Research Article

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Evaluation of Pattern of Inferior Alveolar Nerve Canal in Patients Requiring Surgical Procedure: A Clinico- Radiographic Study

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ABSTRACT

Background: Mandibular canal (MC) or inferior alveolar nerve canal (IANC) is a landmark seen on lingual side of mandible. The present study was conducted to evaluate pattern of inferior alveolar nerve canal in patients requiring surgical procedure.

Materials & Methods: The present study was conducted on 86 patients of both genders requiring surgical procedure in mandibular posterior region. A thorough oral examination was performed in all patients. Patients were subjected to panoramic radiography. The occurrence of IANC based on classification given by Nortje *et al* into type A, B, C and D was evaluated.

Results: Out of 86 patients, males were 46 and females were 40. Type A pattern of IANC was seen in 21 males and 18 females, type B in 15 males and 12 females, type C in 4 males and 3 females, type D was seen in 6 males and 7 females. The difference was non- significant (P> 0.05). Bifid canal was present n 3 males and 3 females, partial absence of canal was seen in 2 males and 3 females and complete absence of canal was seen on 1 male and 1 female. The difference was non- significant (P> 0.05).

Conclusion: Authors found that in most of the patients, high mandibular canal was obtained. Other variations were bifid canal, partial and complete absence of canals.

Keywords: Bifid canal, mandibular canal, Panoramic radiograph.

INTRODUCTION

Mandibular canal (MC) or inferior alveolar nerve canal (IANC) is a landmark seen on lingual side of mandible. It is most important bony structure that begins from the mandibular foramen on the ramus of mandible. Its pathway follows the lower and lateral direction passing to the mandible body, where it is related to the roots of the lower teeth, whose cross-sectional examination reveals an oval, circular or piriform shape.[1]

It is present bilaterally on both sides of mandible. The assessment of exact location and position of inferior alveolar nerve canal is paramount importance.[2] The anatomy of MC shows variation. It occurrence demands special knowledge especially in oral anesthesia, dental implant therapy and maxillofacial surgery. IANC may be damaged by mechanical trauma through irrigants during an endodontic treatment, drilling, root canal over

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instrumentation, third molar exodontia or damage during implant location.[3]

Fig 1: High MC.

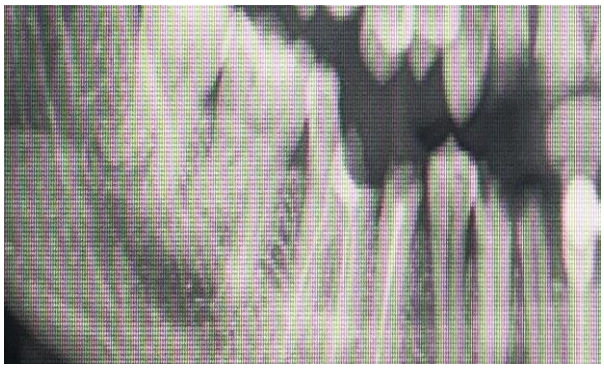


Fig 2: Intermediate MC.

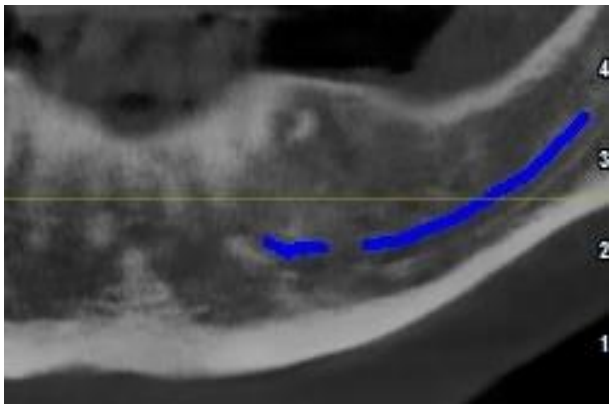
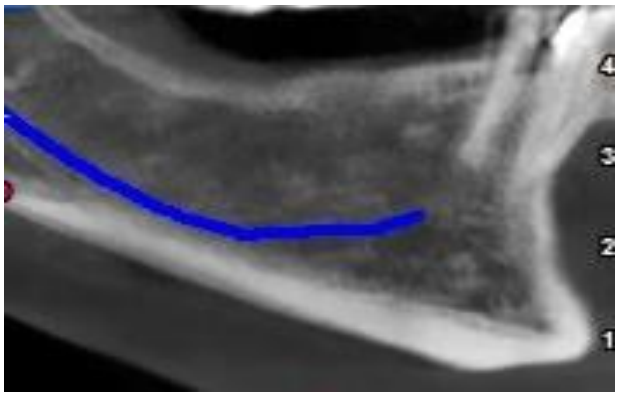


Fig 3: Low MC.



According to Nortje et al[4], there are four type of mandibular canal variation. The location and configuration of the inferior alveolar nerve canal (IAN) such as type A, B, C, D shows their occurrence in different persons. Type A is the early preponderance of canals associated with the roots of teeth (i.e. high canal). Type B is intermediate, type C is low mandibular canal and type D shows variation such as bifid or complete or partial absence of canal.[5] present study was conducted to evaluate pattern of inferior alveolar nerve canal in patients requiring surgical procedure.

Table I: Distribution of patients.

Total- 86		
Gender	Males	Females
Number	46	40

Graph I: Distribution of patients.

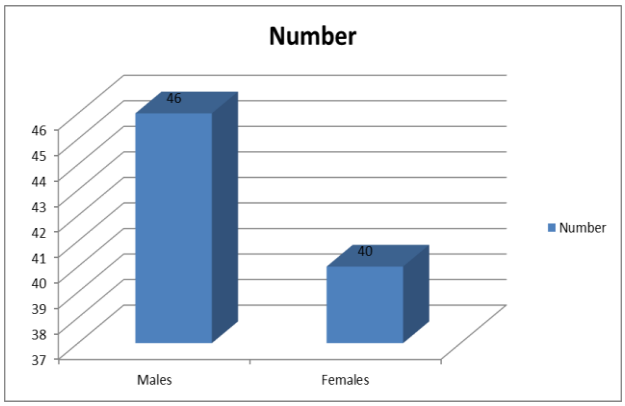


Table II: Variation of inferior alveolar nerve canal.

Type	Males	Females	P value
A	21 (45.6%)	18 (45%)	0.12
B	15 (32.6%)	12 (30%)	
C	4 (8.6%)	3 (7.5%)	
D	6 (13.1%)	7 (17.5%)	

Graph II: Variation of inferior alveolar nerve canal.

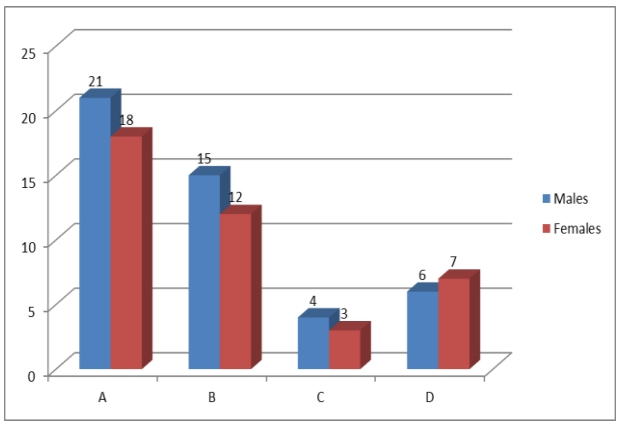
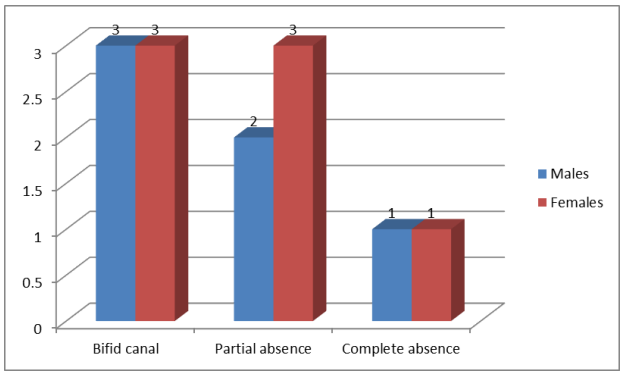


Table III: Distribution of type D pattern.

Type D	Males	Females	P value
Bifid canal	3	3	0.78
Partial absence	2	3	
Complete absence	1	1	

Graph III: Distribution of type D pattern.



MATERIALS & METHODS

The present study was conducted in the department of Oral & Maxillofacial surgery. It comprised of 86 patients of both genders requiring surgical procedure in mandibular posterior region. Patients requiring dental implants, surgical extraction of mandibular third molar etc. were included. Patients with incomplete erupted third molar and pregnant women were excluded from the study. Ethical clearance was obtained prior to the study from institutional ethical committee. All were informed regarding the study and written consent was obtained.

General information such as name, age, gender etc. was recorded. A thorough oral examination was performed in all patients. Patients were subjected to panoramic radiography taken with Kodak extraoral digital machine operating at 120 kVp, 12 mA and 17 seconds. Poor quality images were not taken into consideration.

The occurrence of IANC based on classification given by Nortje et al into type A, B, C and D was evaluated. Results thus obtained were subjected to statistical analysis using chi- square test. P value less than 0.05 was considered significant.

RESULTS

Table I, graph I shows that out of 86 patients, males were 46 and females were 40. Table II, graph II shows that type A pattern of IANC was seen in 21 males and 18 females, type B in 15 males and 12 females, type C in 4 males and 3 females, type D was seen in 6 males and 7 females. The difference was non- significant (P> 0.05). Table III, graph III shows that bifid canal was present n 3 males and 3 females, partial absence of canal was seen in 2 males and 3 females and complete absence of canal was seen on 1 male and 1 female. The difference was non- significant (P> 0.05).

DISCUSSION

The mandibular canal is a single channel which is enclosed by bone. It is referred to as bilateral single structure that curves downward and forward from mandibular foramen toward the mental foramen.[6] It encloses the inferior alveolar nerve and associated vessels that give rise to dental plexus within the canal in respective areas to supply each tooth of the lower jaw.[7] The inferior alveolar nerve enters the mandibular canal through mandibular foramen on the medial aspect of the ramus and exits through the mental foramen on the lateral aspect of the body of the mandible.

Surgical procedure in mandibular posterior region requires accurate assessment and evaluation of mandibular canal to avoid any untoward injury to the anatomic vital structures.[8] Iatrogenic injury to IANC in surgical methods such as during dental implants insertion, disimpaction, osteotomy etc. are common. The variations in the course, shape, curve, and direction of the IAN complicates the regional anatomy. Most previous attempts to describe the IAN anatomy too have not been accurate.[9] The present study was conducted to assess variation in occurrence of inferior alveolar nerve canal (IANC) in adult population requiring surgical procedure.

In present study, out of 86 patients, males were 46 and females were 40. We found that type A pattern of IANC was seen in 21 males and 18 females, type B in 15 males and 12 females, type C in 4 males and 3 females, type D was seen in 6 males and 7 females. Kumar Potu et al[10] described the MC pathway in a cross-section view of mandible, reporting that MC crosses lingually to the third and second molars

roots, adjacent to first molar roots and buccally from the premolars. At the retromolar space, the distance from the MC to the buccal cortical presented values close to twice of those observed to the lingual cortical, while the distance to the mandibular base was approximately fourfold to the lingual cortical.

We found that bifid canal was present n 3 males and 3 females, partial absence of canal was seen in 2 males and 3 females and complete absence of canal was seen on 1 male and 1 female. Munoz et al[11] analyzed 50 CBCT images assessing the specific location of MC at the retromolar space as related to inferior teeth roots. The MC length and pathway were measured from the mandibular foramen up to the mental foramen. MC was closer from lingual cortical than buccal at the retromolar space as well the distal root of the second molar and the root of the second premolar are closest to MC. A mean length for the MC of 70.8 (±5.3 mm) for the right side and 71 (±5.8 mm) for the left side was observed.

Singh et al[12] in their study assessed the prevalence of bifid mandibular canals using cone beam computed tomography (CBCT) images. A total of 408 CBCTs were examined, out of which 23 exhibited bifid mandibular canal with the prevalence of 5.63%. Type 2BC was the most common type of bifid mandibular canal. All the CBCTs showing Type 1U and 1B bifid mandibular canals, 33.3% of Type 2UC and 25% of Type 2BC bifid mandibular canals exhibited Class B relationship with the third molar.

Panoramic radiography is widely used radiographic tool for assessment of mandibular canal. It has advantage that in one image only both IANC can be assessed. I present study, digital OPG images were obtained.

CONCLUSION

Inferior alveolar nerve canal is a vital anatomical landmark which required careful evaluation before planning any surgical procedure in mandibular posterior region of jaw. Authors found that in most of the patients, high mandibular canal was obtained. Other variations were bifid canal, partial and complete absence of canals.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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