

# Incidence of large accessory mandibular foramen in human mandibles

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## SUMMARY

The mandibular foramen (MF) is present on the inner surface of the ramus of the mandible. The inferior neurovascular bundle passes through it. A large accessory mandibular foramen (AMF) was present postero-superior to the normal MF (left side) in 1 mandible out of 335 (0.3%) mandibles observed. The diameters of this foramen were 10 mm antero-posteriorly and 5 mm vertically, and that of MF were 7 mm antero-posteriorly and 5 mm vertically. The distance between these 2 foramina was 11 mm, and between the AMF and the apex of the lingula was 4 mm. The distances from the posterior limit of AMF to the posterior border of the ramus and angle were 18 mm and 52 mm, respectively. The AMF led into a canal that passed obliquely forwards and lateral to the mandibular canal and joined the latter at the level of the 3<sup>rd</sup> molar. A large AMF is a rare occurrence and therefore one should be aware of its incidence, since the structure/s passing through it could be compromised during surgical procedures of this area.

**Key words:** Mandibular foramen – Accessory mandibular foramen – Inferior alveolar nerve – Ramus of mandible

## INTRODUCTION

The mandibular foramen (MF) is located on the inner surface of the mandibular ramus. It opens

upwards just postero-inferior to the lingula and transmits the inferior alveolar neurovascular bundle. Many studies have been conducted to evaluate its exact position in order to locate the inferior alveolar nerve during the anaesthetic blockade of the latter (Daw et al., 1999; Mbajior-gu, 2000; Keros et al., 2001). Interestingly, almost all studies failed to establish the constant position of this foramen, probably due to the variations among races and ethnicity. All these studies and standard textbooks of Anatomy (McMinn, 1992; Soames, 1995) have concentrated only on the dimensions and locations of single mandibular foramen and not on the incidence of an additional mandibular foramen such as the one reported here. If such a foramen exists, it could transmit the structures that usually pass through the MF or a separate set of structures. In either case, these structures would be involved in anaesthetic and surgical procedures on the mandible. In view of this risk, the present study was aimed to investigate the possibility of a large sized accessory MF in dry human mandibles of south Indian origin.

## MATERIALS AND METHODS

In this study 335 dry human mandibles were used. These bones were collected from the department of anatomy and medical students of Kasturba Medical College, Mangalore. All the bones were observed for the presence of AMF. In a bone that presented the AMF, the canal leading from it was studied by chiseling the mandi-

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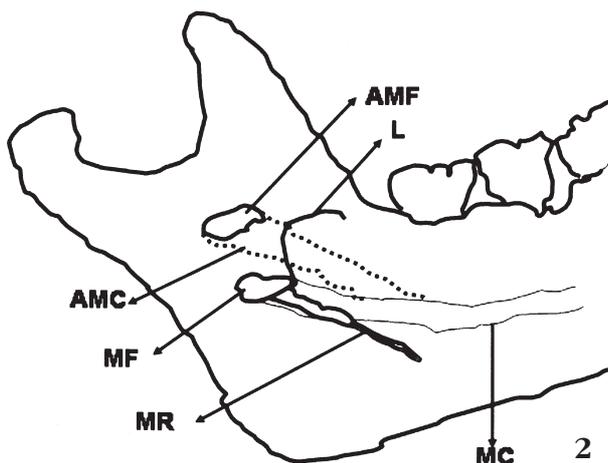
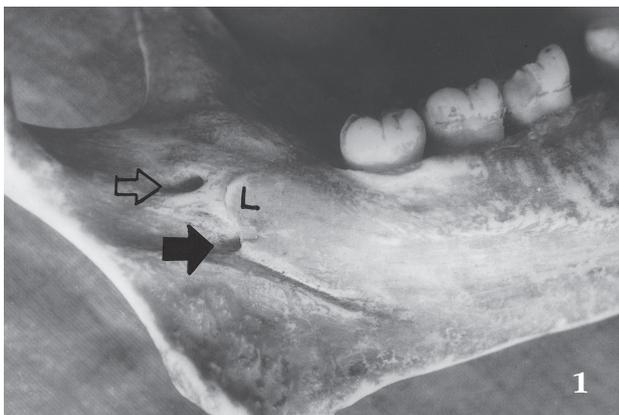
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ble from its inner surface. The findings were recorded by photography and line drawings.

## RESULTS

Out of 335 mandibles studied, only one mandible (0.3%) showed the AMF on the left side (Fig. 1). This additional foramen was present postero-superior to the normal foramen. The normal MF measured 7 mm in antero-posterior diameter and 5 mm in vertical diameter, whereas the additional foramen measured 10 mm antero-posteriorly and 5 mm vertically. The distance between these two foramina was 11 mm. It was located 4 mm posterior to the apex of the lingula at the level of the root of third molar. Its posterior limit was 18 mm anterior to the posterior border of the ramus. The distance from the gonial angle to the foramen was 52 mm. The canal extending from this foramen coursed obliquely downwards forwards and



**Fig. 1.-** Photograph of a mandible showing an AMF (open arrow) on the left side. Note that the normal MF (arrow) is located anteroinferior to it. The typical tongue-shaped lingula (L) is indicated.

**Fig. 2.-** Line drawing of the same mandible showing the AMF and the MF. The former is located posterosuperior to the latter. Note the mandibular canal (MC) coursing through the ramus and the body, and the accessory mandibular canal (AMC; broken line) joining the former from superolateral aspect below the 3<sup>rd</sup> molar. A typical tongue-shaped lingula (L), and mylohyoid groove (MR) are indicated.

lateral to the mandibular canal and joined the latter at the level of the 3<sup>rd</sup> molar (Fig. 2).

## DISCUSSION

The position of the MF is variable (Nicholson, 1985) leading to occasional failure of inferior alveolar nerve blockade (Afsar et al., 1998; Keros et al., 2001; Blanton and Jeske, 2003). The occurrence of an AMF would therefore aggravate these complications. We have previously reported that the retromolar foramen could be present (21.9%) in the retromolar triangle and that some branches from the inferior alveolar neurovascular bundle would pass through it (Narayana et al., 2002). In this case, the AMF was present outside the retromolar triangle and it was much larger in diameter compared to the retromolar foramen reported in the literature (Ossenberg, 1987; Pastor-Vazquez et al., 2001; Narayana et al., 2002). Thus it is clear that, the foramen reported in this case was not a retromolar foramen. Moreover, a small AMF is usually located behind the MF (Pastor-Vazquez et al., 2001), and the other studies (Sutton, 1974; Jayasheelan and Sharma, 1984) also did not find an AMF as large as the one reported here. To our knowledge, there are no reports on AMF similar to this one, as well as the structure/s passing through it.

The canal (accessory mandibular canal) extending from the AMF joined the mandibular canal below the 3<sup>rd</sup> molar with an acute angle (Fig. 2). The anatomy of this canal was entirely different from three types of retromolar canals reported previously (Narayana et al., 2002). The accessory mandibular canal was coursing lateral to the mandibular canal and had the same diameter of the mandibular canal, whereas the retromolar canals were narrow and all of them started from the retromolar triangle. Thus, there is no similarity between the AMF reported here and the retromolar foramina and the canals of the mandible. This indicates that the AMF and its canal are a separate set of non-metrical variants and their low incidence (0.3%) against 5.2% of small-sized AMF located posterior to the MF (Pastor-Vazquez et al., 2001), also implies that it is a very rare trait of the mandible. Alternatively, it could be said that, this is a case of duplication of the MF, which is further supported by the resemblance of its canal to the mandibular canal in its anatomy. That is, it joined the mandibular canal after a short course lateral to the former. The appearance of the AMF and its canal in the radiograph is not known, since such a case has not been previously recorded. Thus, for an unsuspecting surgeon, it may be a trap leading to serious complications.

The mechanism of formation of this type of AMF is not known. It is known that the inferior

alveolar artery passes through the small-sized AMF located behind the MF during development (Pastor-Vazquez et al., 2001). It may be that similar structure/s develops towards the mandible during its development, finally resulting in the formation of this foramen and consecutively the canal. Regardless of its mechanism of formation, its unexpected encounter would damage the structures passing through it, during surgical approaches in this area.

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