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Topography Of Greater Palatine Foramen In Relation to Interpalatine Suture in Adult Dry Skull

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Abstract

Introduction

The greater palatine foramens (GPF) are close to the palate lateral border, behind the palate-maxillary suture, which previously are deep vascular grooves. The greater palatine foramen (GPF) is related to the upper 3rd molar tooth in most of the skulls (55%), 2nd molar in (12%), between the 2nd & 3rd molar in (19%) and retromolar in (14%). The shape of the foramen is elongated antero-posteriorly; however, an unusually crescent shaped foramen is rare.At either posterior angle of the hard palate is the greater palatine foramen, for the transmission of the descending palatine vessels and greater palatine nerve; and running anteriorly (forward) and medially (towards the center-line) from it is a groove, for the same vessels and nerve. To anaesthetize posterior part of soft palate for various surgical procedures, knowledge of the position of the greater palatine foramen (GPF) is very important. Blocking of maxillary division of trigeminal nerve or its branches for local anaesthesia is common practice for maxillofacial surgeries.

Aim

To analyse the relationship of greater palatine foramen to the inter palatine suture in adult dry skull.

Marterial and Method

The measurements between the reference points, were done using the following instruments: divider,ruler. The first measurements performed from the right and left greater palatine foramens to the inter palatine suture. One point of the divider is placed on the greater palatine foramen and other point is placed on the inter palatine suture and the distance between them is measured with the help of a ruler. Totally 100 skulls were measured with the same procedure.

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Result

Totally 100 skulls were measured and the total mean value is 16.4 and the standard deviation is 4.96.The minimum value of right greater palatine foramen to interpalatine suture is 1.30 and maximum is 2.0 and the minimum value of left greater palatine foramen to interpalatine suture is 1.40 and maximum is 2.0.The mean value for the minimum and maximum of right greater palatine foramen to interpalatine suture is 1.65 and the standard deviation is 1.41.The mean value for the minimum and maximum of left greater foramen to interpalatine to interpalatine suture is 1.70 and the standard deviation is 1.46.

Key words: *Greater palatine,Interpalatine,Palate, Suture, Topography*

I. Introduction

The **greater palatine foramen** is the opening in the posterior hard palate of the **greater palatine canal,** which is formed between the articulation of maxillary bone and the greater palatine sulcus of palatine bone. The canal is also known as the **pterygopalatine canal.** A small accessory canal branches off it and courses more posteriorly, the lesser palatine canal.[1]The foramen is located just anterior to the lesser palatine foramina. It transmits the greater palatine nerve and vessels to the palate[2].

The human anatomy, in general, provides knowledge about the localization of structures in the human body, allowing a higher security for the professionals in the health area. In dentistry, as a heath field, is very important to know the constituting structures of the oral cavity and face, aiming to relate these structures to anesthetic and surgical procedures.[3]

In this way, a higher topographic knowledge of this foremen, having as reference the fixed anatomic structures, generate a higher security in the anesthetic technique, with less punches, less quantity of anesthetic liquid, resulting in a higher comfort to the patient.[4]

The greater palatine foramen is important anatomical landmark in relation to the hard palate because of the structures transmitting through it such as the greater palatine nerve, one of the branches of the maxillary division of the trigeminal nerve. Greater palatine nerve innervates the posterior part of hard palate. Greater palatine foramen (GPF) is of censorius importance to ENT surgeons, dentists and oral and maxillofacial surgeons who perform a number of procedures in this region like dental implant placements, local anesthetic administration, Le Forte osteotomies, sinonasal surgeries etc [5]. Evaluating the relative position of GPF is necessarily important for injection of local anaesthetic to provide optimal pain control in oral and maxillofacial surgeries [6]. Maxillary divisions of the trigeminal nerve or its branches are usually blocked by administering anaesthesia in the greater palatine canal. The location and position of greater palatine foramen is the major problem. Most of the textbooks fail to give the exact location of the greater palatine foramen. Matsuda [7] gave the first description of the foramen in 1927. Grays Anatomy [4] states that GPF lies near the lateral palatal border of the transverse palatal suture. Variations in position of Greater palatine foramen had difficulties in identifying the emergence of the greater palatine artery within the oral cavity, which represents important information in the surgery of maxillary sinus , palatal free vascular flaps or cleft palate [8]. For performing operative procedures in the region of posterior part of hard palate, anaesthesia of this region is done by injecting greater palatine

foramen where the nerve with the same name penetrates, responsible for the innervation of the reported area.

The larger greater palatine foramen is located in usually at the apex of the maxillary third molar tooth. The poster lateral region of each of the palatine bones. The greater palatine nerve and blood vessels passes through greater palatine foramen[9]. The lesser palatine nerve and blood vessels passes through smaller opening nearby, the lesser palatine foramen. These two foramina are openings of the pterygopalatine canal that carries the descending palatine nerves and blood vessels from the pterygopalatine fossa to the palate[10] . For the dentist and the oral and maxillofacial surgeon the greater palatine foramen (GPF) is of paramount importance. The anatomical relation of this foramena have not been studied in detail. This clinical anatomy must be born in mind during various procedures in this region like dental implant placements, local anesthetic administration, Greater palatine foramen (GPF) very importance Le Forte osteotomies, sinonasal surgeries etc. For injection of local anaesthetic for optimal pain control in maxillofacial and dental surgeries[11]. Evaluation of the relative position of GPF is important in maxillary divisions of the trigeminal nerve or its branches are usually blocked by administering anaesthesia in the greater palatine canal[12].

II. Material and Method

The measurements between the reference points, were done using the following instruments: divider,ruler. The first measurements performed from the right and left greater palatine foramens to the interpalatine suture. One point of the divider is placed on the greater palatine foramen and other point is placed on the interpalatine suture and the distance between them is measured with the help of a ruler. Totally 100 skulls were measured with the same procedure.[13]

III. Result

	MINIMUM:	MAXIMUM:	MEAN:	STANDARD DEVIATION:
RIGHT GREATER PALATINE FORAMEN TO INTERPALATINE SUTURE:	1.30	2.0	1.65	1.41
LEFT GREATER PALATINE FORAMEN TO INTERPALATINE SUTURE:	1.40	2.0	1.70	1.46

NO. OF SKULLS STUDIED:	100
TOTAL MEAN VALUE :	16.4
STANDARD DEVIATION:	4.96

Totally 100 skulls were measured and the total mean value is 16.4 and the standard deviation is 4.96. The minimum value of right greater palatine foramen to interpalatine suture is 1.30 and maximum is 2.0 and the minimum value of left greater palatine foramen to interpalatine suture is 1.40 and maximum is 2.0.The mean value for the minimum and maximum of right greater palatine foramen to interpalatine suture is 1.65 and the standard deviation is 1.41.The mean value for the minimum and maximum of left greater foramen to interpalatine to interpalatine suture is 1.70 and the standard deviation is 1.46.

IV. Discussion

In relation to the distance between the GPF and the interpalatine foramen, the measurements vary [14] but they remained between 1.5 and 1.84 cm; whereby in the studies, the majority present measurements close to the data of this verified research. Considering the localization of the GPF in relation to the molars, scientific studies are unanimous [15]. All of them found a low number of GPF near the second molar. The position of the closest GPF to the third molar is show in the majority of studies [16] and they are in accordance to the data presented in this study. Another relevant data was the comparison between the mean of the measurements of the reference points in relation to the GPF antimeres, aiming to verify a possible bilateral asymmetry between them. The obtained results only demonstrated a significant difference to the distance from the GPF antimeres to the interpalatine suture, what is also in accordance to other scientific studies that proposed to verify this information [17] Another important data is the correlation between the antimeres of each measurement, even in those where a bilateral asymmetry was verified, meaning that, in occurring significant differences between both sides, a relation between them still remains, otherwise anatomical variations very inharmonious anatomic changes would be frequent[18]. Reports in Legal Dentistry several times contribute to reach na identity of an individual, from information given by its skull. In relation to the possibility of gender identification through skull measurements, several studies have been developed [19]. Male skulls, in general are more angled, larger, heavier and they have a higher thickness in skull bones claimed that male skulls sent measurement significantly higher than female skulls, in relation to the reference points, in this case is the mastoid [20]. Kumar A et al noted that 85% GPF are located opposite third molar tooth. Study by Wang et

al in Chinese population found GPF between 2nd and 3rd molar in 48.5% and opposite third molar in 33.5% cases.[21]

V. Conclusion

The GPF in the majority of the skulls studied was located closer to the third molar, comparing the distances of the GPF antimeres in relation to the reference points, only was found a significant difference between the right and left GPF in relation to the interpalatine suture[22].The distance between the right greater palatine foramen to interpalatine suture is somewhat similar to the distance between left greater palatine foramen to interpalatine suture[23].Thus there is a variation in the distance between the right and left greater palatine foramen to the interpalatine suture[24]. This study will prove very important to compare Indian skulls with skulls of other ethnic groups and other regions. This will further help anaesthetics to exactly locate the position of GPF. Knowledge of variations of GPF will help clinicians to improve the results of surgeries. For Oral and maxillofacial surgery procedures the GPF may be an anatomical landmark in the posterior area of the palate. The variations in its position are helpfull for clinicians in providing improved surgical procedures[25]. Details study on clinical anatomy of GPF can also be helpful in evaluating and predicting craniofacial growth. Knowledge of variations of GPF will helpful for clinicians to improve the results of surgeries.[26]

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