Journal of the Anatomical Society of India xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Journal of the Anatomical Society of India

journal homepage: www.elsevier.com/locate/jasi

Original article

Clinical implications of variations in the position of mandibular foramen in North Indian mandibles

Prerna Gupta [a,*], Neetu Bharati [a], Muktyaz Hussein [b], Abhishek Bahadur Singh [c]

[a] Department of Anatomy, Integral Institute of Medical Sciences and Research, Lucknow, U.P., India
[b] Department of Anatomy, Govt. Medical College, Ambedkar Nagar, U.P., India
[c] Department of Otorhinolarygology, King George Medical University, Lucknow, U.P., India

ARTICLE INFO

Article history:
Received 22 August 2016
Accepted 7 January 2017
Available online xxx

Keywords:
Mandibular foramen
Position
North Indian mandibles
Clinical implications

ABSTRACT

Introduction: The mandibular foramen is a prominent feature on the medial surface of the ramus of the mandible which is located just above its center. The dental surgeon who is going to perform a surgery in oral cavity, tooth extraction should be aware of accessory mandibular foramina for planning to give anesthesia at an appropriate anatomical site as the branches of facial, mylohyoid, buccal and transverse cervical cutaneous nerves are known to pass through these foramina.
Methods: The present current study was carried out on 50 human dry North Indian mandibles in which 45 were dentulous and 5 edentulous. The measurements were obtained with sliding caliper as per standard anthropological conventions.
Results: We observed that the mandibular foramen was positioned at a mean distance of 19 mm with SD 2.34 from coronoid notch of the anterior border of the ramus. It was found in this study that the location of mandibular foramen is not at the center of mandibular ramus in the horizontal plane, it is situated at a distance of 2.75 mm posterior to the midpoint of antero posterior width of ramus of mandible.
Discussion: Knowledge of the position of mandibular foramen is very importance for many procedures in dentistry and useful for the maxillofacial surgeons, radiologists and oncologists in preventing neurovascular complications and misinterpretations.

1. Introduction

The mandible is the strongest bone present in the lower jaw. It is the only movable bone of the facial skeleton. It has a horse shoe shaped body and right and left rami, which are quadrilateral in shape. The ramus on each side projects from the posterior end of the body and bears the condylar and coronoid processes on each side. The rami of the mandible have anterior, posterior, superior and inferior borders and two surfaces the lateral and the medial surfaces. The inner or medial surface of the ramus has a mandibular foramen near its center which is guarded by a bony projection known as lingula. The mandibular foramen leads into the mandibular canal (MC), canal present on the body of the mandible which gives passage to inferior alveolar nerve and vessels, which supply the lower teeth.[1] The Lingula is a tongue shaped bony projection which is just opposite to the mandibular foramen. Previous studies have classified the lingula into the triangular, nodular, truncated and assimilated type, depending on its shape.

The mandibular foramen is an opening on the internal surface of the ramus for the passage of mandibular vessels and nerve. The mandibular canal starts at the mandibular foramen and descends obliquely forward in the ramus, and later in the body of the bone containing the inferior alveolar neurovascular bundle.[2] The present study was carried out to locate the variations in the position of mandibular foramen in various adult dry mandibles so that the data can be useful for inferior alveolar nerve anesthesia, dento alveolar surgery planning, lesion diagnosis and endodontic treatments.[3] Problems may arise while giving anesthesia in the region of mandible. The distance between the anesthetic needle and mandibular foramen determines the success rate of the procedure.

The changes in position of mandibular foramen may go unnoticed, which can give rise to errors in anesthesia of Inferior alveolar nerve. Variations in the Position of mandibular foramen

* Corresponding author.
E-mail address: dr.prerna2009@gmail.com (P. Gupta).

http://dx.doi.org/10.1016/j.jasi.2017.01.003
0003-2778/

Please cite this article in press as: Gupta P, et al. Clinical implications of variations in the position of mandibular foramen in North Indian mandibles, *J Anat Soc India.* (2017), http://dx.doi.org/10.1016/j.jasi.2017.01.003

along with changes in height and breadth of ramus of mandible and absence of any specific anatomical bony landmarks can lead to achievement of low levels of anesthesia and approximately 20–25% failure rates have been observed by various authors in Inferior alveolar nerve block.[5] The various past studies reported the importance of mandibular foramen in the success of inferior alveolar nerve block. Although several reports in the literature have mentioned about the position of mandibular foramen from various anatomical landmarks, but no study is available to explain the technical aspect of the nerve block to overcome these failures.

2. Aims and objectives

The present study was carried out to identify the precise landmarks which would help to locate the exact position of mandibular foramen thus helping the dentists and clinicians in modifying the technique of inferior alveolar nerve block. The position of this foramen will avoid injury to the inferior alveolar nerve and vessels which pass through it and supply the lower teeth.

3. Materials and methods

3.1. Source of data

The present current study was carried out in the department of Anatomy, Integral Institute of Medical Sciences and Research on 50 human dry mandibles of North Indian population of unknown age and sex in which 45 were dentulous and 5 were edentulous. Preferably these human dry mandibles were obtained from the department of anatomy, Integral Institute of Medical Sciences and Research Lucknow. Damaged and diseased human dry mandibles were excluded from the current study.

3.2. Method of collection of data

In the present study all measurements were obtained with sliding caliper to the nearest millimeters (mm) as per standard anthropological conventions. The position of mandibular foramen showing in (Fig. 1), measurements were taken on both side and then the average of both was considered for statistical analysis. The mandibular points for measurements are from the anterior border of the ramus of mandible to the mid-portion of the mandibular foramen (Fig. 2) and then from the mid-portion of the mandibular foramen to the posterior border of the ramus of mandible (Fig. 3). Similarly measurements were made from the midpoint of foramen to other bony landmarks such as inferior border, internal oblique ridge, mandibular notch and condyles were carefully measured and recorded. The ramus height from the head of condyle to the inferior border of mandible was also measured.

4. Results

In our current study on variations in position of mandibular foramen in North Indian mandibles we observed that the mandibular foramen is positioned at a mean distance of 19 mm with SD 2.34 from the coronoid notch of the mandible and anterior border of the ramus (Table 1). It was also found that the position of mandibular foramen is not at the center of ramus of mandible in the transverse plane. It is situated at a distance of 2.75 mm posterior to the midpoint of anteroposterior width of ramus. Superio-inferiorly the mandibular foramen is situated 5 mm inferior to the midpoint of the condyle inferior border in a vertical

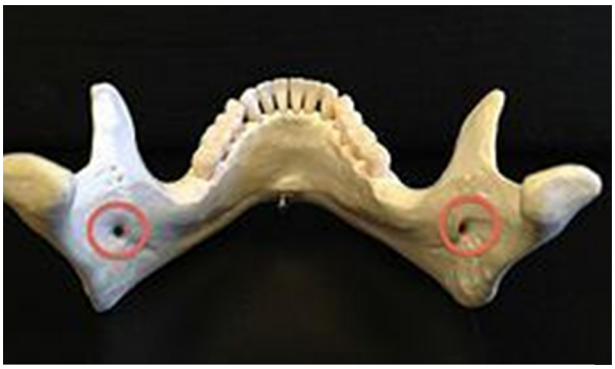

Fig. 1. Showing the position of mandibular foramen in mandible both side.

Fig. 2. Showing distance of mandibular foramen from the anterior border of ramus of mandible.

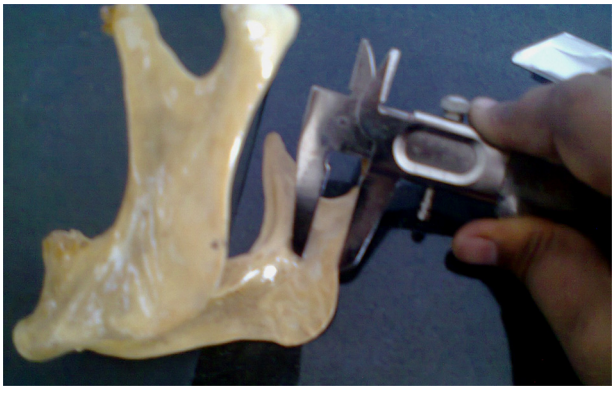

Fig. 3. Showing distance of mandibular foramen from posterior border of ramus of mandible.

Table 1
Showing the distance of mandibular foramen in (mm) from the anterior border of the ramus of mandible.

Side	Dentulous mandibles ($n=45$)				Edentulous mandibles ($n=5$)			
	Min.	Max.	Mean	SD	Min.	Max.	Mean	SD
Right	15	24	18.9	2.14	15	21	17.8	2.09
Left	13	24	18.88	2.34	15	21	17.5	2.19
T	0.152				0.603			
P value	0.88				0.563			

Please cite this article in press as: Gupta P, et al. Clinical implications of variations in the position of mandibular foramen in North Indian mandibles, *J Anat Soc India.* (2017), http://dx.doi.org/10.1016/j.jasi.2017.01.003