sella turcica. Nevertheless, there was no linkage between the shape of sella turcica and gender. Our findings are in line with the study conducted by Sobuti and colleagues who revealed that the normal shape of sella turcica was found in 64.76% of patients, while almost 35.33% of them had bridging. Furthermore, he reported a significant relationship between the diameter of the sella turcica and the age of the patient ($p<0.0001$). [13]

Alqahtani H., evaluated the correlation between bridging of sella and absence of maxillary lateral incisors. The author revealed that there was a significantly reduced length of sella turcica in patients with developmental absence of maxillary lateral incisors ($p = 0.04$).[14] Furthermore, the author also found a significant relationship between bridging of sella turcica and the age of the patient.

In the present study, we only had fifteen patients with hypodontia. The majority of these had no abnormality of sella turcica while one had double contour of the floor, three had bridging of sella turcica, and the other two had pyramidal shape of dorsum sella. Amelinda et al explored the correlation of sella turcica bridging with palatally impacted canine and hypodontia. The authors reported that the sella turcica bridge was significantly more frequent in patients with hypodontia ($p=0.002$). Furthemore, the study also reported a significant relationship between sella turcica bridge and palatally impacted canine ($p = 0.002$).[15]

An interesting research was carried out by Leonardi et al regarding connection of sella turcica bridging with impacted canines. Leonardi et al studied the presence of sella turcica bridging in subjects with different craniofacial deviations. He concluded that there was a positive correlation between the two.[16] The basis of the relationship between sella morphology and dental anomalies was explained through the embryologic connection between shape of sella turcica, vertebrae and disruption in tooth eruption.[17,18] Karaman et al., revealed a significant relationship of orthodontic defects such as impacted canines or taurodontism with the calcification of interclinoid ligament thus concluding that sella turcica shape significantly impacts the development of teeth.[17]

The present study highlighted the importance of the misshapen sella turcica and its association with the various dental problems including impaction and hypodontia. The authors believe the findings of the current study acts as a catalyst and foundation for further research into the matter.

CONCLUSIONS

In conclusion, our research demonstrated the significance of various morphological types of sella turcica and its impact on the developmental process of teeth, especially impaction and hypodontia. It is suggested that a study should be carried out with a large sample of patients having hypodontia to find any association between sella shapes and the hypodontia.

LIMITATION OF STUDY

There were certain limitations of our study. For instance, we did not have a control group therefore, cases were not compared to healthy individuals. Secondly, due to a small sample size, the interference from the current findings and its generalizability are limited. Therefore, further large-scale and a multicenter research is warranted.

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