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ORIGINAL ARTICLE

A STUDY ON ASSOCIATION BETWEEN SELLA TURCICA BRIDGING AND PALATALLY IMPACTED MAXILLARY CANINE AMONGST NORTH KERALA COHORT

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ABSTRACT

Maxillary canine impaction is a dental anomaly found in 1% to 2% of clinical situations. Palatally displaced maxillary canine causes numerous clinical problems such as midline shift, root resorption and malocclusion. The Anterior contour of Sella is useful in predicting patient growth and in assessing craniofacial morphology. Studies have linked the Sella Turcica bridging to multiple hereditary development syndromes affecting the craniofacial region and various systemic disorders. It has been discovered that many dental anomalies such as tooth transposition, hypodontia, canine impactions and missing second premolars have association with Sella Turcica bridging. The aim of this study was to determine if an association exists between Sella Turcica bridging and palatally impacted maxillary canines in North Kerala population. The study was conducted on a sample of 30 patients, aged 14-30 years with maxillary palatal canine impactions. The control group had 70 subjects with normally erupted canines, aged 14-30 years.

The Sella parameters like Length, Diameter, and length to 3/4th of diameter was assessed in normal patients without canine impaction and patients with palatally impacted maxillary canine. It was found that there was a significant difference of Sella parameters between subjects and controls. The mean dimensions of Sella were relatively short in patients with palatally impacted maxillary canine than the control group patients. Then the same parameters were evaluated between males and females. It was found that there was no significant difference in Length, Diameter, and length to 3/4th of diameter of Sella between males and females of both subjects and the control group. Thus, Sella bridging highlights the risk of future palatal canine impactions, especially in children with a history of canine impaction in their parents or siblings and who are undergoing phase 1 orthodontic treatment.

KEYWORDS: Sella turcica, palatally impacted canine, length, diameter, orthodontics

INTRODUCTION

Maxillary canine impaction is one of the common anomalies of dental region which accounts for about 1% to 2% of all clinical situations affecting the craniofacial region. Canine impaction can be palatal or buccal, vertical or horizontal, unilateral or bilateral etc., Among those, palatally impacted maxillary canine is the one which can cause a variety of dental problems like root resorption, crowding, midline shift etc., Their treatment is more complex and expensive in older patients. Early diagnosis and timely intervention of these impacted canines can reduce the time, cost and complexity of treatment in the permanent dentition[1].

There are Conventional two -dimensional and three-dimensional imaging techniques is routinely used in diagnosing the position and the expected path of eruption of the canines. These radiographs are also a diagnostic tool in detecting skeletal variations related to the skull and cervical spine, including abnormal Sella Turcica morphology. The Anterior contour of Sella Turcica is useful in predicting patient growth and in assessing the craniofacial morphology. One common morphologic variation of Sella Turcica is the Sella turcica bridging[2].

Exaggerated ossification of the dura mater between the anterior and posterior clinoidal processes of the sphenoid bone or abnormal embryologic development of the sphenoid bone results in irregular bridge formation. Studies have linked this Sella Turcica bridging to multiple hereditary development syndromes affecting the craniofacial region and various systemic disorders. It has been discovered that many local dental anomalies such as tooth transposition, hypodontia, canine impactions and missing second premolars have association with Sella Turcica bridging. The reason might be that Sella Turcica, Dental Epithelial Progenitor cells and developing fields of Maxilla and Palate share a common embryologic origin (Neural Crest cells)[3].

AIM AND OBJECTIVE

The aim of this study is to determine if an association exists between Sella Turcica bridging and palatally impacted maxillary canines in North Kerala population. To measure the dimensions of Sella Turcica in North Kerala population with palatally impacted maxillary canines and normally erupted canines. To determine whether an association exists between Sella Turcica bridging and palatally impacted maxillary canines in North Kerala population.

MATERIALS AND METHODS

Pre-treatment lateral cephalograms of 30 patients with palatally impacted maxillary canines visiting the department of Orthodontics at the Mahe institute of dental sciences were collected. The study was conducted on a sample of 30 patients, aged 14-30 years with maxillary palatal canine impactions. The control group had 70 subjects with normally erupted canines, aged 14-30 years. Cephalograms were traced manually on acetate sheets with a 0.5mm lead pencil in a dark room using x ray viewer. The important hard and soft tissue structures were marked on the cephalogram for evaluation. Sella Turcica was drawn as a `**U**' shaped structure from the tip of the Dorsum Sellae to that of the Tuberculum Sellae as seen in radiograph. The linear dimensions like the interclinoidal distance, depth and anteroposterior diameter of Sella Turcica will be measured as depicted in the picture. (Fig 1) To evaluate and quantify the level of bridging, the standard scoring scale developed by Leonardi et al was used.

On the basis of Sella dimensions, the bridging classified into 3 groups.

-**Type I (No calcification),** where the length is either equal to or greater than three fourths of the diameter.
-**Type II (Partial calcification),** where the length is equal to or less than three fourths of the diameter.
-**Type III (Complete calcification),** where only the diaphragm Sellae is visible on the radiograph.

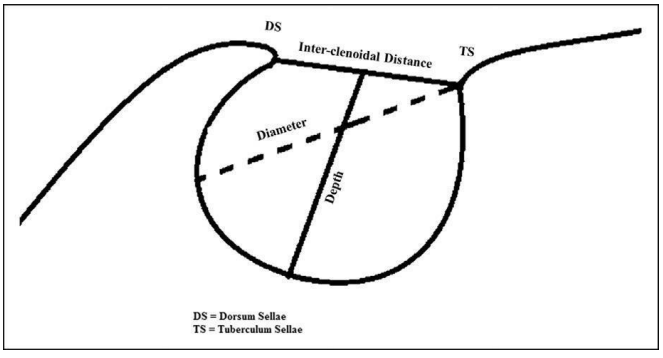


FIG 1 - the inter-clinoidal distance, depth and anteroposterior diameter of Sella Turcica

RESULTS

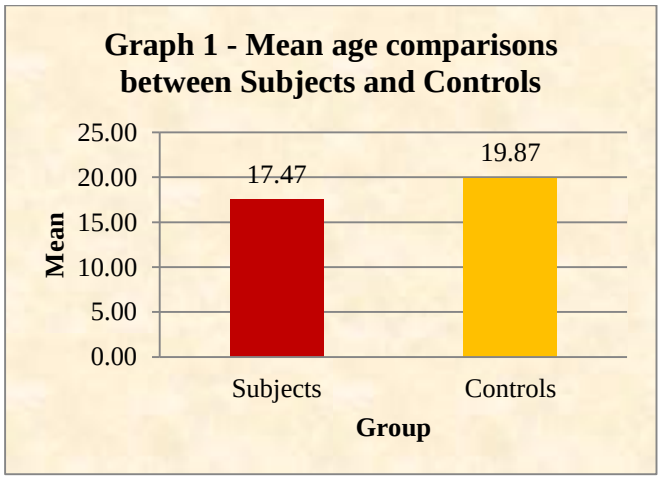
The data was collected, tabulated and statistical analysis was performed.
Statistical package for social sciences for windows, version 22.0, Armonk, NY: IBM corp was performed. The descriptive statistics were expressed in mean, standard deviation, minimum and maximum coefficient of variability.

AGE DISTRIBUTION

The age distribution was calculated between 30 subjects and 70 controls and the mean age for subjects and controls were 17.47(subjects) and 19.87(controls) with a standard deviation of 3.33(subjects) and 3.37(controls) respectively. (Table 1, graph 1)

Study group	Sample size (N)	Mean	SD
Subjects	30	17.47	3.33
Controls	70	19.87	3.37

Table 1 – age distribution



RESULTS - MEAN COMPARISON OF L,D,D' B/W SUBJECT AND CONTROL

The independent sample t test was done to evaluate the mean comparison of (L)length, (D)diameter, and length to 3/4th of diameter(D') in millimetres between subjects and controls. the mean difference between subjects and controls were found to be 2.64(length) table 2, 1.46(diameter) table 3 and 2.42(length to 3/4th of diameter) table 4

Study group	Sample size (N)	Mean	SD	Mean difference	t value	P value
Subjects	30	2.37	2.25	2.64	5.625	0.000 S
Controls	70	5.01	2.12			

TABLE 2 - the mean comparison of (L)length between subjects and controls

Study group	Sample size (N)	Mean	SD	Mean difference	t value	P value
Subjects	30	6.90	2.38	1.46	3.424	0.001 S
Controls	70	8.36	1.74			

TABLE 3 - the mean comparison of (D)diameter between subjects and controls

Study group	Sample size (N)	Mean	SD	Mean difference	t value	P value
Subjects	30	3.85	3.18	2.42	5.415	0.000 S
Controls	70	6.27	1.30			

TABLE 4 - the mean comparison of and length to 3/4th of diameter(D') between subjects and controls

The P values were 0.000 for length, 0.001 for diameter and 0.000 for length to 3/4th of diameter which was statistically significant since all the P values were less than 0.005.

RESULTS - MEAN COMPARISON OF L,D,D' B/W MALE AND FEMALE IN CONTROL GROUP

The independent sample t test was done to evaluate the mean comparison of length, diameter, and length to 3/4th of diameter between males and females in control group. The mean difference were found to be 0.86(length) table 5, 0.66(diameter) table 6 and 0.49(length to 3/4th of diameter) table 7. The P values were 0.097, 0.123, and 0.123 respectively which were statistically not significant since the P values were greater than 0.005.

Gender	Sample size (N)	Mean	SD	Mean difference	t value	P value
Male	28	4.50	1.91	0.86	1.682	0.097 NS
Female	42	5.36	2.20			

TABLE 5 - the mean comparison of (L)length between male and female in control group

Gender	Sample size (N)	Mean	SD	Mean difference	t value	P value
Male	28	7.96	1.75	0.66	1.561	0.123 NS
Female	42	8.62	1.70			

TABLE 6 - the mean comparison of (D)diameter between male and female in control group

Gender	Sample size (N)	Mean	SD	Mean difference	t value	P value
Male	28	5.97	1.31	0.49	1.561	0.123 NS
Female	42	6.46	1.27			

TABLE 7 - the mean comparison of length to 3/4th of diameter(D') between male and female in control group

RESULTS - MEAN COMPARISON OF L,D,D' B/W MALE AND FEMALE IN SUBJECT GROUP

The independent sample t test was done to evaluate the mean comparison of length, diameter, and length to 3/4th of diameter between males and females in subject group. The mean difference were found to be 0.77(length) table 8, 0.11(diameter) table 9 and 1.08(length to 3/4th of diameter) table 10. The P values were 0.363, 0.903, and 0.370 respectively which were statistically not significant since the P values were greater than 0.005

Gender	Sample size (N)	Mean	SD	Mean difference	t value	P value
Male	12	2.83	2.17	0.77	0.925	0.363 NS
Female	18	2.06	2.31			

TABLE 8 - the mean comparison of (L)length between male and female in subject group

Gender	Sample size (N)	Mean	SD	Mean difference	t value	P value
Male	12	6.83	2.59	0.11	0.123	0.903 NS
Female	18	6.94	2.31			

TABLE 9 - the mean comparison of (D)diameter between male and female in subject group

Gender	Sample size (N)	Mean	SD	Mean difference	t value	P value
Male	12	4.50	2.86	1.08	0.911	0.370 NS
Female	18	3.42	3.39			

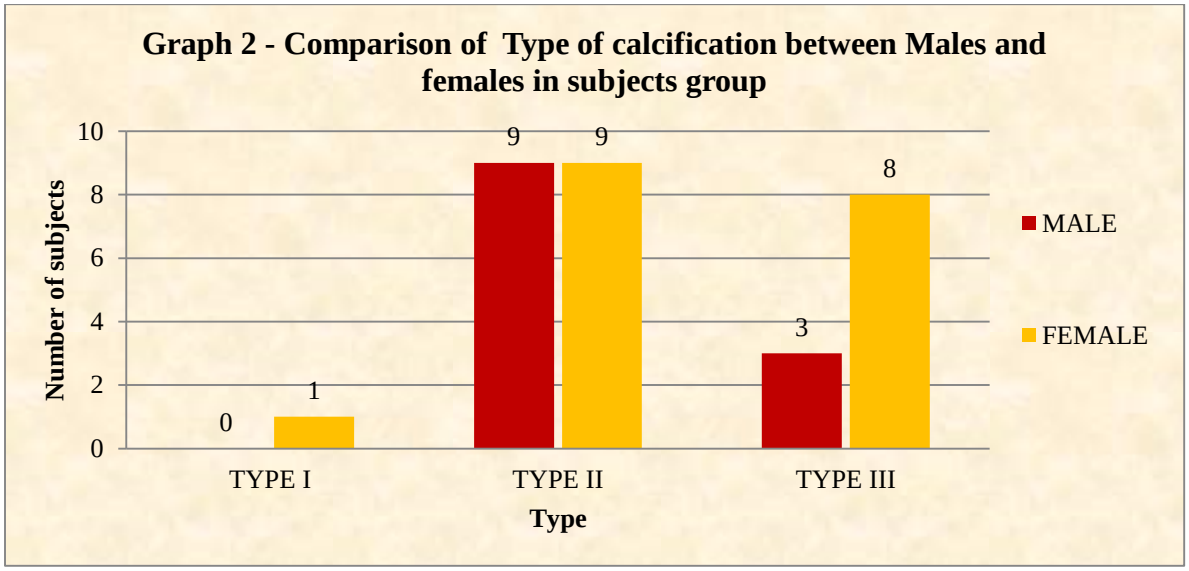
TABLE 10 - the mean comparison of length to 3/4th of diameter(D') between male and female in subject group

RESULTS - COMPARISON OF TYPE OF CALCIFICATION BETWEEN MALES AND FEMALES IN SUBJECT GROUP

The chi-square test was done to evaluate the type of calcification between males and females in subject group. It was found that the chi-square value for subject group between males and females were 2.159 and the P value was 0.340 which was not statistically significant since the P value was greater than 0.05.(table 11) (graph 2)

Type of Calcification	MALE [N=12]	FEMALE [N=18]	Chi-square value	P value
	n(%)	n(%)		
TYPE I	0 (0.0)	1 (5.6)	2.159	0.340 NS
TYPE II	9 (75.0)	9 (50.0)		
TYPE III	3 (25.0)	8 (44.4)		

Table 11 - comparison of type of calcification between males and females in subject group

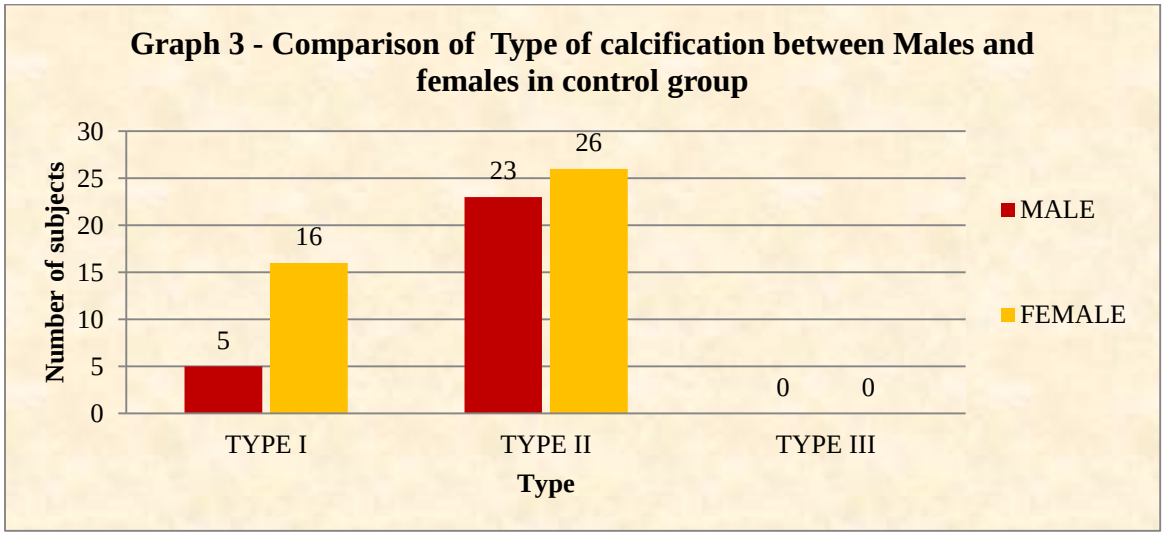


RESULTS - COMPARISON OF TYPE OF CALCIFICATION BETWEEN MALES AND FEMALES IN CONTROL GROUP

The same was done to evaluate the type of calcification between males and females in control group. It was found that the chi-square value for subject group between males and females were 3.277 and the P value was 0.070 which was not statistically significant since the P value was greater than 0.05.(table 12) (graph 3).

Type of Calcification	MALE [N=28]	FEMALE [N=42]	Chi-square value	P value
	n(%)	n(%)		
TYPE I	5 (17.9)	16 (38.1)	3.277	0.070 NS
TYPE II	23 (82.1)	26 (61.9)		
TYPE III	0 (0.0)	0 (0.0)		

Table 12 - comparison of type of calcification between males and females in control group.

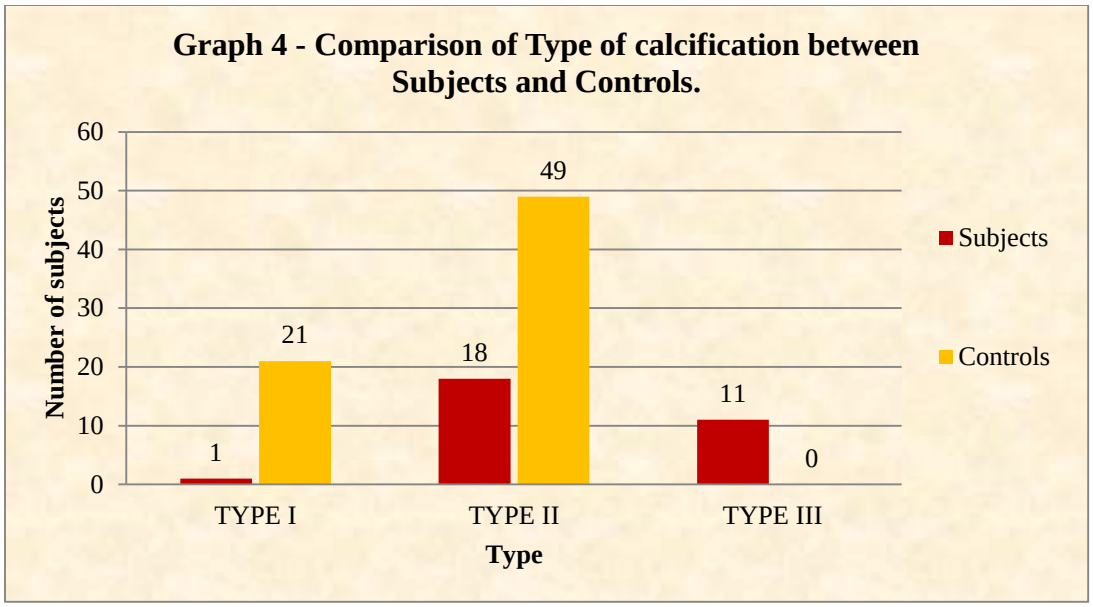


RESULTS - COMPARISON OF TYPE OF CALCIFICATION BETWEEN SUBJECTS AND CONTROLS

The chi-square test was done to evaluate the type of calcification between subject and control. It was found that the chi-square value between subject and control were 32.159 and the P value was 0.000 which was statistically significant since the P value was lesser than 0.05. (table 13) (graph 4).

Type of Calcification	Subjects [N=30]	Controls [N=70]	Chi-square value	P value
	n(%)	n(%)		
TYPE I	1 (3.3)	21 (30.0)	32.768	0.000 S
TYPE II	18 (60.0)	49 (70.0)		
TYPE III	11 (36.7)	0 (0.0)		

Table 13 - comparison of type of calcification between subjects and controls



DISCUSSION

The Sella parameters like Length, Diameter, and length to 3/4th of diameter was assessed in normal patients without canine impaction and patients with palatally impacted maxillary canine. It was found that there was a significant difference of Sella parameters between subjects and controls. The mean dimensions of Sella were relatively short in patients with palatally impacted maxillary canine than the control group patients. Then the same parameters were evaluated between males and females.

It was found that there was no significant difference in Length, Diameter, and length to 3/4th of diameter of Sella between males and females of both subjects and the control group. To evaluate and quantify the level of bridging, the standard scoring scale developed by Leonardi et al was used. On the basis of sella dimensions, the bridging was classified into 3 groups.

TYPE I – NO CALCIFICATION - where the length was either equal to or greater than three fourths of the diameter.

TYPE II – PARTIAL CALCIFICATION - Where the length was equal to or less than three fourths of the diameter.

TYPE III – COMPLETE CALCIFICATION - where only the diaphragm sellae was visible on the radiograph. The type of calcification is segregated and assessed between males and females of both groups and it was found that there was no significant difference in terms of calcification between males and females. The calcification status was then assessed between subjects and controls, and it was found that 36.7 % of patients from subject group had type III calcification whereas it was only 0.0% in control group. Hence there was a significant difference between subjects and controls in terms of calcification. These strong evidences suggests that there is strong association between Sella turcica and maxillary canine.

CONCLUSION

It was found that the percentage of complete calcification was relatively higher in patients with

Palatally impacted maxillary canine. The length, diameter and 3/4th of diameter is significantly differing between the patients with Palatally impacted canines and normally erupted canines. But sex does not influence any sort of bridging or reduction in interclinoid distance. Hence the factors affecting the development of Sella will also affects the development of maxillary canine. Thus, Sella bridging highlights the risk of future palatal canine impactions, especially in children with a history of canine impaction in their parents or siblings and who are undergoing phase 1 orthodontic treatment.

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