



Radiographic Correlative Study of Ponticulus Posticus in Dental Patients

KEYWORDS

ponticulus posticus, sella turcica bridging, neural crestal cells, lateral cephalogram

Dr. Priyanka Chintaman Saokar

Senior lecturer, Dept. of Orthodontics,
YCMRDF Dental College and Hospital,
Vadgaon Guptaa, Ahmednagar, Maharashtra, India

Dr Sudhir Nawale

Assistant professor
Bharati medical college and hospital
Pune, Maharashtra, India.

ABSTRACT

Upper surface of atlas has wide groove for the vertebral artery in some cases a bony arch may form thereby converting this groove into a foramen. This bony arch is known as ponticulus posticus. Bridging of sella turcica is the fusion of anterior and posterior clinoid processes. The objective of the present study was to find out the association between the sella turcica bridging and ponticulus posticus. For the study, 50 pretreatment lateral cephalometric radiographs with sella turcica bridging and 50 without sella turcica bridging were taken. Retrospective study was performed to assess the presence of ponticulus posticus. The results indicated that there was a significant association between the presence of sella turcica bridging with ponticulus posticus. Thereby, suggesting that lateral cephalogram must be looked upon as a baseline screening/ diagnostic/ prediction tool for detecting anomalies and pathology of the head and neck region.

INTRODUCTION:

Humanity has studied itself in perpetuity, always with recognition of intimate link between the spiritual and physical. Even at first glance, appraisals of physiognomy help to determine the variety of human relations that exists between the people. Orthodontist, maxillofacial and plastic surgeons have contributed to this ongoing effort with their study of human face and profile. We must not forget that the field of orthodontics is concerned with the health of entire individual.¹

On the other hand, normal anatomy varies among individuals and can simulate disease. Proper diagnosis of incidental pathoses or rare normal variants is important to avoid patient mismanagement and requires familiarity with the anatomy and pathology of the head and neck region.²

Most of these pathologic conditions, developmental abnormalities, or normal variants are associated with a significant problem in other system. Interestingly, some of these findings are detectable very early in life and often precede other signs or symptoms in syndromes. Therefore, in some cases, they could potentially be valuable for an early diagnosis.³

Although the orthodontist is not directly concerned with the management of cervical spine anomalies, he/she does have an obligation, as a healthcare professional, to take any such findings that may hold importance for the patient to their logical conclusion.

Farman and Escobar described the radiographic appearance of congenital anomalies of vertebral bodies. The normal atlas is a ring-like structure consisting of two lateral masses connected by a short anterior arch and a longer posterior arch. Upper surface of atlas has wide groove for the vertebral artery and the first cervical nerve. In 1-15% of the population, a bony arch may form thereby converting this groove into a foramen through which these structures pass. This bony arch is known as the ponticulus posticus. The Latin meaning of ponticulus posticus is "little posterior bridge". The structure is seen clearly on plain films of the craniocervical junction in the lateral projection, including the lateral cephalogram.⁴

The sella turcica is an important anatomical structure for cephalometric assessment because of its central landmark. The sella turcica lies on the intracranial surface of the body of the sphenoid and consists of a central pituitary fossa. Two anterior and two posterior clinoid processes project over the pituitary fossa. Fusion of the posterior and anterior clinoid

processes is known as a sella turcica bridge.

Recently some studies have been done to establish association of craniofacial skeletal anomalies with dental anomalies. It appears that tooth formation and their eruption and sella turcica bridge calcification, as well as neck and shoulder skeletal development, are influenced by neural crest cells.³

As the visual assessment of the first four cervical vertebrae can be done on a standardized lateral skull radiograph; main purpose of this study is to find out association between sella turcica bridging and ponticulus posticus.

Since "the eye sees what the mind knows", one of the aim of this study is to sensitize orthodontists/radiologist to "see" the skull and cervical spine and be equipped to identify departures from normal anatomy. The next step is to be aware of the implications of finding these departures from the normal.

MATERIALS AND METHODS:

In the present study, pretreatment cephalometric radiographs of 100 patients of local population; aged 6-40 years were retrieved from existing case records of 300 patients. They were grouped in to two groups based on presence or absence of sella turcica bridging.

Group 1: fifty subjects with sella turcica bridging

Group 2: fifty subjects without sella turcica bridging.

All samples with sella turcica bridging are separately evaluated by orthodontist and radiologist and cases with difference of opinion were excluded from study (photograph:1). Control group consisted of 50 pretreatment lateral cephalogram without sella turcica bridging; retrieved from same case records by using simple random sampling. After collection of sample, retrospective study was performed by orthodontist as well as radiologist. As the visual assessment of first four cervical vertebrae can be done on a standardized lateral skull radiograph; each radiograph was then carefully inspected for the presence of ponticulus posticus (photograph:2). Using this data association between sella turcica bridging and ponticulus posticus was determined. The findings were documented and compared.

Armamentarium:

High quality radiographs which were taken by trained radio-

graphic technicians in a standardized manner with clearest reproduction of sella turcica and cervical vertebrae.

Statistical Method:

Chi-Square test:⁵

A chi-square test was used to find out the association of sella turcica bridging and ponticulus posticus.

Statistical software:

The Statistical software namely SPSS 11.0 and Systat 8.0 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

Photograph: 1 Sella turcica bridging



Photograph: 2 Ponticulus posticus



RESULTS:

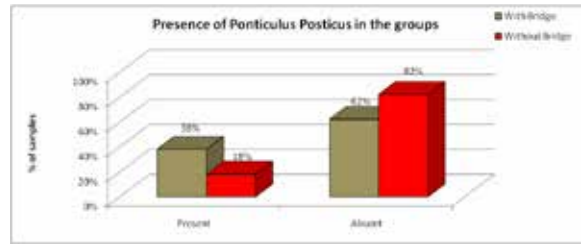
Chi square test was carried out to find association between sella turcica bridging and ponticulus posticus. Ponticulus posticus was present in 38% cases with sella turcica bridging and 18% cases without sella turcica bridging. Ponticulus posticus was found to be present more in the group with bridging compared to group without bridging. Statistically significant association was found between sella turcica bridging and ponticulus posticus (P value: <0.05). Results are represented in table no:1 and graph no:1.

Table no: 1 Association between sella turcica bridging and Ponticulus Posticus :

Group	Ponticulus Posticus				Total	Chi-sq	P-Value
	Present		Absent				
	N	%	N	%			
With Bridging	19	38	31	62	50	4.960	0.026*
Without Bridging	9	18	41	82			

* Significant

Graph no :1 Association between sella turcica bridging and Ponticulus Posticus:



DISCUSSION

When chi square test was carried out to find the association between sella turcica bridging and ponticulus posticus, it was observed that there was a statistically significant association between group with sella turcica bridging and group without sella turcica bridging. Incidence of Ponticulus posticus was found to be more in the group with bridging as compared to the group without bridging. This finding is in accordance with the study done by Mac Rae DL where he found out that the different variants of Atlas could be accompanied by other defects within the vertebral column, such as deformation of the skull base, particularly within the Turkish saddle, extended styloid process or cervical ribs.⁶

This relationship may be based on the involvement of neural crest cells (NCCs) and/or homeobox or hox genes during the development stage.^{7,8} It appears that tooth formation and their eruption and sella turcica bridge calcification, as well as neck and shoulder skeletal development, are all influenced by NCCs.³

Knowledge of sella turcica morphology is of great importance for orthodontic diagnosis and treatment planning because orthodontists regularly analyze considerable number of profile radiographs. Orthodontists will be in many cases the first to register minor malformations of sella turcica. Radiologist can further help in evaluation and confirmation of radiographic findings. Insight into the sella turcica malformations and information about the etiological background of such malformations is very important.

Sella turcica bridging might influence the blood flow in the left internal carotid artery or cause dysfunction of the muscle of the eye on the left side owing to possible compression of the oculomotor nerve. This bridging is also related to difficulties in microsurgical dissection and drilling in cavernous region.⁹ As there is still a lack of detailed information on this structure and its prevalence, knowledge of structural abnormalities is essential for understanding the etiology of some clinical symptoms and for safety in surgical management.¹⁰

The ponticulus posticus may limit the normal mobility of the vessels during flexion and extension of the neck and can cause disturbance of the arterial flow.¹¹ Furthermore vertebral artery can be pinched during neck rotations, which may lead to thrombus formation and embolism which causes cerebellar infarction.¹² Developmental variant of cervical vertebrae may produce the series of disorders such as headache, vertigo, buzzing in the ears, paresis or paralysis of the extremities. These variants should always be taken in to account during the planning of diagnostic process.¹³

Physician Dannie Abse said "As we use the x-ray or the scalpel to lay bare organs, we glimpse something integral to our humanity, and when we do, we realize that health, disease, life, and death are matters that beckon us to more than purely scientific or clinical reflection."⁶⁰ As orthodontists, we get an opportunity to see the skull radiographs in most of our cases hence we should utilize this for the well being of our patients and helping them for better life.

"A remarkable amount of information is available, however,

for those who are willing to put forth the effort to find it!"

CONCLUSION:

This study indicates that ponticulus posticus was found to be present more in the group with sella turcica bridging than the group without sella turcica bridging.

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