

# Incidence of the mandibular accessory foramina in Brazilian population

Freire, AR.<sup>1</sup>, Rossi, AC.<sup>1\*</sup>, Prado, FB.<sup>1</sup>, Caria, PHF.<sup>1</sup> and Botacin, PR.<sup>2</sup>

<sup>1</sup>Department of Morphology, State University of Campinas – UNICAMP, CEP 13414-903, Piracicaba, SP, Brazil

<sup>2</sup>Department of Basic Sciences, Paulista State University – UNESP, CEP 16015-050, Araçatuba, SP, Brazil

\*E-mail: anaclaudiarossi@fop.unicamp.br

## Abstract

In adults, the mandibular accessory foramina are variables and are located on the medial surface of the mandible in positions above or below of the mandibular foramen. The aim of this study was to evaluate the incidence of the mandibular accessory foramina in Brazilians human mandibles and discuss the clinical aspects related to the presence of these foramina. Were evaluated 222 mandibles, adults, irrespective of gender. Was observed that 27.93% and 43.24% of the mandibles presented at least one mandibular accessory foramina located on the medial surface in position below and above, respectively, of the mandibular foramen. Unilaterally, the mandibular accessory foramina were observed below and above of the mandibular foramen in 22.07% and 25.22%, of the mandibles, respectively, and 5.85% and 18.02% bilaterally, respectively. This study demonstrated that the incidence of mandibular accessory foramen in the Brazilian population is significant and should be considered in the planning and execution of procedures in several areas of dental clinical practice in order to avoid complications.

**Keywords:** dry mandibles, accessory foramina, anatomical variation, incidence.

## 1 Introduction

The presence of anatomical variations in human mandible such as the mandibular accessory foramina, presents clinical implications, if not previously identified, can cause complications to clinical dental practice (CLAEYS and WACKENS, 2005). Furthermore, failures in the anesthesia by regional blockade of the inferior alveolar nerve are reported due to the presence of these foramina (SAWYER and KIELY, 1991).

In adults, the mandibular accessory foramina are variables and are located on the medial surface of the mandible in positions above or below of the mandibular foramen (SUTTON, 1974; MCGREGOR and MacDONALD, 1987; FANIBUNDA and MATTHEWS, 2000). This formation was related from its first description with the irrigation and the veined drainage of the temporary teeth's system and of the alveolar processes in formation. From birth, this canal suffers a gradual obliteration during the first year of life (FIGÚN and GARINO, 2001).

Foramina on the medial surface of the mandible have been charted previously in order to account for unsuccessful local analgesia (SUTTON, 1974; HAVEMAN and TEBO, 1976; JEYASEELAN and SHARMA, 1984). Neufeld (1958) observed that accessory foramina communicates directly with cancellous bone, under these circumstances it appears that accessory foramina could play an important part in bony invasion by tumors of the mandibular medial surface and this could be of significance in irradiated mandibles (MCGREGOR and MCGREGOR, 1986).

Therefore, the aim of this study was to evaluate the incidence of the mandibular accessory foramina in Brazilians human mandibles and discuss the clinical aspects related to the presence of these foramina.

## 2 Material and methods

Were evaluated 222 dry mandibles, adults with age between 18 and 70 years, irrespective of gender. The evaluation was performed by two examiners who standardized the research from a previous anatomical study of the structure. Were observed concordance intra and inter-examiner for analysis of the foramina. The mandibles used belong to the laboratories of Anatomy of the Faculty of Dentistry of Araçatuba – Paulista State University (UNESP), SP, Brazil and of the Piracicaba Dental School – State University of Campinas (UNICAMP), SP, Brazil.

In the mandibles were evaluated: the presence of the mandibular accessory foramina located on the medial surface of the mandible in positions above or below of the mandibular foramen, the presence of the foramina (bilateral or unilateral), the presence of the foramina on right and on left sides, and the number of mandibular accessory foramina present on each side.

Radiographs in the anatomic area of interest of the mandibles were made with purpose of illustration.

To obtain the results were evaluated the percentage (%) of the mandibles with the presence of the mandibular accessory foramina.

## 3 Results

Was observed that 27.93% of the mandibles presented at least one mandibular accessory foramina located on the medial surface in position below of the mandibular foramen (Table 1) (Figure 1a). These foramina were present unilaterally in 22.07% of the mandibles and 5.85% bilaterally (Table 1). On the right side, the mandibular accessory foramina were present in 17.12% of the mandibles and on the left side in 16.22% (Table 1). In this study, were observed mandibles with multiple foramina. The analysis

of the right side of the mandibles revealed not presents multiple foramina. However, the left side showed 15.77% and 0.45% of the 222 mandibles with one and two foramina, respectively (Table 1).

Was observed that 43.24% of the mandibles presented at least one mandibular accessory foramina located on the medial surface in position above of the mandibular foramen (Table 2) (Figure 1b). These foramina were present unilaterally in 25.22% of the mandibles and 18.02% bilaterally (Table 2). On the right side, the mandibular accessory foramina were present in 27.48% of the mandibles and on the left side in 21.62% (Table 2). In this study, were observed mandibles with multiple foramina. The analysis of the right side of the mandibles revealed that 21.62%, 5.40%, 0.45% and 0.45% of the 222 mandibles with one, two, three and four foramina, respectively. The left side showed 27.93%, 4.05%, 0.9% and 0.9% of the 222 mandibles with one, two, three and four foramina, respectively (Table 2).

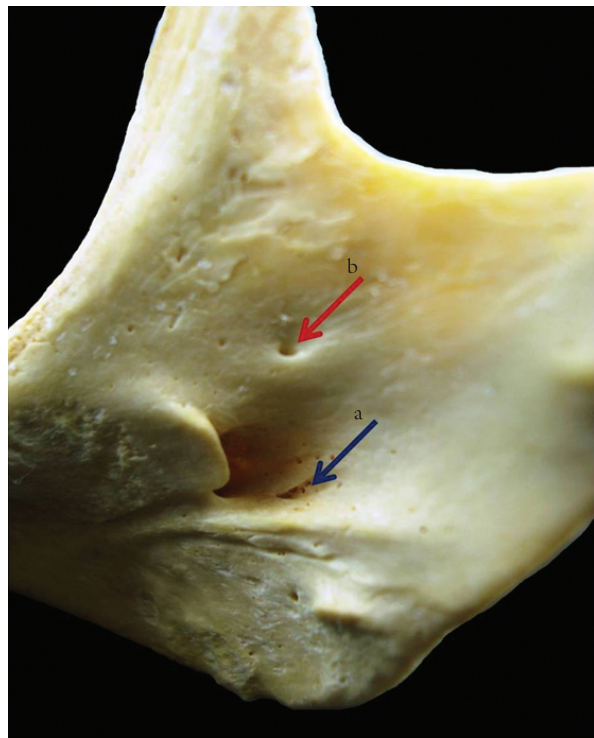
Radiographic analysis revealed that the mandibular accessory foramina located on the medial surface in position below of the mandibular foramen presents a parallel course inferiorly to the mandibular canal (Figure 2). However, the mandibular accessory foramina located on the medial surface in position above of the mandibular foramen presents a course into the mandibular canal (Figure 3).

#### 4 Discussion

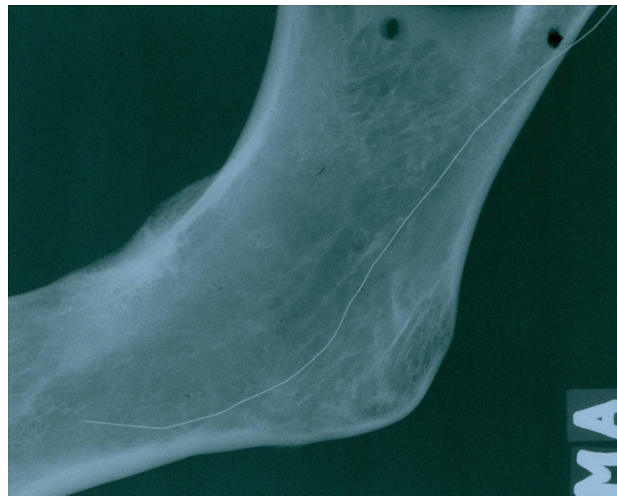
Anatomic variations of the mandible may result in clinical complications if not properly identified, revealing the importance of studying the incidence of these variations (PRIYA and MANJUNATH, 2005). Restoration of form and function without violating important anatomic structures is a fundamental goal in the surgical management of patient (AL-KHATEEB, HAMASHA and ABABNEH, 2007).

From an embryological perspective variations of number in the mandibular canal can be explained because in the early development, the inferior alveolar nerve innervate the anterior teeth group, premolar and the molar region in an independent way (CHAVEZ-LOMELI, MANDILLA LORY, POMPA et al., 1996). The mandibular accessory foramina were related from its first description with the irrigation and the veined drainage of the temporary teeth's system and of the alveolar processes in formation. From birth, this canal suffers a gradual obliteration during the first year of life. In adults, when these foramina remain, it is considered as an anatomical variation (FIGÚN and GARINO, 2001).

The present study showed that the Brazilian population presented a significant incidence of 27.93% and 43.24% of the mandibular accessory foramina in position, respectively, below and above of the mandibular foramen. Sutton (1974) reported the presence of mandibular accessory foramina in 300 human mandibles, which were crossed by



**Figure 1.** Medial view of mandibular ramus. a) Mandibular accessory foramina located on the medial surface in position below of the mandibular foramen; b) Mandibular accessory foramina located on the medial surface in position above of the mandibular foramen.



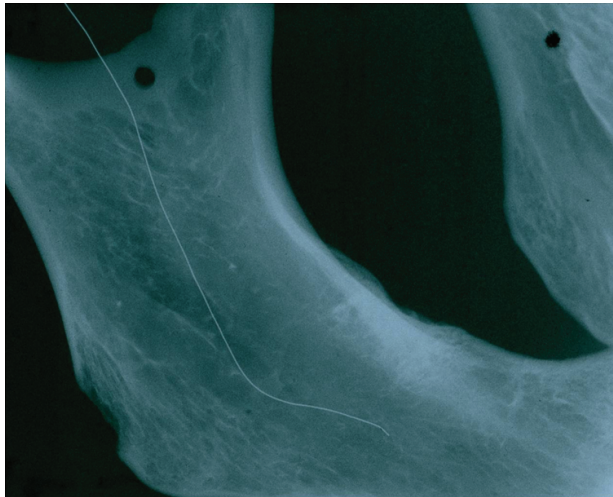
**Figure 2.** Radiography of the medial view of mandibular ramus. Mandibular accessory foramina located on the medial surface in position below of the mandibular foramen. The course of canal is represents by a copper wire.

**Table 1.** Incidence (%) of the mandibular accessory foramina located on the medial surface of the mandible in position below of the mandibular foramen.

Unilateral		Bilateral		Right side				Left side				Overall
22.07		5.85		17.12				16.22				27.93
				Number of foraminas				Number of foraminas				
-	-	1	2	3	4	1	2	3	4	-		
-	-	17.12	-	-	-	15.77	0.45	-	-	-		

**Table 2.** Incidence (%) of the mandibular accessory foramina located on the medial surface of the mandible in position above of the mandibular foramen.

Unilateral	Bilateral	Right side				Left side				Overall
25.22	18.02	27.48				21.62				43.24
		Number of foraminas								
		1	2	3	4	1	2	3	4	
-	-	21.62	5.40	0.45	0.45	27.93	4.05	0.9	0.9	-



**Figure 3.** Radiography of the medial view of mandibular ramus. Mandibular accessory foramina located on the medial surface in position above of the mandibular foramen. The course of canal is represents by a copper wire.

additional sensory fibers. The author related the presence of this foramen to the failure to obtain analgesia from the classical anesthetic techniques and, moreover, confirmed the clinical significance of this observation through the study of anesthetic techniques in 130 patients. Suazo, Zavando and Smith (2009) found an incidence of 42.6% of the mandibular accessory foramina analyzing 256 adults mandible of age between 18 and 100 years, in a Brazilian population.

Thus, the study of the incidence of these foramina is important in order to avoid failure in regional anesthetic techniques for blocking the inferior alveolar nerve due to accessory innervations that this structure provides (KAUFMAN, SERMAN and WANG, 2000). In addition, Fanibunda and Matthews (2000) affirmed that the number and distribution of mandibular accessory foramina on the medial surface of the mandible are important, because provides a direct pathway into the cancellous bone and facilitate the tumors infiltration from the floor of the mouth.

**5 Conclusion**

In conclusion, this study demonstrated that the incidence of mandibular accessory foramen in the Brazilian population is significant and should be considered in the planning and execution of procedures in several areas of dental clinical practice in order to avoid complications. The accessory innervations caused by the presence of this foramen leads to failures in anesthesia techniques by regional block of the inferior alveolar.

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