

## Relation of Mandibular Canal to the Root Apices of Different Types of Impacted Mandibular Third Molars Using Panoramic Radiographs in Iraqi Sample

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### Key words

Root canal,  
impacted 3<sup>rd</sup>  
molar,  
panoramic

### Abstract

The lower third molar is the most teeth failed to erupt in the alveolar process and the surgical extraction of lower third molar is widely carried out in the dental clinic due to pathologic change and prophylactically purpose, the damage of the inferior dental canal can be occurred when the lower third molar located deep and its root is closely to the inferior dental canal, the aim of this study was to investigate the prevalence of the types of impacted lower third molar between male and female and to determine the radiographic relationship of the inferior dental canal to the root apices of different types of the impacted lower third molar using dental panoramic radiograph, eighty (80) panoramic radiographic images ,40 male 40 female aged (18-41) were selected from the pool of data stored in the computer of the digital panoramic machine, the teeth were divided according to the relation to the lower 7<sup>th</sup> molar (angulation), and the relation of the root apices to the inferior dental canal according to the distance of root apices from the inferior dental canal either far, close , superimposed. The result of this study showed that the mesioangular type of impaction is the most closely positioned to the inferior dental canal , and this may represent an independent risk factor for postoperative paraesthesia, the majority of patients showed the position of the inferior dental canal varies in relation to the root apices of impacted mandibular third with the majority being in adjacent position , The superimposed relation of roots apices of the mesioangular impaction in male was 32% while in female was 46% so the risk of the damage to the mandibular canal in female more than the male during the surgical extraction of lower third molar, this variation should be appreciated by the oral surgeon when undertaking surgical extraction of the impacted mandibular third molars.

### Introduction:

The impacted tooth can be defined as the

tooth when it is failed to be erupted in its suitable functional location <sup>(1)</sup>, when the tooth failed to be completely erupted in the dental arch during the time predicted in the developmental period and there is no hope to be anticipated to do that so it's considered as an impacted tooth <sup>(1)</sup>. The lower third molar is the most teeth failed to erupt in the alveolar process and the

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surgical extraction of lower third molar is widely carried out in the dental clinic due to pathologic change and prophylactically purpose<sup>(2,3)</sup>.

The damage of the inferior dental canal can be occurred when the lower third molar located deep and its root is closely to the inferior dental canal, so careful evaluation for the location of lower third molar and its relation to the inferior dental canal can decrease the probability of the damages to the inferior dental canal, the inferior alveolar nerve runs inside the IDC, and it is surrounded by a canal of thick bone, radiographically the canal can be seen as 2 radiopaque lines parallel to each other<sup>(4)</sup>.

The dental panoramic radiograph was invented in 1949 by Paatro, it has the ability to give an image from condyle to condyle of the other side of the face horizontally and from hyoid bone to the forehead vertically so dental panoramic radiograph can cover the erupted and unerupted teeth and the supporting tissues of the teeth on one image, the exposure time is relatively short (15 seconds), and the total amount of radiation is minimum, dental panoramic radiograph is widely indicated for the investigation of the lower third molar when it was impacted<sup>(5,6)</sup>. There are several classification for the impacted lower 3<sup>rd</sup> molar, the most common one is according to Archer(1975) and Kruger(1984) whom related the lower 3<sup>rd</sup> molar to the long axis of the lower 2<sup>nd</sup> molar so it can be classified either horizontal, vertical, distoangular, buccoangular, linguangular and inverted<sup>(7,8)</sup>.

According to the relationship of the roots of the lower 3<sup>rd</sup> molar to the inferior dental canal when this relationship examined radiographically either away, close, superimposed. The aim of this study is to investigate the prevalence of the types of impacted lower third molar between male and female and to determine the radiographic relationship of the inferior dental canal to the root apices of different types the impacted lower third molar using dental panoramic radiograph.

## Materials and method:

### Sample

Eighty panoramic radiographic images, 40 male 40 female aged (18-41) were selected from the pool of data stored in the computer of the digital panoramic machine (DIMAX 3 digital x-ray unit system machine (Finland)) in the X-ray department, Collage of Dentistry, Baghdad University according to the following criteria:

1. Complete or partial impaction of lower third molar.
2. No lesion affect the area of lower third molar.
3. The image with good quality.

The exclusion criteria were:

1. When the inferior dental canal cannot be identified.
2. And when the roots of the impacted lower third molar are not completely formed.

### Method

Each dental panoramic image has been examined to determine the type of impacted lower third molar according to the relationship of lower third molar to the adjacent lower second molar either horizontal, vertical, distoangular, buccoangular, linguangular and inverted.

Determine the radiographical relationship of the root apices of lower third molar to the inferior dental canal either:

Adjacent :when the apices of the tooth touch the upper border of inferior dental canal.

Away : when the apices of the tooth far from the upper border of inferior dental canal.

Superimposed : when the apices of the tooth superimposing the inferior dental canal.

The information were recoded in special case sheet for each radiographic image.

## Results:

The results showed mesioangular impaction was the most common type in 46 cases (58%) in male (22) teeth and in female (26), followed by vertical type recognized in (12) cases (15%) 6 teeth in each group (male and female), horizontal type was the same like vertical type (12)

cases, one case in the female and (11) for the male, distoangular type was showed in (9) cases (12%) in male was (1) and in female (8) teeth, buccoangular was present only in female in one case only as illustrated in table (1).

The relation of root apices of impacted lower third molar to the inferior dental canal was 42(52%) adjacent (21 male, 21 female), 23(29%) superimposed (10 male, 13 female), and 15(19%) away (9 male, 6 female) as illustrated in table (2).

The relation of each type of impaction to the mandibular canal according to the gender as follow as illustrated in table (3).

- The relation of mesioangular impaction to the mandibular canal in male are (11) adjacent, (4) away, (7) superimposed while in female (12) adjacent, (1) away, (11) superimposed.

- The relation of distoangular impaction to the mandibular canal in male are (0) adjacent, (0) away, (1) superimposed while in the female the relations are (4) adjacent, (3) away, (1) superimposed.

- The relation of vertical impaction to the mandibular canal in male are (4) adjacent, (1) away, (1) superimposed, while in female the relation (5) adjacent, (0) away, (1) superimposed.

- The relation of horizontal impaction to the mandibular canal in male are (6) adjacent, (4) away, (1) superimposed, while in female the relation (0) adjacent, (1) away, (0) superimposed.

- The buccoangular impaction was only found in one case in female and its relation to mandibular canal was away.

## Discussion:

One of the most serious postoperative complication after the surgical extraction of impacted lower third molar is the damage or injury to the inferior dental nerve, the damage of the inferior dental canal can be occurred when the lower third molar located deep and its root is closely to the inferior dental canal,<sup>(4)</sup> previous knowledge of the relation of the roots of the impacted lower third molar to the mandibular canal could be helper factor in decreasing this

complication<sup>(9,10)</sup>. Intraoral radiography, dental panoramic radiograph, and cross sectional tomography can be used to assist the relation between the lower 3<sup>rd</sup> molar and the inferior dental canal, it has been recommended that the dental panoramic radiograph as the first choice for the radiographical investigation when the preoperative evaluation of the impacted lower 3<sup>rd</sup> molar and its surrounding tissue being indicated<sup>(11)</sup>. Maegawa et al, in 2003 and Monaco et al, in 2004 have been assisted the reliability of dental panoramic radiograph versus Computed Tomography scan in the preoperative evaluation of the relation between inferior dental canal and lower 3<sup>rd</sup> molar<sup>(12,13)</sup>, high radiation dose and higher cost as compared to dental panoramic radiograph so the dental panoramic radiograph still widely used in the investigation of impacted lower 3<sup>rd</sup> molar<sup>(14)</sup>. The study showed that the mesioangular impaction had the greater number of impactions and adjacent relationship of apices of third molar to the inferior dental canal had a greater number followed by superimposition and the away relation, this result agreed with the studies of both Canto et.al, 2009 and shahrazad et.al, 2004<sup>(15,16)</sup>, but disagreed with the result of Hazza et.al, 2006 whom found that vertical impaction had a great number this may due to variation in the sample size and also disagreed with Monaco et.al, 2004 whom found that the horizontal impaction is the most dangerous position in terms of contact between the root apices and inferior dental canal<sup>(17,13)</sup>. And the study also showed that the most frequent relation between root apices of impacted mandibular third molar and the mandibular canal was adjacent relation (52%), that disagreed with S.Niknesan et.al, 2013, whom found that superimposition (41.80%) was the most frequent relation between inferior dental canal and third molar roots, this disagreement may be due to nationality and place variation<sup>(18)</sup>. The relation between root apices of impacted lower third molar and inferior dental canal according to gender the results showed that the adjacent relation was equal in both male and female 21 cases (50%) for both of them and those results disagree with



B.Zamiri et.al,2003 whom found that the adjacent relation was in female more than in males ,and that disagreement may be due to racial variation<sup>(19)</sup>.

**Conclusion:**

It can be concluded from this study:

1. The mesioangular type of impaction had the greater number of impactions.
2. Adjacent relationship of apices of third molar to the inferior dental had a greater number followed by superimposition and then the away relation.

3. Buccoangular impaction is the least frequent type of impaction among the sample.

4. Mesioangular impaction is the most dangerous type among the other types of impaction because it has been showed the greater percentage of superimposed relation of its root apices to the inferior dental canal.

5. The superimposed relation of roots apices of the mesioangular impaction in male was 32% while in female was 46% so the risk of the damage to the mandibular canal in female more than the male during the surgical extraction of lower third molar.

Table (1): each type of impaction according to gender with percentage for each gender and to total

Type of impaction	Sex		Total
	Male	Female	
Mesioangular	22(55%)	24(60%)	46(57%)
Distoangular	1 (2%)	8(20%)	9(11%)
Vertical	6(15%)	6(15%)	12(15%)
Horizontal	11(27%)	1(2%)	12(15%)
Buccal	0(0%)	1(2%)	1(1%)
<b>Total%</b>	<b>40</b>	<b>40</b>	<b>80</b>

Table (2): the relation of impacted mandibular third molar to inferior dental canal according to gender

	Adjacent	Away	Superimposed
Male	21(52%)	9(22%)	10(25%)
Female	21(52%)	6(15%)	13(32%)

Table (3) : The relation of each type of impacted mandibular third molars to the mandibular canal according to gender

Type of impaction	Male			Total	Female			Total
	Adjacent	Away	Superimposed		Adjacent	Away	Superimposed	
Mesioangular	11	4	7	22	12	1	11	24
Distoangular	0	0	1	1	4	3	1	8
Vertical	4	1	1	6	5	0	1	6
Horizontal	6	4	1	11	0	1	0	1
Buccal	0	0	0	0	0	1	0	1
<b>Total</b>	<b>21</b>	<b>9</b>	<b>10</b>	<b>40</b>	<b>21</b>	<b>6</b>	<b>13</b>	<b>40</b>

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