INCIDENCE OF BRIDGING AND DIMENSIONS OF SELLA TURCICA IN CLASS I AND III TURKISH ADULT FEMALE PATIENTS

Mineralization of the interclinoid ligament of the sella turcica, or sella turcica bridging, has been associated with severe craniofacial deviations. The aim of this study was to evaluate the incidence of sella turcica bridging, sella turcica dimensions, and skeletal variables in 57 Class I (mean age, 27.2 ± 5.3 years) and 61 Class III (mean age, 25.8 ± 4.6 years) Turkish adult females. Sella bridging was found in three (5%) of the Class I and 11 (18%) of the Class III individuals (P < .010). The association between sella turcica bridging and manifest skeletal Class III malocclusions was statistically significant according to the chi-square test (P < .050). No significant differences in sella turcica dimensions were found between the Class I and Class III patients. Skeletal variables that differed significantly were SNB (P = .004), ANB (P = .002), and NAPg (P = .000) angles and N-B (P = .030), N-Pg (P = .003), Go-Pg (P = .007), and TM-Pg (P = .002) dimensions. World J Orthod 2009;10:99–103.

The sella turcica is the saddle-like bony formation on the upper surface of the sphenoid body. The sella is bordered by the anterior and posterior clinoid processes and is an important anatomical structure for cephalometric assessment. A number of studies have illustrated the changes in sella turcica shape during growth. The morphology of the sella is decisive because S is a key reference point for various measurements. DiChiro and Nelson, Friedland and Meazzini, Keats and Lusted, and Abdel-Kader suggested various methods to measure the size of the sella turcica in radiographs.

Due to abnormal development in the anterior, middle, and posterior clinoid processes, the bony structures of sella can eventually fuse and form an osseous bridge. Some studies have described normal variations and skeletal abnormalities of sella, including mineralization of the interclinoid ligament. Overall, there are few publications with cephalometric standards on normal growth and development of the sella turcica.

The aim of this study was to analyze the size and describe the morphology of the sella turcica and incidence of sella turcica bridging on standardized lateral cephalograms of Class I and Class III Turkish adult female patients.

SUBJECTS AND METHODS

One hundred eighteen lateral cephalograms from 57 Class I (mean age, 27.2 ± 5.3 years) and 61 Class III (mean age, 25.8 ± 4.6 years) Turkish females were randomly selected from the patient records of the Department of Orthodontics, Faculty of Dentistry, Istanbul University, Istanbul, Turkey. The inclusion criterion was a good-quality lateral cephalometric radiograph. Exclusion criteria were presence of a cleft lip and palate or other...
craniofacial anomalies or syndromes, traumata, multireagent chemotherapies, and severe craniofacial deviations requiring additional surgical procedures.

Patients were categorized as Class I or Class III according to their ANB angle. All relevant cephalometric parameters are found in Table 1; those of the sella dimensions are in Table 2. All lateral cephalograms were taken in a cephalostat with ear rods and a light source to adjust the head posture. The film-focus distance was 180 cm, and the distance from the midsagittal plane of the head to the film was 10 cm.

The diagnosis of a possible sella bridge was made by a single investigator (GM) on the lateral cephalogram with the clearest reproduction of the relevant area.

The dimensions of the sella turcica measured were (see Fig 1) width (A, distance from superior aspect of dorsum sellae to superior aspect tuberculum sellae), depth (B, distance perpendicular from the base of the pituitary fossa to the line connecting the superior aspect of dorsum sellae and the superior aspect tuberculum sellae), interclinoid (C, shortest distance between both clinoid processes), and diameter (D, greatest anteroposterior diameter from the tuberculum sella to a point on the posterior inner wall of the pituitary fossa).

The parameters measured on the cephalograms were (Figs 2 and 3):

- SNA: angle of sella (geometric center of the pituitary fossa), nasion (the most anterior aspect of the frontonasal suture), and point A (the most posterior point in the concavity between the anterior nasal spine and the maxillary alveolar process)
- SNB: angle between sella, nasion, and point B (the most posterior point in the concavity between the chin and mandibular alveolar process)
- ANB: angle of A, N, and B
- NAPg: angle between N, A, and point Pg (pogonion, most anterior point on the chin)
- ArGoGn: angle between point Ar (articulare, intersection of the posterior border of the ramus and the inferior border of the cranial base), point Go (gonion, bisection of a tangent to the inferior border of the mandible and a tangent to the posterior border of the ramus located on the curvature of the mandibular angle), and point Gn

### Table 1  Mean values, standard deviations, and P values for various cephalometric variables in Class I (n = 57) and Class III (n = 61) patients

<table>
<thead>
<tr>
<th></th>
<th>Class I</th>
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<th>Class III</th>
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<th>P</th>
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<tr>
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<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
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<td>SNA (degrees)</td>
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<td>SNB (degrees)</td>
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<td>-8.1</td>
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<tr>
<td>NAPg (degrees)</td>
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<td>-8.3</td>
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<tr>
<td>ArGoGn (degrees)</td>
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<td>N-A (mm)</td>
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<td>N-B (mm)</td>
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<td>N-ANS (mm)</td>
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<td>N-Gn (mm)</td>
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<td>Me-NF (mm)</td>
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</table>

### Table 2  Mean values, standard deviations, and P values for various sella turcica measurements in Class I (n = 57) and Class III (n = 61) patients

<table>
<thead>
<tr>
<th></th>
<th>Class I</th>
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<th>Class III</th>
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<tbody>
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<td></td>
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<td>SD</td>
<td>Mean</td>
<td>SD</td>
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<tr>
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<td>14.1</td>
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<tr>
<td>Width (mm)</td>
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<td>11.3</td>
<td>1.8</td>
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<td>.8</td>
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<tr>
<td>Depth (mm)</td>
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<td>9.4</td>
<td>1.4</td>
<td></td>
<td>.9</td>
</tr>
<tr>
<td>Interclinoid (mm)</td>
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<td>1.2</td>
<td>3.5</td>
<td>1.2</td>
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<td>.8</td>
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</table>

SD = standard deviation.

![Fig 1](Dimensions of sella turcica. See text for specifics.)
(gnathion, midway between Pg and menton [inferior border of the mandibular symphysis] on the outline of the mandibular symphysis)

- N-A: distance from N to A
- N-B: distance from N to B
- N-Pg: distance from N to Pg
- Go-Pg: distance from Go to Pg
- Ar-Go: distance from Ar to Go
- PNS-ANS: distance from posterior nasal spine to anterior nasal spine
- N-ANS: distance from N to ANS (upper anterior facial height)
- ANS-Gn: distance from ANS to Gn (lower anterior facial height)
- N-Gn: distance from N to Gn (total anterior facial height)
- Me-NF: distance from menton (inferior border of the mandibular symphysis) to nasal floor (ANS-PNS line)
- TM-ANS: distance from temporomandibular point (uppermost point of mandibular condyle) to ANS
- TM-Pg: distance from TM to Pg

**Method error**

Each cephalogram was traced and measured manually by a single investigator (GM). All measurements were repeated after 7 days, and the mean value of the two measurements was used as the final measurement. To evaluate the tracing and measurement reliability, 50% of all cephalograms were selected at random and retraced and remeasured. The differences between the original and repeated measurements were statistically analyzed using a matched paired t test. The results of this analysis showed no significant differences. The measurement errors ranged from 0.2 degrees to 0.5 degrees for all angular measurement and from 0.19 mm to 0.21 mm for all distance measurements.

On this basis, it was considered that the experimental error was unlikely to bias the accuracy of the standard cephalometric and the sella turcica measurements.
Statistical analysis

Statistical tests were performed using NCSS 2007 software (NCSS, Kaysville, Utah, USA). Comparisons between the two groups were analyzed via t test. The association between the incidence of the two Angle classes and sella turcica bridging was investigated with the chi-square test.

RESULTS

As seen in Table 1, significant differences were found between Class I and Class III adult female patients for SNB ($P = .004$), ANB ($P = .002$), and NAPg ($P = .002$) angles and N-B ($P = .003$), Go-Pg ($P = .007$), and TM-Pg ($P = .002$) distances. No relationship was found, however, between these variables and sella turcica dimensions. As seen in Table 2, there were no further significant differences between Class I and Class III individuals in sella turcica dimensions.

Assessment of bridging was carried out again by the operator (GM). Bridging was found in three (5%) of the Class I and 11 (18%) of the Class III patients. This difference was significant ($P < .010$). The bridging always occurred as an extension and meeting of the anterior with the posterior clinoid process. None of the bridges demonstrated ribbon-like mineralization between the clinoid processes.

DISCUSSION

Mineralization of the sella diaphragm, which radiologically has been described as bridging of the sella, is often looked at as a normal variant of the sella turcica if not accompanied with any clinical signs or symptoms. However, many pathological processes can be associated with such mineralization. It has been reported that the interclinoid ligament of sella turcica is laid down in cartilage at an early developmental stage and that it will ossify early in childhood. This ossification can be due to the complex embryologic maturation of the sphenoid bone. According to this theory, a sella turcica bridge should be considered a developmental anomaly.

The effect of a sella turcica bridge on the pituitary gland is unknown. Carstens studied the occurrence of sella bridges in patients with various diseases and found an 8.0% incidence, compared to 4.6% in healthy individuals. He assumed that chronic infections may affect the pituitary gland and lead to sella bridging. Becktor et al, after studying 1,040 radiographs, mentioned a possible association between sella turcica bridges and ophthalmologic symptoms.

Other reports hypothesized that structural deviations in the anterior wall of the sella turcica are related to specific deviations in the facial configuration. Jones et al reported a prevalence of sella bridges in 16.7% of orthognathic surgery patients, but they did not mention the respective malocclusions of their patients. Leonardi et al stated that the prevalence of sella bridging is increased in adolescents with dental anomalies (17.6% vs 9.9% in a normal control group). Becktor et al saw sella turcica bridges in 18.6% of 177 individuals who had severe craniofacial deviations and thus were scheduled for combined orthodontic and surgical treatment. They reported an especially high percentage of sella bridging in patients with a Class III. Similarly, Abdel-Kader observed a higher percentage of sella bridges in Class III as compared to Class I and Class II patients. Our findings are in agreement with the results of that study. According to other investigations, the occurrence of sella turcica bridging in general varies between 1.8% and 6.0%.
CONCLUSIONS

The overall results of this study are:

1. The prevalence of a sella turcica bridges was significantly higher in Class III than in Class I Turkish adult females.
2. No significant differences were found in sella turcica dimensions between Class I and Class III Turkish adult females.
3. No significant relationship was found between craniofacial measurements and sella turcica dimensions.

REFERENCES