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Sellaturcica anomalies on lateral cephalometric radiographs and its relationship with class II skeletal malocclusion

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***Abstract*---**To know the relationship of morphological variation of sella turcica (ST) with Class II malocclusion. The sample in this study were 100 lateral cephalometric radiographs divided into two groups Class I and Class II skeletal malocclusion based on the ANB value, each group was randomized and identified by morphology of ST and later compared with the value ANB from each group. The findings of this study indicate a significant difference between morphological variation of ST in Class I and class II malocclusion. The normal morphology of ST was observed in, 68% of Class I and 12% of Class II skeletal malocclusion subjects. Irregular (notching) of the posterior wall was higher in Class II malocclusion (26%) and in Class I malocclusion, it

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was only 8%. To distinguish between normal and atypical appearances, the orthodontist should be conversant with the various morphologies of the ST.

Keywords---Sella turcica, malocclusion, pituitary gland, radiographs, orthodontist, prevalence.

Introduction

The sella turcica (ST) is a crucial component of the craniofacial complex. It serves as a radiographic marker that may be used for orthodontic diagnosis of maxillofacial disharmonies, growth assessment using superimposed tracings, and evaluation of orthodontic treatment outcomes.[1,2] The pituitary gland is located in the sella and is responsible for the production of important hormones such as prolactin, growth hormones, TSH, and FSH, among others.[3] Systemic diseases and changes in pituitary gland function can cause morphological changes in the ST, or vice versa, morphological abnormalities in the sella might disclose previously undiagnosed pathologies.[4] A lateral cephalometric radiographic assessment of the craniofacial structures is one of the essential diagnostic tools of the orthodontic treatment diagnosis. The identification of various landmarks during the tracing of the radiographs are essential, as these points help in analyzing the relative positions of that of the maxilla and the mandible in relation to themselves or to the cranium. These reference points assist the orthodontist during diagnosis and in the estimation of orthodontic treatment results by superimposition of the reference points.[5,6]

Previous studies discovered substantial variations in the shape and size of ST in persons of various ethnicities, thus additional study is needed to get more data and information on this. Data on the standard morphology of the ST for all populations is required in order to gain information that will aid in the detection of anatomical anomalies in the ST.[8,9] Because dentists and orthodontists frequently indicate and evaluate cephalometric radiographs, they will be able to recognize abnormalities of the ST if these normal variations change, even before clinical manifestations appear, if they learn and understand the normal variations of this area. Researchers from numerous disciplines of study are now focused on establishing the morphology of the human craniofacial region. The relationship between the shape and size of the ST and facial skeletal types class I, class II, or class III is a recent notion that is still being investigated.[9,10] With this background, the present study was carried out to know the relationship of morphological variations of ST with Class II malocclusion.

Material and Methods

This was a cross-sectional, observational study. The study participants were belonging to the age range of 18-38 years, obtained in the form of a lateral cephalometric radiograph of the subject with Class I and Class II skeletal malocclusions. Based on the large sample calculation with 1: 1 proportion, the minimum sample for each treatment group was 50 subjects so that the total sample was 100 participants. The subjects incorporated in the present study were

based upon specific inclusion and exclusion criteria, x-rays obtained by a trained personnel, trained radiographer in a standard position with specific equipment and a cephalostat with a known and fixed magnification factor. Only the x-rays showing a clear picture of the ST were chosen for interpretation and assessment. Radiographs were categorized and facial skeletal pattern were classified based on the various measurements including, ANB, SNA, SNB as specified in the previous similar study.[11] The ST and related structures were traced on the lateral cephalometric radiographs according to the previous study.[11]

The obtained data were compiled and evaluated using Statistical Package for the Social Sciences version 21.0 (SPSS Inc., Chicago, Illinois, USA). The data was analyzed descriptively to know the frequency distribution based on the characteristics of the study participants. The numerical data was represented in terms of mean and standard deviation. Somers test and Chi Square test was applied to assess the relationship between the morphology of ST and the type of skeletal malocclusion and to evaluate the morphological differences between the subjects. A p-value ≤0.05 was considered statistically significant.

Results

The findings of the present study indicated that the normal morphology of ST is commonly observed in the patients who were having Class I skeletal malocclusion that is as many as 34 subjects (68%). The second most commonly observed morphological variation of the ST was bridging in 6 (12%) subjects (Figure 1).

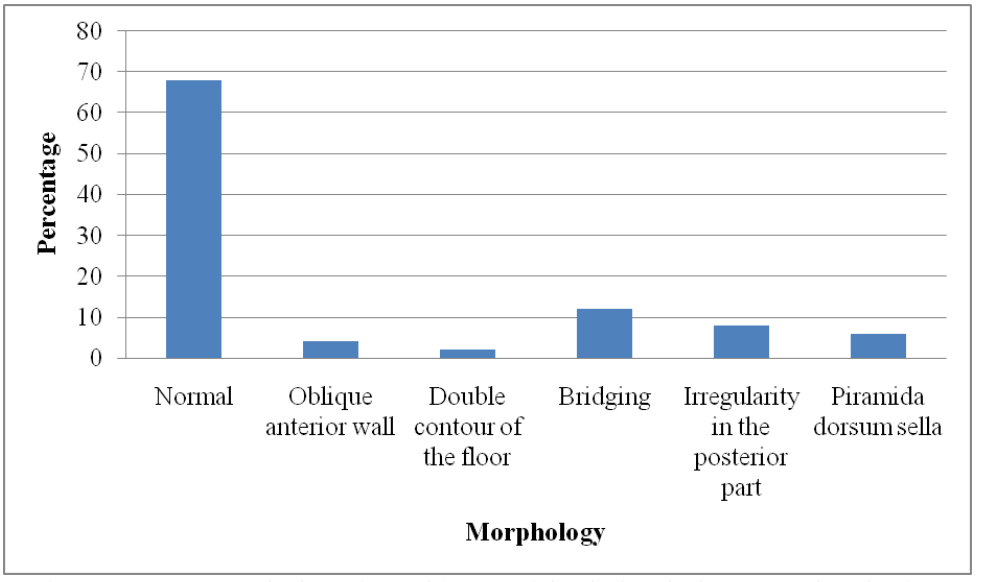

Figure 1. ST morphology in subjects with skeletal class I malocclusion

The observations of the present study showed considerable morphological variation of ST in subjects with skeletal class II malocclusion. There was irregularity of posterior part of ST and this was noted in 13 (26%) subjects, as compared with normal morphology of ST, which was noted in only 7 (14%) subjects. Furthermore, the second common morphological variation of ST in

skeletal Class II malocclusion subjects was bridging, which was found in 13 (26%) patients (Figure 2).

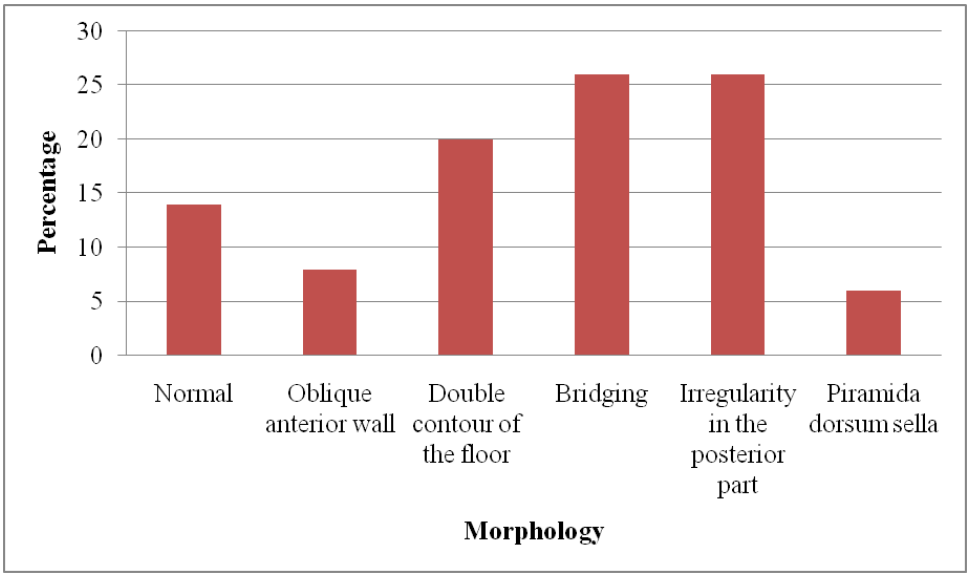

Figure 2. ST morphology in subjects with skeletal class II malocclusion

The results of the present study suggests a significant difference between the morphological variations of ST in the Class I skeletal malocclusion subjects as compared to Skeletal Class II skeletal malocclusion patients (P=0.0001) (Figure 3).

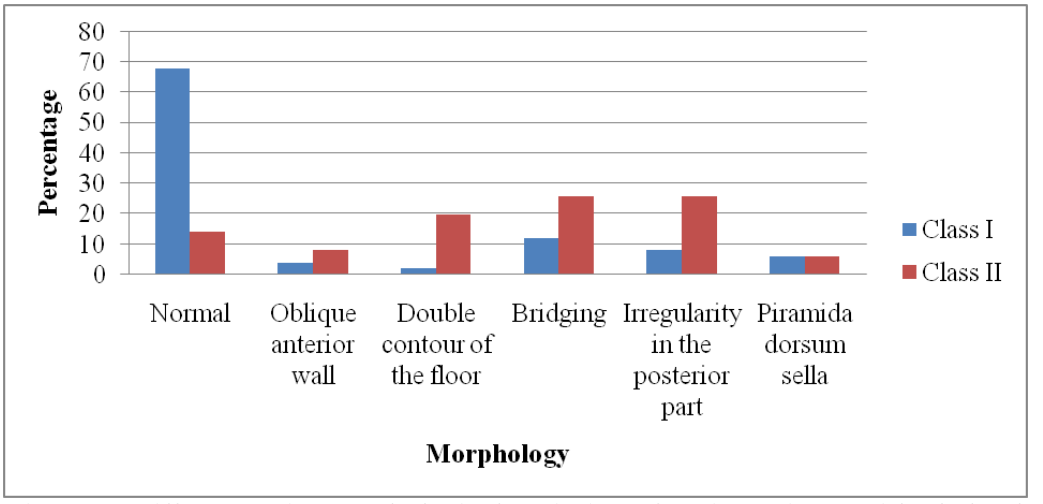

Figure 3. Differences in morphological variation of ST in patients with skeletal class I and class II malocclusions

The findings of the present study indicate that there was a correlation between skeletal Class II malocclusion with variation in ST morphology. Table 1 shows the findings of Somers test, that there was a positive correlation between skeletal

Class II malocclusion with morphological variations of the ST, with correlation coefficient value (r) = 0.611.

Table 1
Correlation between variables by Somers test

Correlation between Variable	N	r	p
Class II malocclusion with STmorphology variation	50	0.611	0.0001 (significant)

Discussion

Because the pituitary gland is in ST and its development has been perfect before the development of ST is completed, pathological conditions that occur in the gland can cause morphological changes in the ST. Hence the morphological assessment of ST is a measuring tool in assessing the pituitary gland. In cases of severe craniofacial deviation, genetic illnesses, congenital abnormalities, and dental anomalies such as ectopics and impaction, morphological alterations of the ST have been observed.[11]

The beauty of the face is determined by the harmony of craniofacial structures. It's critical to identify the source of the stomatognathic system's discord, restore function, and enhance overall face's attractiveness. The underlying skeletal components of a balanced face profile are well-proportioned. Sagittal or vertical dysplasia can develop from a misalignment of the maxillary and mandibular bone bases.[12]As indicated in the functional paradigm, predicting the direction and degree of face growth before the commencement of pubertal surge can be a significant asset, and the skeletal disharmony that results can be balanced. Early detection of developing skeletal malocclusions allows for conservative orthodontic treatment. In the past, researchers presented a number of factors for predicting face development trends.[13,14] The ST has also been studied to see whether it might predict the development of skeletal malocclusion.[5,15]

In this study the most normal ST morphology was found in the first sample group of skeletal class I as many as 34 samples (68%) while in the sample group of 6 skeletal Class II (12%), this was consistent with the study by Alkofide et al.,[5]Mahmood Shah et al.,[10] and Solmaz et al.[16] The fusion of the anterior and posterior clinoideus bone is known as bridging of ST (STB). The prevalence of STB in the general population was found to be 1.75 to 6%.[11] In the present study the prevalence of STB in Class I was 6 samples (12%) while in Class II it was seen in 13 samples (26%). Meyer-Marcotty noted 9.3% of STB in subjects with a skeletal Class I.[17] The occurrence of irregular (notching) posterior wall of ST may also occurs in normal individuals although the prevalence of irregular (notching) posterior wall is more common in patients with dental anomalies and craniofacial deviation.[18] In the present study, the irregular (notching) posterior wall was more common in Class II malocclusion and this observation was similar to the previous reports.[11,17,18]

The observations of this study indicates a significant difference in morphological variation of ST in Class I skeletal malocclusion compared with group of Skeletal

Class II malocclusion. The results of this study shows that the correlation between morphological variation of ST with skeletal Class II malocclusion as per ANB could not be determined because of uneven distribution of participants, where the number of samples each ANB value is not the same.

Conclusion

The pituitary gland's size may be estimated using the linear measurements of the ST. To distinguish between normal and atypical appearances, the orthodontist should be conversant with the various morphologies of the ST. If there is a family history of impacted teeth, symptoms of ectopic eruption, or other dental abnormalities, lateral cephalograms may be recommended for children so that treatment can be recognised and treated early.

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