Radiographic determination of the distance of the mandibular third molar tooth to the inferior alveolar canal.

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ABSTRACT
Background: This study was done to evaluate the following:
1- Distance between the mandibular canal and the lower third molars
2- Distance between the mandibular canal and the lower cortex of the mandible

Materials and methods: One hundred radiographs were taken from patients' files who attended the dental clinics of the Faculty of Dentistry, Ajman University of Science and Technology. All radiographs were exposed and processed in a standardized pattern. Substandard radiographs were excluded.

Results: The image of lower 3rd molars in of 66% of cases were found above the mandibular canal border, 16% of the cases were touching the upper border, 14% between the borders, 2% below the canal border and 2% touching the lower border. The vertical distance between the lower border of the mandibular canal and the inferior border of the mandible at the area mesial to the lower thirds were not similar in both sides, in the right side 2% of cases are of 0.4 cm distance, and 1% of 2.2 cm distance and the majority 13% are of 0.9 cm distance. Whereas in the left side the majority 14% is of 1.1 cm distance, 5% of 0.4 cm and 1% is of 3.5 cm distance.

Conclusion: In this study, it was found that 16 % of the cases touching the upper border of the mandibular canal in right side and 31% in left side which indicates the presence of a deviation of the inferior dental canal.

Keywords: Mandibular third molar tooth to the inferior alveolar canal. (J Bagh Coll Dentistry 2010;22(4):59-61).

INTRODUCTION
Removal of an impacted third molar may result in dysesthesia of the inferior alveolar nerve, due to inferior nerve damage after third molar removal ranging from 0.4% to 5.5%. (1)

The mandibular canal has a close relationship to the apices of impacted teeth. Inferior nerve damage is caused by injury to the sensory nerve bundle, so an inherent risk of mandibular third molar odontectomy is damage to the inferior alveolar nerve, which generally lies in a position buccal and inferior to the tooth roots.

Studies where assessments of the radiographic predictors of potential nerve injury to correlate impaction type with tooth proximity to the inferior alveolar nerve based on panoramic findings indicated that radiographic findings may give a clue to the proximity of the inferior alveolar nerve to the tooth root, the clues may include the following: (2,3)

1- Root darkening
2- Root deflection
3- Root narrowing
4- The presence of a bifid root apex
5- Interruption of the white line(s) of the inferior alveolar canal
6- Diversion of the inferior alveolar canal
7- Narrowing of the inferior alveolar canal.

Rood and Shebab suggested that 3 of the 7 signs were more significantly associated with inferior alveolar nerve injury: root darkening, interruption and diversion of the white line(s) of the inferior alveolar canal. (4)

A radiographic examination, perhaps entailing a panoramic radiograph, is required to diagnose this condition; however this radiographic technique does not always resolve the buccolingual relationship between the mandibular canal and the mandibular third molar. So dental radiographs that are used to investigate the mandibular canal are panoramic radiographs, cross-sectional tomographs, scanographs, and computed tomographs. (5,6)

The position of the canal varies with respect to the apices of the teeth roots and the lower border of the mandible. They can be classified into the following varieties: (13)
1. High (Type I): close to the apices of the teeth
2. Intermediate (Type II)
3. Low (Type III): close to the lower cortex of the mandible

The canal calcifies before the roots of the third molar are formed and during their development may impinge on the canal.

Typically the canal is located inferiorly and laterals to the apices and, it is often seen to be traversing the roots of a fully developed third molar tooth.
It is possible to make a reasonably accurate prediction as to whether this is merely superimposition or actual grooving or even perforation of the root by the canal. Normally the canal is seen as a radiolucent band with parallel upper and lower borders. When a band of decreased radiopacity crossing the roots and coinciding with the outline of the inferior dental canal it indicates that the tooth root is grooved by the inferior dental canal and its contents. Interruption of the continuity of one or both border of the canal as they cross the tooth root is seen when deep grooving is present, it is indicated by an increased radiolucency of the band and loss of its marginal white borders. On very rare occasions the contents of the canal actually perforate the tooth root and in this case a characteristic narrowing of the radiolucent band occur–hour-glassing- with loss of its marginal white borders.

As Root tunneled through by the inferior dental canal described previously the normal radiographic appearance of the mandibular canal is two thin parallel radiopaque lines the so-called tramlines. The variations that indicate a possible intimate relationship with the lower 3 molars are:-
• Loss of the tramlines.
• Narrowing of the tramlines.
• A sudden change in the direction of the tramlines.
• A radiolucent band evident across the root if the tooth is grooved or tunneled through by the mandibular canal bundle.

MATERIALS AND METHODS

Subjects:
• The total numbers of participated participants were 210
• The participant’s ages varies between 18-69 years (mean age 38.5)

Radiographic technique:
Extraoral panoramic radiograph technique was used in this study
• Panoramic machine (Gendex orthoralix 9200)
• Panoramic film (AGFA 15×30cm).
• Panoramic film cassette (KODAK.X-O-MATIC cassette)
• Processing machine (Gendex Orthoralix 9200)

Procedure:
• Patients attended the dental clinic (Faculty of dentistry, Ajman university of science and technology) were a panoramic radiograph was taken for each person.
• All radiographs were automatically processed.

Radiographic interpretation:
• All panoramic x-rays were traced using a magnifying viewer, transparent paper, pencil with thin tip and caliper.
• For certainty and reducing errors possibility, radiographs were traced in room with subdued light.
• All extraneous light of the viewer was blocked leaving a 15 x 30 cm window for the radiograph.
• The results of radiographic interpretation were recorded in a special form supplied to the radiologist
• Only those results concerning lower third molars and mandibular canal were statistically analyzed.

RESULTS AND DISCUSSION
This study shows that there is difference in the third molar position in respect to the mandibular canal and there is change in the level of the mandibular canal in the mandible even in the same patient. The mandibular canal width differs between the right and left side even in the same patient. The minimum width on both sides was 0.2cm which represents 3% in the right side and 2% in left side.

Evaluation of the lower third molars position revealed that in the right and left sides it follows the same pattern but with different percentage, that is to say, in the right side 66% of cases were found above the mandibular canal border, 16% of cases touching the upper border, 14% of cases between the borders, 2% of cases below the canal border and 2% touching the lower border. Whereas in the left side the majority of cases were found to be positioned above the canal border 51%, 30% of cases touching the upper border ,15% of cases between the canal borders , 2% of cases below the borders and for those touching the lower border represent 1%.

Regarding the vertical distance between the alveolar crest and the upper border of the mandibular canal at area the mesial to the lower third molars, there is quite a difference between the right and the left sides. This study showed that in the right side the maximum value is 2.7 cm (1%) which indicates that the mandibular canal is of type III (that is close to the inferior border of the mandible), the majority of cases has a distance of 1.7 cm (14%) that means type II mandibular canal (i.e. the canal is between the root apices of the 2nd and 3rd molar
and the inferior border of the mandible), and 3% has type I mandibular canal (i.e. the canal is close to the alveolar crest by 0.3 cm.

In contrast, the left side has 1% a distance of 2.4 cm, i.e. type III mandibular canal, 1% of cases were of type I mandibular canal that is of distance 0.7 cm, and the majority of cases 20% of type II mandibular canal that is of distance 1.5 cm.

This relation contributed to the cortication of the canal borders and to the rate of bone resorption associated with the alveolar crest.

Regarding the vertical distance between the lower border of the mandibular canal and the inferior border of the mandible at area mesial to the lower third molars, the measurement was quite similar in both sides, in the right side 2% of cases is of 0.4 cm distance, and 1% of 2.2 cm distance and the majority 13% is of 0.9 cm distance. Whereas in the left side the majority 14% is of 1.1 cm distance, 5% of 0.4 cm and 1% is of 3.5 cm distance.

These results can be attributed to the anatomical development of the mandible and the physiological turnover of the bone that takes place in the lower border of the mandible.

According to Gowgiel et al, the neurovascular bundle is located about 10 cm above the inferior border in the body of the mandible in the molar region. The results of this study showed that 7% of cases in right side and 6% in left side that were located about 10 mm above the inferior border of the mandible, while the majority of the cases (27%) were away by 0.9 - 1.1 cm.

Tapio et al evaluated the vertical relationship between the mandibular third molar root and the mandibular canal seen on panoramic radiographs of 47 teeth, 16 (34%), 16 (34%), and 15 (32%) were type A, B, and C, respectively, where (A) the root apex at the upper half of the mandibular canal, (B) the root apex at the lower half of the mandibular canal, or (C) the root apex under the inferior wall of the mandibular canal. In my study 66% of cases is of type A, 15% is of type B and 2% is of type C.

In this study, it was found that 16 % of the cases touching the upper border of the mandibular canal in right side and 31% in left side which indicates the presence of a deviation of the inferior dental canal.

REFERENCES