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Radiographic evaluation of mandibular canal and Angle's malocclusions amongst Konkan population: a Retrospective Study

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ABSTRACT

AIM AND OBECTIVE: To evaluate location of mandibular canal on panoramic radiograph in relation to apices of permanent mandibular molars and base of mandible in correlation with Angle's class I, II and III malocclusion.

MATERIALS AND METHODOLOGY: A total of 1000 panoramic radiographs as well as cephalometric radiographs of last 5 years were retrieved. The panoramic radiograph was evaluated for the bilateral relation of mandibular canal with the mandibular 1st, 2nd and 3rdmolar apices and base of the mandible. Similarly, the cephalometric data of the same individual were also evaluated for Angle's malocclusion.

RESULTS: Chi-square test significantly showed high proportion of mandibular canal type 2(50.7%) & (51.6%) in class I and class II Individuals but on contrary in class III individuals mandibular canal type 3(50.9%) was noted significantly.

CONCLUSION: The morphological changes in anatomical location of mandibular canal in relation to apices of permanent molars and mandibular base are related to angle's classes I, II and III malocclusion.

Keywords: Mandibular Canal, Angle's class I, II and III malocclusion

INTRODUCTION

Malocclusions are understood as problems of growth and development that affect the occlusion of teeth. *El-Mangoury & Mostafa (1990)* found the worldwide prevalence of malocclusion and concluded that:

Angle class I (50 to 55%) (Most prevalent group)

Angle class II (15 to 20%)

Angle class III (1%).

To prevent injury to ***inferior alveolar nerve*** during dental procedures, knowledge of its anatomical location and course of mandibular canal is imperative. *According. To Díaz Torres et al. (1990) a*mong the many factors that change the position of mandibular canal, is the type of occlusion of the individual. *Jung et al. (2007)* suggested that these differences in the position of mandibular canal occur because of changes in positioning of teeth in molar regions especially in Angle class III individuals. Malocclusion is the misalignment of teeth when jaws are closed and can be identified clinically. By knowing the common type of canal in each occlusion one can have an idea of location of nerve. So we planned to correlate mandibular canal and Angle's malocclusion.

Materials and methodology

Total **1000 patient's** data including Panoramic radiographs as well as cephalometric radiographs

from last 5 years were retrieved. We excluded out the cases of systemic disorders and parafunctional habits. **Panoramic radiograph** was used to evaluate bilateral relation of mandibular canal in relation to mandibular 1st, 2nd and 3rdmolar apices and base of the mandible. Similarly, the **cephalometric data** of the same individual were evaluated for Angle's occlusion.

Mandibular canal evaluation

Mandibular canal was evaluated using panoramic radiographs according to Nortje et al classification (1977). Mandibular canal is divided into following types;

1 - If mandibular canal is in contact or is positioned at a maximum of 2 mm from the apex of first, second and third permanent molars. (Figure 1)

2 - If mandibular canal is located halfway between the apices of permanent molars canals, and halfway from the base of the mandible. (Figure 2)

3 - If mandibular canal is in contact or approaches, a maximum of 2 mm from cortical bone of the mandibular base. (Figure 3)

The obtained radiographic data, Measurements of the distance of mandibular canal in relation to apices of the teeth, and the mandibular base were correlated and analysed using SPSS software ver. 20.

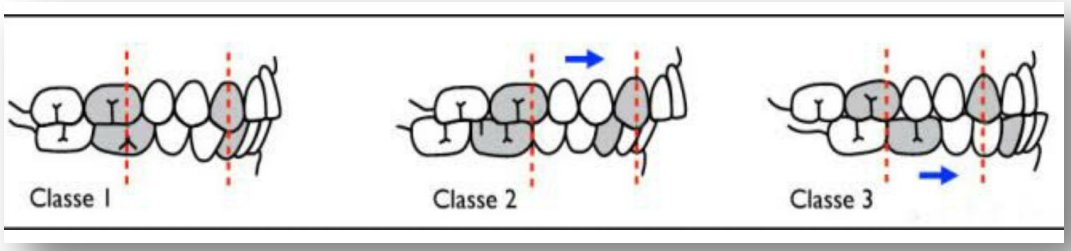
(Figure 1)

(Figure 2)

(Figure 3)

EVALUATION OF MALOCCLUSION

Cephalometric radiographs were used to determine occlusal Angle Classes of these individuals. (Figure 4)



Results

Class I (52.7%) was the most prevalent group followed by class II (30.8%) and a very less proportion of class III (16.55) group.

In Mandibular canal, Type 2 (46.7%) was in high proportion, Type 1(31.2%), Type 3(22.1%) was noted.

In our study, Type 2 mandibular canal is common in both class I(50.7%) and class II(51.6%),followed by type 1 canal i.e In class I(32.6%) and class II(32.5%).type 3 was found least common in both class I(16.7%) and class II(15.9%) but it was found prevalent in class 3 occlusal classes. (Table 1)

Discussion

Panoramic radiograph was used because it is a popular and widely accepted technique to produce a single image of facial bones and their surrounding structures. It is also possible to perform reproducibility on panoramic radiographs, because of minimizing errors and eliminating image distorsions during radiographic technique *(Schulze et al., 2000).*

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Panoramic radiographic interpretation of mandibular canal is not facilitated by overlapping anatomical structures because the panoramic devices put mandible as a structure that remains on the cutting plane of device. *(Kambylafkas et al., 2006; Liu et al.).*

Similar Studies Were Conducted by Tronje *et al., 1981; Wadu et al., (1997); Oguz & Bozkir, (*2002); Yamamoto *et al., (2002); Ylikontiola et al.,(2002); Tsujiet al., (2005),Jung et al. (2007).*

In Previous study, it was revealed that individuals with Angle class I, most prevalent group of occlusal class had not shown the tendency for a specific type of mandibular canal type, but our study has shown mandibular canal type 2 common in angle class 1 Individuals.

The knowledge of real position of mandibular canal in three occlusal classes is applied for planning surgeries of mandibular third molar, placing implants in the mandible *(Li et al., 2001; Ylikontiola et al.), and also in* sagittal split osteotomy of mandibular ramus *(Yamamotoet al.; Ylikontiola et al.).*

The results of this study will assist those planning to avoid complications during and after surgery, to determine location of mandibular canal.

Conclusion (table 1)

- Mandibular canal type 2 is more commonly seen in angle class I and class II followed by mandibular canal type 1.
- In class III individuals, a high proportion of mandibular canal type 3 is observed and a similar proportion of type 2 and type 1.
- In females with class III, mandibular canal type 3 is significantly found, but on the counterpart in males no such correlation is observed.
- These knowledge of type of mandibular canal in region of lower molars can be definitely used to clinically determine canal location where there is unavailability of radiographs and other sources.

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	TYPE 1	TYPE 2	TYPE 3
CLASS 1	32.6%	50.7%	16.7%
CLASS 2	32.5%	51.6%	15.9%
CLASS 3	24.2%	24.8%	50.9%

Table 1:

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FIGURE LEGENDS

1: mandibular canal is in contact or is positioned at a maximum of 2 mm from the apex of first, second and third permanent molars.

2 - Mandibular canal is located halfway between the apices of permanent molars canals, and halfway from the base of the mandible.

3 - Mandibular canal is in contact or approaches, a maximum of 2 mm from cortical bone of the mandibular base.

4: Angles classification of malocclusion

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