

RELATIVE ANATOMICAL POSITION OF GREATER PALATINE FORAMEN WITH REFERENCE TO INTRAORAL LANDMARKS IN SOUTH INDIAN POPULATION

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ABSTRACT

Background: The Greater Palatine Foramen is of great clinical significance, but the published descriptions about the position of this foramen in the adult human skulls have not been consistently reported. An understanding of the position of Greater Palatine Foramen in relation to adjacent anatomical landmark is important, as this foramen forms a precise site for injection of local anaesthetics to obtain optimal pain control in Dental surgeries.

Materials and Methods: The present study was conducted in 137 dry adult unsexed south Indian skulls obtained from the Department of Anatomy, SRM Medical College Hospital and Research Centre, Tamilnadu. All the skulls studied were normal with fully erupted third molar and free from any pathological changes. We have measured the different parameters in each bone, following the Standard Methodology.

Results: In our study we found that the perpendicular distance of the Greater Palatine Foramen to the mid maxillary suture in south Indian skull was about 13.7 ± 1.13 (SD) mm and the distance of Greater Palatine Foramen to the incisive fossa was approximately 36.6 ± 1.95 (SD) mm. The distance of greater palatine foramen to the posterior border of hard palate was approximately 3.7 ± 0.92 (SD) mm.

Conclusion: To conclude that our study provides appropriate data about the relative anatomical position of GPF that is essential to achieve successful maxillary nerve block via GPF would be relatively easy and free from any complications.

KEY WORDS: Greater Palatine Foramen, Incisive Fossa, Posterior border of Hard Palate.

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INTRODUCTION

The Greater Palatine Foramen is the lower orifice of the greater palatine canal, opens close to the lateral border of the hard palate, immediately behind the palato maxillary fissure. This

foramen otherwise called as posterior palatine foramen, which transmits descending palatine vessels and anterior palatine nerve running forward and medially forms a groove for the greater palatine vessels and nerve [1-3]. The

location of the greater palatine foramen from the posterior border of the hard palate in Indian skull was 3.7mm. The present study evaluates the relative position of greater palatine foramen for precise injection of local anaesthesia for optimal pain control in maxillo facial and dental surgeries in patients where general anaesthesia is contraindicated [4,5].

MATERIALS AND METHODS

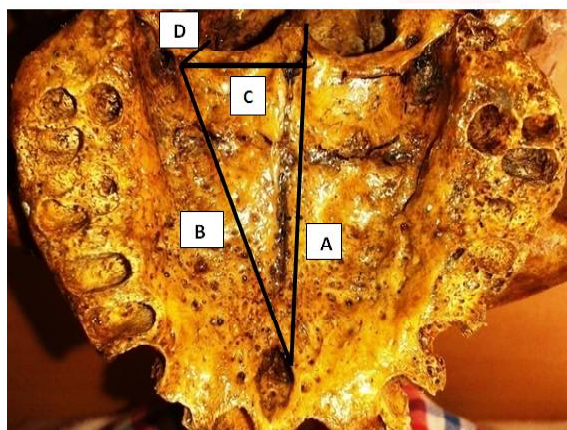
This study was conducted in 137 adult unsexed dried south Indian skulls, collected from the Department of Anatomy, SRM Medical College, Hospital and Research Centre in Chennai. All the skulls studied were normal and free from any pathological changes with fully erupted third molars. The measurements were done on 137 skulls using a vernier caliper, divider and measuring scale. All the measurement was taken bilaterally.

Parameters Studied

1. Shortest perpendicular distance of the greater palatine foramen to the mid sagittal plane.
2. Distance of the greater palatine foramen from the incisive fossa.
3. Distance of the greater palatine foramen from the posterior border of hard palate.

The direction of greater palatine canal.

Fig. 1: Showing the Morphometric parameters measurements.



- A-Mid sagittal plane
- B- Distance between GPF and incisive fossa
- C-Distance between GPF and midline
- D-Distance between GPF and posterior border of hard palate

Statistical analysis: All the findings were tabulated and analyzed statistically using student's t test. Differences between sides were analyzed using Pearson's chi-square test.

RESULTS

Table 1: Shortest perpendicular distance of the Greater palatine foramen to the mid sagittal plane.

| Right & left sides n=137 | Right | | Left | | Total | |
|-----------------------------|--------|--------|--------|--------|--------|---------------------|
| | Mean | ±SD | Mean | ±SD | Mean | ±SD |
| GPF to midline | 13.748 | 1.1248 | 13.653 | 1.1529 | 13.701 | 1.1379 p=0.491ns |

The statistical analysis showed that no significant difference in the measurement between the right and left side with regard to the distance of greater palatine foramen to the midline. The mean distance from the sagittal plane to the greater palatine foramen on the right side was 13.7 ± 1.12 (SD) mm and on the left side the foramen had a mean distance of 13.6 ± 1.15 (SD) mm.

Table 2: Distance of the Greater Palatine Foramen from the incisive fossa.

| Right and left sides n=137 | Right | | Left | | Total | |
|-------------------------------|--------|--------|--------|--------|--------|---------------------|
| | Mean | ±SD | Mean | ±SD | Mean | ±SD |
| GPF to incisive fossa | 36.544 | 1.9921 | 36.668 | 1.9234 | 36.606 | 1.9555 p=0.600ns |

The statistical analysis showed that no significant difference in the measurement between the right and left side with regard to the distance of greater palatine foramen to the incisive fossa. The mean distance from the incisive fossa to the greater palatine foramen on the right side was 36.5 ± 1.9 (SD) mm and on the left side the foramen had a mean distance of 36.6 ± 1.9 (SD) mm.

Table 3: Distance of the Greater Palatine Foramen from the Posterior Border of Hard Palate.

| Right and left sides n=137 | Right | | Left | | Total | |
|--|-------|--------|-------|--------|-------|---------------------|
| | Mean | ±SD | Mean | ±SD | Mean | ±SD |
| GPF to posterior border of hard palate | 3.766 | 0.9607 | 3.792 | 0.8925 | 3.779 | 0.9256 p=0.820ns |

The statistical analysis showed that no significant difference in the measurement between the right and left side with regard to the distance of greater palatine foramen from the posterior border of hard palate. The mean distance from the posterior border of hard palate to the greater palatine foramen on the right side was 3.7 ± 0.9 (SD) mm and on the left side the foramen had a mean distance of 3.7 ± 0.8 (SD) mm.

Table 4: Direction of Greater Palatine Canal.

| Direction of greater palatine canal | Right side n (%) | Left side n (%) | Total n (%) |
|-------------------------------------|------------------|-----------------|-------------|
| Forward | 52 (39.3) | 53 (40%) | 105 (39.6) |
| Forward and lateral | 16(11.5) | 14(10) | 30 (10.7) |
| Forward and medial | 69(49.2) | 70(50) | 139(49.7) |
| Total | 137(100) | 137(100) | 274(100) |

In 49.7% of skulls, greater palatine foramen was directed forwards and medially on the lateral border of the hard palate, where as 39.6% was directed forwards and 10.7% of greater palatine canal directed forward and laterally.

DISCUSSION

The first description about the location of the Greater Palatine Foramen was reported by Matsuda. The greater palatine foramen was found to be 15mm from the palatine mid line and 19mm anterior to the posterior border of the hard palate in East Indians. In Negroid skull, the location of the foramen was 10-16mm antero medial to the pterygoid hamulus and was usually distal to the third maxillary molar tooth on its mid palatine aspect. In a study on Kenyan skulls, 76% of cases showed the location between the second and maxillary molar and the foramen was located at a distance of 4.11mm from the mid Sagittal [6].

The location of the greater palatine foramen from the posterior border of the hard palate in Indian skull was 3.7mm, and in Nigerian skull was 3.5mm respectively which is fairly consistent. The foramen was commonly located medial to the third maxillary molar tooth [7].

The present study evaluated the relative anatomical position of the greater palatine foramen for precise injection of local anesthesia for optimal pain control in maxillo facial and dental surgeries.

The route of choice to block the maxillary nerve as it exits from foramen rotundum is through the greater palatine canal. The greater palatine canal approach technique used most frequently with greater success. The only limitation for wide spread use of this technique is high variability in the position of the greater palatine foramen compounded with conflating and inadequate description of the position. This inadequacy is more marked when it comes to

describe the foramen in Indians especially in south Indian population.

In this study the average distance from the greater palatine foramen to the midline was 13.7mm on the right side and 13.6mm on the left side which compared with that of study on East Indians (15mm) by West moreland et al.,(1982) and Nigerians (15.4mm) by Ajmani et al., (1994),Chinese (16mm) by Wang et al.,(1988) and Thais (16.2mm) by Methathrathip et al., (2005),Caucasians (14.8mm) by West more land et al., (1982). In this study, the distance from the greater palatine foramen to the midline is slightly lower than what has been described in previous studies. When comparing this with the previous studies on Indian skull by Ajmani et al., (1994),on the right side was 14.7mm and on the left side was 14.6mm and Saralya et al., (2007) described the distance was about 14.7mm on both sides. In the present study, the distance from the greater palatine foramen to the incisive fossa was 36.60±0.60mm. This is slightly lower than that reported in the study on same population by Saralaya et al., (2007) [7- 11].

The distance of greater palatine foramen from the posterior border of the hard palate on both sides was fairly constant, with a mean of 3.7mm; Westmore land and Blanton (1982) found a mean distance of 0.19cm from the posterior border of hard palate. Methathrathip et al., (2005) reported the greater palatine foramen was 2.1±1.3mm anterior to the posterior border of the hard palate in Thais. Ajmani found this distance to be 3.7mm and Saralaya et al., (2007) 4.2mm in Indian skull [9-11]. The variability in location of the foramen may be due to structural growth occurring between the maxilla and the palatine bone. The posterior dimension of the palate increases with eruption of the posterior teeth (Slavkin et al., 1966) [12].

Most of the studies describe the direction of greater palatine canal in general way i.e., Forward and laterally, Forward and medially. In this study the direction of Greater Palatine Canal was directed forward in 39.6%, forward and laterally in 10.7%, forward and medially in 49.7%. The opening of the foramen was directed antero-laterally in large number of Nigerian skulls in 38.7% by Ajmani et al., (1994)

[7]. When comparing this with the previous studies on Indian skulls by Saralaya et al., (2007) [11] forward in 41.3%, forward and laterally in 12.5%, forward and medially in 46.2%.

This observation may explain the occasional difficulty encountered while attempting to insert the point of needle into the greater palatine foramen and pterygo palatine canal. According to Slavkin et al., (1966) the frequency of anatomical obstruction of the needle increases with age [16]. West more land and Blanton (1982) reported the opening of the foramen was directed inferiorly (vertically) from the hard palate in 82% of skulls [9].

CONCLUSION

Our study also confirms that maxillary nerve block via greater palatine foramen is respectively easy and free from complication. This study will be useful in the field of Anesthesia and Dentistry. Our study would also help clinicians to locate the GPF in patients with or without maxillary molars.

ABBREVIATIONS

GPF- Greater Palatine Foramen

Ns- Not Significant

s- Significant

SD- Standard Deviation

Conflicts of Interests: None

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