

Comparative Evaluation of Sella Turcica Bridging in Individuals with Congenitally Missing Lateral Incisors and Third Molars

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Abstract

Background: Sella turcica is a saddle-shaped depression present in sphenoid bone that shows an association with congenital disturbances such as hypodontia. We aimed to compare sella turcica bridging (STB) in individuals with congenitally missing maxillary lateral incisor (CMMLI), missing maxillary third molars (MM3M), and complete dentition (CD). **Materials and Methods:** In this retrospective study, lateral cephalograms and orthopantomograms were used. 66 patients were divided into three groups (22 each). Group “A” comprised of patients with CMMLI, Group “B” included patients with MM3M, and Group “C” comprised of patients with CD (including all third molars). Age of these patients ranged from 12 to 30 years. Dimensions of sella turcica and STB were measured in all the three groups and compared with each other to identify variation amongst them. Statistical analysis was done using one-way analysis of variance and Independent “t” test. **Results:** We found the shortest sella turcica length in CMMLI group. CMMLI, MM3M, and CD groups showed partial (Type II) calcification 40.9%, 54.5%, and 36.3%, respectively, while only CMMLI group showed complete (Type III) calcification (9.1%). **Conclusion:** It can be concluded that the complete calcification of sella turcica is positively related with CMMLIs.

Keywords: Interclinoid ligament, Lateral incisor, Missing molars, Sella turcica bridging.

INTRODUCTION

Sella turcica is a saddle-shaped depression present in the sphenoid bone. Its anterior border is formed by tubercular sella while dorsum sella forms the posterior border.^[1,2] There is involvement of neural crest cells in the formation of different orofacial structures such as sella turcica and teeth. Changes in dimensions of sella and its calcification show an association with congenital disturbances of teeth also such as hypodontia and oligodontia.^[3] In cephalometrics, sella is considered an important and commonly used landmark, generally used for analyzing positions of the maxilla and mandible.^[4] Morphological assessment of sella turcica may also help in age and gender determination.^[5] When the anterior and posterior clinoid process fuse, it is termed as sella turcica bridging (STB). Ossification of the ligaments present between anterior and posterior clinoid processes of the sphenoid bone may lead to such bridging. It is a developmental abnormality found in shape of sella turcica.^[1,6] Altered structure of sella turcica may be caused by defective formation of the pituitary gland along with this calcification

of sella (STB) which is an important radiographic feature of Gorlin–Goltz syndrome, calcified falx cerebri, etc.^[1,3,7] Depending on the dimensions of sella turcica, STB can be classified in three types:

- Type I: The length $\geq 3/4$ of the diameter. No calcification.
- Type II: The length $\leq 3/4$ of the diameter. Partial calcification.
- Type III: Only the diaphragm sella is visible radiographically. Complete calcification.^[1,6]

In this study, we aimed to compare STB in individuals with congenitally missing maxillary lateral incisor (CMMLI), missing maxillary third molars (MM3M), and complete dentition (CD).

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MATERIALS AND METHODS

In this retrospective study (SAIMS/IEC/22/25), past 10-year data related to lateral cephalograms (lat. ceph) and orthopantomograms (OPG) were retrieved from Department of Orthodontics of Sri Aurobindo College of Dentistry, Indore. Age range of these patients ranged from 12 to 30 years. After screening the records, lat. ceph and OPGs of 66 patients were selected and divided into three groups (22 each). Group “A” comprised of records with CMMLIs, Group “B” included records with MM3M, and Group “C” comprised of the records showing CD (including all third molars); control population. Cephalograms and OPGs without area of interest, films with poor contrast, and distorted films were excluded during screening of records. With the help of tracing paper, marking pencil and plastic scale boundaries of sella turcica were marked. Dimensions (length, depth, and diameter) of sella turcica and STB were measured in all the three groups and recorded. The data were entered into the excel sheet.

The data were analyzed using the Statistical Package for the Social Sciences 20.0 version. The data were analyzed for probability distribution using Kolmogorov–Smirnov test, $P > 0.05$ indicated that the data were normally distributed, and thus, parametric test of significance was applied. Descriptive statistics was performed, and data were described as mean and standard deviation. The intergroup comparison was done using one-way analysis of variance and independent “*t*” test. $P < 0.05$ was considered as statistically significant. Confidence interval was set at 95%.

RESULTS

The mean length of sella turcica in the participants belonging to Group A was 5.6818 ± 3.27161 mm. The mean diameter of sella turcica in the participants belonging to Group A was 9.2273 ± 2.22394 mm. The mean depth of sella turcica in the participants belonging to Group A was 7.5909 ± 1.33306 mm.

The mean length of sella turcica in the participants belonging to Group B was 7.0000 ± 1.85164 mm. The mean diameter of sella turcica in the participants belonging to Group B was 9.2273 ± 1.90067 mm. The mean depth of sella turcica in the participants belonging to Group B was 7.5000 ± 1.50396 mm.

The mean length of sella turcica in the participants belonging to Group C was 7.2273 ± 1.54093 mm. The mean diameter of sella turcica in the participants belonging to Group C was 9.0909 ± 1.30600 mm. The mean depth of sella turcica in the participants belonging to Group C was 7.9091 ± 1.19160 mm.

In both groups, number of participants with bilaterally missing teeth was greater as compared to that with unilaterally missing teeth (Table 1 and Figure 1).

In Group A, maximum number of participants had Type I STB (50.0%), followed by Type II (40.9%) and only 9.1% had Type III STB. In Group B, the number of participants

with Type II STB (54.4%) was more than that with Type I (36.4%). None of the patients had Type III STB. In Group C, the number of participants with Type I STB (63.6%) was more than that with Type II (45.4%). None of the patients had Type III STB. The number of participants with Types I, II, and III STB did not differ significantly between the groups ($P > 0.05$) (Table 2 and Figure 2).

Table 1: Distribution of study subjects based on side of missing teeth

Side of missing teeth	Group A	Group B
Unilateral	9 (40.9%)	3 (13.6%)
Bilateral	13 (59.1%)	19 (86.4%)
Total	22 (100.0%)	22 (100.0%)

Table 2: Distribution of study subjects based on type of ATB

Type of sella turcica bridging (STB)	Group A	Group B	Group C
Type I	11 (50.0%)	10 (45.4%)	14 (63.6%)
Type II	9 (40.9%)	12 (54.5%)	8 (36.4%)
Type III	2 (9.1%)	0 (0.0%)	0 (0.0%)
Total	22 (100.0%)	22 (100.0%)	22 (100.0%)

Chi-square value - 5.639, df - 4, $P > 0.05$, STB: Sella turcica bridging

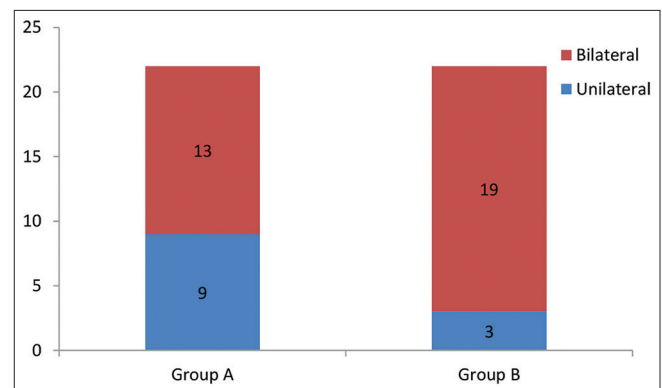


Figure 1: Distribution of study subjects based on side of missing teeth

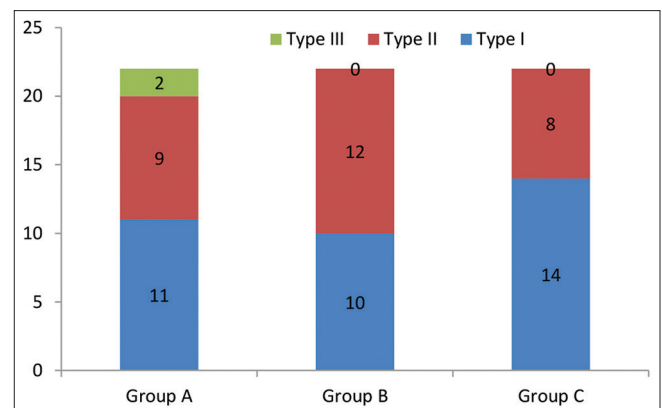


Figure 2: Distribution of study subjects based on type of sella turcica bridging

The mean length, diameter, and depth of sella turcica of the participants belonging to three groups did not differ significantly ($P > 0.05$).

Amongst Group A participants, the mean length of sella turcica differed significantly between participants with different types of sell turcica ($P < 0.05$). However, the mean diameter and depth of sella turcica did not differ significantly between participants with different types of sell turcica ($P > 0.05$).

Post hoc analysis revealed that the length of sella turcica in participants with Type I sella turcica was significantly greater than those with Type III. However, it does not differ significantly between participants with Types I and II STB.

Amongst Group B participants, the mean length of sella turcica differed significantly between participants with different types of sell turcica ($P < 0.05$). However, the mean diameter and depth of sella turcica did not differ significantly between participants with different types of STB ($P > 0.05$).

Amongst Group C participants, the mean length of sella turcica differed significantly between participants with different types of sell turcica ($P < 0.05$). However, the mean diameter and depth of sella turcica did not differ significantly between participants with different types of STB ($P > 0.05$).

In Group B, the length, diameter, and depth of sella turcica did not differ among participants with unilateral and bilaterally missing molar ($P > 0.05$).

DISCUSSION

The sella turcica is an important point for cephalometric analysis, and it is a saddle-shaped structure present in the middle cranial fossa on the sphenoid bone. It is also important as the master gland is situated here. The embryology of sella turcica involves neural crest cells similar to the development of teeth. During the growth phase, up to 16–18 years, the shape especially the length of sella turcica changes due to changes at the tuberculum sellae and posterior border of sella turcica.^[6,8]

We found the average anteroposterior dimension of sella turcica around 5.68 mm, 7.0 mm, and 7.22 mm in CMMLI, MM3M, and CD groups, respectively, while average depth was 7.59 mm, 7.5 mm, and 7.90 mm in CMMLI, MM3M, and CD groups, respectively, which is in the range suggested by Sathyanarayana *et al.* in 2013^[4] and Baidas *et al.* in 2018^[9] in their respective studies where anteroposterior dimensions of the sella turcica ranged from 5 mm to 16 mm and depth was from 4 mm to 12 mm.

In our study, we found mean length in increasing order from CMMLI < MM3M < CD while reverse was found for diameter CD < CMMLI = MM3M. Similar findings were presented by Alqahtani in 2019 who found reduction in length among the CMMLI group.^[1]

We found higher number of calcifications in MM3M (54.5%) group followed by CMMLI (50%) and CD groups (36.3%). Similarly, Alqahtani in 2019 also found a significantly higher number of subjects with calcification with CMMLI (69.4%) in comparison to control group (46.9%).^[1]

In our study, we found shortest sella in group with CMMLI (mean length 5.68 mm) and 100% participants with Type III bridging showed agenesis of maxillary lateral incisor. Antonarakis *et al.* in 2020 also found shorter sella in children with agenesis of lateral incisor on the side of cleft and 100% children with complete calcification also presented with agenesis of lateral incisor.^[3]

CONCLUSION

It can be concluded that change in the size and degree of calcifications in sella turcica can result in congenital absence of teeth, especially complete calcification of sella turcica is positively related with CMMLIs.

The calcification of interclinoid ligament or STB can be assessed in fetal skull with different analyzing methods which can help in forecasting developmental disturbances or syndromes.

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