

# Morphologic study of the greater palatine canal

Urbano, ES.\*, Melo, KA. and Costa, ST.

Department of Morphology, Institute of Biological Sciences,  
Federal University of Juiz de Fora – UFJF, Juiz de Fora, MG, Brazil

\*E-mail: esurss@yahoo.com.br

## Abstract

Anesthesia of the hard palate is necessary interventions palate and periodontal procedures, drainage of abscesses and extractions. In most cases the identification of the foramen is made with reference to the second molar. Although this guide is considered unstable because of possible periodontal disease. This study aimed to determine the topography and morphology of the greater palatine canal, and its use for large trunk locks. A sample of 43 skulls was used. Measurements were done with a compass needle points, a caliper and needle 27 g. The landmarks were the anterior nasal spine and later, the tuber of the jaw, the pterygopalatine fossa and cruciform suture. The data were analyzed statistically. The results show a significant difference between the length of the gap the greater palatine foramen and the distance between the tuber of the jaw and the beginning of the suture pterygomaxillary. With this study we can conclude that the gap of the foramen has variable length which requires further criterion for the anesthesia. For the maxillary nerve block via the greater palatine foramen, considerations in facial biotype of the patient should be made.

**Keywords:** anesthesia, dentistry, greater palatine foramen, hard, palate.

## 1 Introduction

Previous knowledge of anatomy and morphology is highly relevant in the field of health, once it allows the professional to acquire security and, later, the necessary ability to some procedures, such as the anesthesia (MADEIRA, 2004).

The anesthesia of the hard palate is necessary when the palatal interventions are needed. For instance, periodontal procedures, drainage of abscesses and even surgical procedures like dental extractions (MADEIRA, 2004; MALAMED, 2001).

The anesthetic technique, in particular, is reported by patients as being one of the most painful. The spike is greater palatine foramen, where the nerves emerge from the same name (MALAMED, 2001).

The identification is most of the times done with the second molar as the reference point. Although, this reference is considered very unstable since it may vary due to periodontitis. This implies the need for further research taking as a parameter is fixed for one to need more safely the location of this anatomical structure (MADEIRA, 2004).

An Indian study, conducted in skulls Indian and Nigerian, Ajman (1994), noted that the position of the foramen are distal to the third molar of Indian skulls in only 2.9% of cases while 48% of the time for the Nigerian skulls and in 64% for Indian skulls he was in medial position, or in front of the third molar.

Another important factor is that the topography of foramina varies according to sex and race of the individual, having said that, this study seeks to quantify the position of individuals in the macro-region is located where the Federal University of Juiz de Fora, making more accurate data for the work of local dentists and even allowing for further analysis of differences between localities within our country.

Thus, this study aims to determine the topography of the palatine foramen in skulls in order to spread knowledge and, as a result, generate greater certainty in the implementation of dental practices, and contribute to the anatomical knowledge of our population.

## 2 Materials and methods

The sample was obtained from archives of the Department of Morphology, Federal University of Juiz de Fora constituting a sample of 43 skulls of both sexes, in good repair. The skulls were selected randomly by the researches.

This study was evaluated and approved by the Ethics and Search Committee from Universidade Federal de Juiz de Fora under the number of 053/2009.

In a pilot study, fifteen skulls were measured in order to calibrate the examiners. All skulls used on the pilot study were excluded from the final sample.

In each skull, it was measured 8 distances using a caplitter and a needle point compass both from ICE brand. For the third dimension, it was used a 25 G needle from UNOJET brand with the help of an endodontic stop.

The dimensions were the following:

- Dimension 1: the center of the greater palatine foramen to the median palatine suture;
- Dimension 2: the center of the greater palatine foramen to the posterior edge of hard palate;
- Dimension 3: penetrability of the greater palatine foramen measured until the needle reaches the anterior wall of pterygoid process (Figure 1);
- Dimension 4: length of the gap t the greater palatine foramen (Figure 2);

- Dimension 5: distance between the two major palatine foramina (Figure 3);
- Dimension 6: distance between the tuber of maxillary and the pterygoid process (pterygomaxillary suture);
- Dimension 7: distance between the anterior nasal spine and the posterior nasal spine;
- Dimension 8: distance between the anterior nasal spine and the cross suture.

To raise the accuracy of the results, all the skulls were remeasured after a period of seven days. The statistic base was done by the computer software SPSS 11. Analysis of the results included descriptive measures and comparative analysis. Differences between groups were considered significant at  $p < 0.05$ .

### 3 Results

The results shows, for distance 1, mean of 16.63, for the right side, and 16.39 for the left side. For distance 2, the mean were 4.5 and 4.56 for the right and left side, respectively. 16.05 for the right side and 15.67 and lefts side, were the results for the dimension 3. For the dimension 4, the mean was 3.64 for the right and 3.53 for the left side of the skull. For the dimension 5, 7 and 8 the mean was,

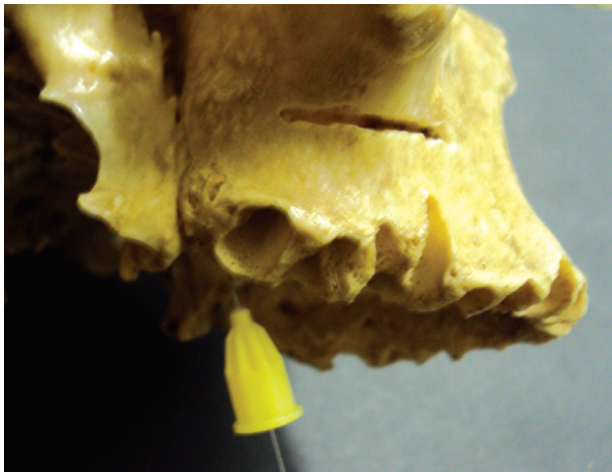


Figure 1. Penetrability of the greater palatine foramen.

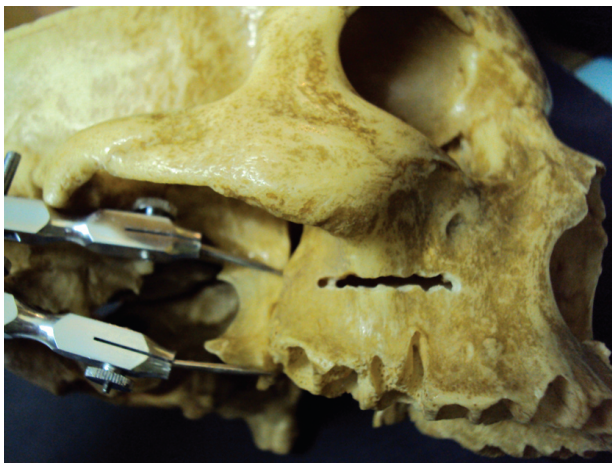


Figure 2. Length of the gap to the greater palatine foramen.

respectively 32.74; 50.63 and 38.04. And last, but not least, for the dimension 6, it was seen, for the right side and for the left side (Figure 4).

Those with normal distribution were tested with the *t*-test and the others have passed the Kruskal Wallis test.

It was possible seen that there were significant differences in gap length and distances between the tuber and the beginning of the suture.

### 4 Discussion

Promote anesthesia of the region of the hard palate is achieved by inserting a needle into the canal through the greater palatine foramen. This process allows the anesthetic solution reaches the pterygopalatine fossa, where the ramification of the trigeminal nerve, the trunk of the maxillary nerve, lies down. The technique which guarantees total maxillary nerve block is simple, practical and effective, having a low rate of incidence of complications,



Figure 3. Distance between the two foramina.

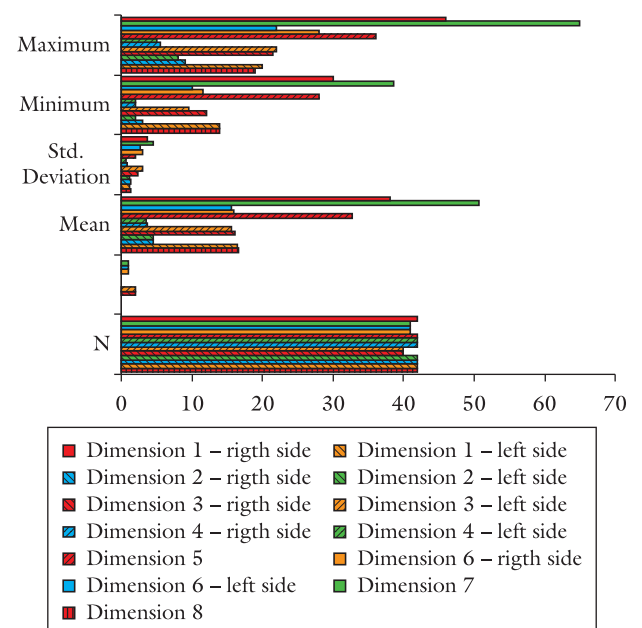


Figure 4. Results.

but requires knowledge of the anatomy of the hard palate (METHATHRATHIP, 2005).

Considering the substantial importance of the exact location of the greater palatine foramen, this study aims to exam dry skulls to describe variations of the position of the greater palatine foramen. Its precise location is not adequately described in anatomy or surgery textbooks, although in anesthetic texts it is possible to find something more specific (JAFFAR and HAMADAH, 2003). However, in comparison of these text its easily find variations in the reported locations (METHATHRATHIP, 2005; JAFFAR and HAMADAH, 2003).

The use of digital cameras followed by image analysis were revealed to be an excellent tool for biometry in morphology in medical and dentistry areas combining easy handling with accessibility according with Moreira, Sgrott, Seiji et al., (2006). There was no statistically significant differences between the means in this method and in the traditional one, though.

Significant differences in gap length and distances between the tuber and the beginning of the suture were observed. Although, Rossi, Ribeiro and Smith (2003), in their study, have noticed the presence of cranial asymmetry statistically significant throughout the whole sample, including the distance from the greater palatine foramen to the posterior nasal spine.

Considering the distance between the center of the greater palatine foramen to the median palatine suture, distance 1, our study shows mean of 16.63, for the right side, and 16.39 for the left side. Our results denote no significant difference between right and left sides. These observations support the findings of Jaffar and Hamadah (2003), Methathrathip (2005) and Saralaya and Nayak (2007). But Teixeira (2007) disagrees demonstrating results with significant difference to the distance between the sides of the greater palatine foramen to the median palatine suture. The last author mentioned also adds that distance 1, as other reference points, such tuber of maxillary and anterior nasal spine, can be applied to estimate genders. He asserts that the average distance between the center of the greater palatine foramen and median palatine suture has statistically larger dimensions in male skulls, which agrees with some observations of Methathrathip (2005) about gender measurements.

The distance 2, from the center of the greater palatine foramen to the posterior edge of hard palate, the mean were 4.5 and 4.56 for the right and left side, respectively. The statistical analysis indicated there was no significant difference in the measurement between the right and left sides on our study and on the studies of Jaffar and Hamadah (2003) and Methathrathip (2005).

According to Methathrathip (2005) and our own results founded there is no significant difference between sides on the penetrability of the greater palatine foramen measured until the needle reaches the anterior wall of pterygoid process, distance 3.

The majority of the skulls in the present study did not vary the length of the gap the greater palatine foramen, presenting the mean 3.64 for the right and 3.53 for the left side. The same pattern occurs in the study of Jaffar and Hamadah (2003).

## 5 Conclusion

It was possible to conclude that the foramen presents a variable size which requires further criteria for the anesthesia. Considering all the distances measured, this study may help clinicians to localize, more precisely, the greater palatine foramen in patients and to predict the depth of a needle to anesthetize the maxillary nerve with a low rate of complications. For maxillary nerve block through the foramen greater palatine, considerations of facial biotype must be done.

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