



## Impacted mandibular third molar and the inferior alveolar canal in Iraqis (A radiographical study)

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### Abstract

**Aim of the study:** To evaluate the position of impacted mandibular third molars and its relation to the inferior alveolar canals by the aid of panoramic radiographs.

**Materials and method:** The study includes (246) panoramic radiographs with (444) impacted mandibular third molar teeth that are collected from different oral and maxillofacial surgery units belong to patients with the age between (20-35) years who seeks for help to remove their impacted mandibular third molar teeth in order to evaluate the relationship between the position of impacted mandibular third molars and its relation to the inferior alveolar canals by the aid of panoramic radiographs. Impacted mandibular third molar teeth position were classified as vertical, horizontal, mesioangular, and distoangular (Winter's classification) and the radiographic relationship of the root apex of impacted mandibular third molar to the inferior alveolar canal was categorized as :below,superimpose,grooving and none of them(none).

**Result and discussion:** The majority of impacted mandibular third molar teeth was of mesioangular position (35%), then the vertical position (29%), distoangular (20%), and the horizontal position (16%) in both gender and males has a higher percentage than females. In general, superimposition relationship between impacted mandibular third molar teeth and inferior alveolar canal is the highest (39%) in most of the cases among the other types of relation, then to a lesser extent was below the roots (31%), grooving (25%), and lastly, none (5%). The alveolar canal is mostly below the vertical and horizontal type of impaction. The alveolar canal is mostly superimposed on the roots of mesioangular and distoangular type of impaction. Grooving relation ship is most common with mesioangular impacted mandibular third molar.

**Key words:** Impaction mandibular third molar, inferior alveolar canal, panoramic radiograph.

### Introduction

A panoramic radiograph is frequently used as the radiological investigation of choice prior to third molar surgery. The relationship between the roots of mandibular teeth and the inferior alveolar nerve can often be assessed radiographically, particularly with a panoramic

radiograph<sup>(1-3)</sup>. The prevalence of impacted third molars is a very common condition, and the extraction of it is one of the most frequent surgical procedures, thus, it is important to grasp the location of the inferior alveolar canal on extracting mandibular third molar<sup>(4,5)</sup>, to avoid the

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damage of the mandibular canal that may lead to parasthesia and paralysis of the lower lip and perioral region<sup>(6,7)</sup> The extraction of an impacted mandibular third molar can cause neurological complications that consist of temporary or permanent sensory alterations due to the damage in the inferior alveolar nerve<sup>(8)</sup> Injury to the inferior alveolar nerve has been related to deeply impacted teeth<sup>(9)</sup> and to roots in close approximation to the inferior alveolar nerve<sup>(10)</sup>, thus, accurate assessment of the position of the inferior alveolar nerve in relation to the impacted mandibular third molar tooth might reduce injuries to this nerve.

Anatomically, the nerve lies in the inferior alveolar canal which is enclosed within a tube of dense bone. The tube is seen on radiographs as two parallel radiopaque lines.

To evaluate the relationship between the position of impacted mandibular third molars and its relation to the inferior alveolar canals by the aid of panoramic radiographs.

## Materials and Methods

Two hundred forty six panoramic radiographs with (444) impacted mandibular third molar teeth were collected from different oral and maxillofacial surgery units belong to patients with the age between (20-35) years who were indicated to remove their impacted mandibular third molar teeth and there was no evidence of any pathological conditions or fractures. The sample consists of 132 (54%) male and 114 (46%) female. A pilot study was done involving (20) OPGs for examiner calibration during two weeks intervals to determine intra-examiner variability and until reliability and reproducibility were achieved. The radiographs were examined under ideal conditions including (viewing box, magnifying lenses and film

masking). Impacted mandibular third molar teeth position were classified as vertical, horizontal, mesioangular, and distoangular (Winter's classification). The radiographic relationship of the root apex of impacted mandibular third molar tooth and inferior alveolar canal was categorized according to the following criteria:

- A- Below: the superior border of the canal was under root apices.
- B- Superimposed: the canal was superimposed over part of the roots that appear less opaque than the remaining root.
- C- Grooving: radiolucent band across the root above the apex, interruption of both superior and inferior borders of the canal, and narrowing of the canal space.
- D- None: The relation between the roots and the canal could not be decisively assessed or not within the above criteria.

The data were collected and statistical analysis was done using chi-square at  $p < 0.05$ .

## Results

The study includes (246) panoramic radiographs with (444) impacted mandibular third molar teeth. Bilateral impaction was detected in (198) radiograph (80%) while unilateral impaction was found in (48) radiograph (20%) distributed as (245) male (55%) and (199) female (45%).

The majority of impacted wisdom teeth was of mesioangular position 156 (35%), then the vertical position 129 (29%), distoangular 88 (20%), and the horizontal position 71 (16%) in both gender although, male has a higher percentage than female. Table (1).

In general superimposition relationship between impacted mandibular third molar teeth and inferior alveolar canal is the highest

among the other types of relation 172 (39%), to a lesser extent was below the roots 134 (30%), grooving 114 (26%), and lastly, none 24 (5%), although this is not true with the horizontal type of impaction in which 48% of the cases, the canal is below the roots of the impacted mandibular third molar. table (2).

Table (3) show that grooving and superimposition relationship is mostly associated with mesioangular impaction (45%) and (36%) respectively, while (31%) of the vertical impacted lower 3<sup>rd</sup> molar, the canal is below the roots which is the higher percentage among the other types of impactions.(5%) of the total impacted teeth can not recognized their relation to the inferior dental canal.

Stastical analysis using the position of the inferior alveolar canal was decisively demonstrated and categorized according to its relationship to the roots of the impacted mandibular third molar teeth, and it was found that there is a significant difference between male and female regarding all types of mandibular third molar impaction, in addition to, there is a significant difference between types of impacted mandibular third molars and their relations to the inferior alveolar nerve.

## Discussion

The Knowledge of the proximity of the roots of the mandibular third molars to the inferior alveolar canal may minimize the possibility of the injury to the canal<sup>(4-6)</sup>.

Several authors have evaluated the reliability of OPG against CTs images in the preoperative assessment of the relationship between mandibular third molar and inferior alveolar canal, and although, they all concluded that the OPG is an invaluable tool in the

assessment and possessed the potential for identifying the need for further computed diagnostic procedures<sup>(7-9)</sup>, the relatively high radiation exposure, high cost, and inferior image resolution are drawbacks of CTs, therefore, it can be concluded that OPG remains the most common radiograph used for the assessment of impacted mandibular third molars and appears to have the best cost-information ratio<sup>(10-12)</sup>.

The mesioangular impaction has a high percentage than the other type of impaction in males and females, this may be due to the path of eruption of the mandibular third molar tooth which make it inclined slightly mesially due to the thicker distal bone, and superimposition relationship between mesioangular impacted mandibular third molar tooth and inferior alveolar canal is most common(40%),and this is also true for the distoangular type of impaction in which (43%) of it the canal are superimposed on them. The canal is mostly below the all horizontal impacted mandibular third molar tooth (48%) involved in this study, and this may be due to the horizontal position of the impacted tooth which decrease the superior-inferior dimension of the tooth and make it far away from the canal. (5%) of the impacted lower 3<sup>rd</sup> molar teeth can not assessed the relation between them and the inferior dental canal which may be due to other radiolucency such as pharyngeal air space.

The inferior alveolar canal is mostly located below the vertical type of impacted third molar tooth (31%) because the ability of the tooth to move upward easier than the other types of impaction due to less interruptions in its path of eruption, this finding is in agreement with Kipp et al<sup>(1)</sup> but not with Bell<sup>(13)</sup> who found (50%) of his sample have this criteria which may be due to the difference in sample selection.

## Conclusions

- 1- Impacted mandibular third molar tooth is more in male than female.
- 2- Mesioangular position of impacted mandibular third molar is the most among the other types of impaction.
- 3- The alveolar canal is mostly below the vertical and horizontal type of impaction.
- 4- The alveolar canal is mostly superimposed on the roots of mesioangular and distoangular type of impaction.
- 5- Grooving relation ship is most common with mesioangular impacted mandibular third molar.

## References

- 1- Howe G, Poynton HG: Prevention of damage to the inferior alveolar nerve during the evaluation of mandibular third molars. *Br Dent J* 109:355, 1960.
- 2- Blaeser BF, Augus MA, Donoff RB: Panoramic radiographic risk factors for inferior alveolar nerve injury after third molar extraction. *J Oralmaxillofac Surg* 61:417, 2003.
- 3- Rood JP, Shehab BA: The radiological prediction of inferior alveolar nerve injury during third molar surgery. *Br J Oralmaxillofac Surg* 28:20, 1990.
- 4- Cade TA. Parasthesia of the inferior alveolar nerve following the extraction of the mandibular third molars: A literature review of its causes, treatment, and prognosis. *Mil Med* 1992;157: 389-92.
- 5- Ichimura K, Nibu K, Tanaka T. Nerve paralysis after surgery in the submandibular triangle: Review of University of Tokyo Hospital experience. *Head Neck* 1997; 19:48-53.
- 6- Carmichael FA, McGowan DA. Incidence of nerve damage following third molar removal: a West of Scotland Oral Surgery Research Group Study. *Br J Oralmaxillofac Surg* 1992; 30: 78-82.
- 7- Bataineh AB. Sensory nerve impairment following mandibular third molar surgery. *J Oral Maxillofac Surg* 2001;59: 1012-7.
- 8- Kipp DP., Goldstein BH., Weiss WW Jr.: Dysesthesia after mandibular third molar surgery: A retrospective study and analysis of 1377 surgical procedure. *JADA* 1980 Feb., 100(2), p.185-192.
- 9- Van Gool AV, Ten Bosch JJ, Boering G. Clinical consequences of complaints and complications after removal of the mandibular third molar. *Int J Oral Surg* 1977, 6: 29-37.
- 10- Osborn TP, Frederickson G Jr, Small IA, Torgerson TS. A prospective study of complications related to mandibular third molar surgery. *J Oral maxillofacial surgery* 1985, 43: 767-769.
- 11- Carmichael FA, McGowan DA. Incidence of nerve damage following third molar removal a West of Scotland Oral Surgery Research Group study. *Br J Oral Maxillofacial Surgery* 30:78, 1992.
- 12- Howe GL, Poyton HG. Prevention of damage of the inferior dental nerve during extraction of mandibular third molars. *Br Dent J* 1960, 109: 355-363.
- 13- Maegawa H, Sano K, Kitagawa Y, Ogasawara T, Miyauchi K, Sekine J, Inokuchi T. Preoperative assessment of the relationship between the mandibular third molar and the mandibular canal by axial computed tomography with coronal and sagittal reconstruction. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2003 Nov, 96(5):639-646.
- 14- Pawelzik P, Cohnen M, Willers R, Becker J. A comparison of conventional panoramic radiographs with volumetric computed tomography images in the preoperative assessment of impacted mandibular third molars *Oral Maxillofac Surg* 2002,(60):979-984.
- 15- Monaco G, Montevecchi M, Bonetti GA, Gatto MR, Checchi L. Reliability of panoramic radiography in evaluation the topographic relationship between the mandibular canal and impacted third molars. *Am Dent Assoc.* 2004,(7):312-318.
- 16- Tal H, Moses O. A comparison of panoramic radiography with computed tomography in the planning of implant surgery. *Dentomaxillofac Radiol.* 1991 Feb, 20(1):40-2.
- 17- Aryatawong S, Aryatawong K. Evaluation of the inferior alveolar canal by cross-sectional hypocyloidal tomography. *Implant Dent.* 2000, 9(4):339-45.
- 18- Wenzel A, Aagaard E, Sindet-Pedersen S. Evaluation of a new radiographic technique: diagnostic accuracy for mandibular third molars. *Dentomaxillofac Radiol.* 1998, (27):255-263.

- 19- Dharmar S. Locating the mandibular canal in panoramic radiographs. Int J Oral Maxillofac Implants.1997 Jan-Feb, 12(1):113-7.  
 20- Bell GW.Use of dental panoramic tomographs to predict the relation between

mandibular third molar teeth and the inferior alveolar nerve. Radiological and surgical findings and clinical outcome. Br J Oral Maxillofac Surg.2004 :( 42):21-27.

**Table 1: The distribution of the number of patients and type of impacted mandibular third molars according to sex**

	No. of patients	No. of impacted third molars	Mesioangular Impaction	Vertical impaction	Distoangular impaction	Horizontal impaction
Male	132 54%	245 55%	89	71	45	40
Female	114 46%	199 45%	67	58	43	31
Total	246 100%	444 100%	156 35%	129 29%	88 20%	71 16%

# Chi-square = 5.732 p= 0.0125 p<0.05 significant

**Table 2: The relation between the types of impaction and the inferior alveolar canal and its percentage**

	Superimposition	Below	Grooving	None	Total
Mesioangular	62 * 40%	37 24%	51 33%	6 3%	156 100%
Vertical	52 * 40%	41 32%	29 22%	7 6%	129 100%
Distoangular	38 * 43%	22 25%	24 27%	4 5%	88 100%
Horizontal	20 28%	34 * 48%	10 14%	7 10%	71 100%
Total	172 39%	134 30%	114 26%	24 5%	444 100%

\* Higher percentage # Chi-square = 5.879 p= 0.042 p<0.05 significant

**Table 3: Inferior alveolar canal relationship with the different types of impaction and its percentage**

	Mesioangular	Vertical	Distoangular	Horizontal	Total
Superimposition	62 * 36%	52 30%	38 22%	20 12%	172 100%
Below	37 28%	41 * 31%	22 16%	34 25%	134 100%
Grooving	51 * 45%	29 25%	24 21%	10 9%	114 100%
Unclear	6 25%	7 29%	4 16%	7 29%	24 100%

\* Higher percentage # Chi-square = 6.484 p= 0.009 p<0.05 significant

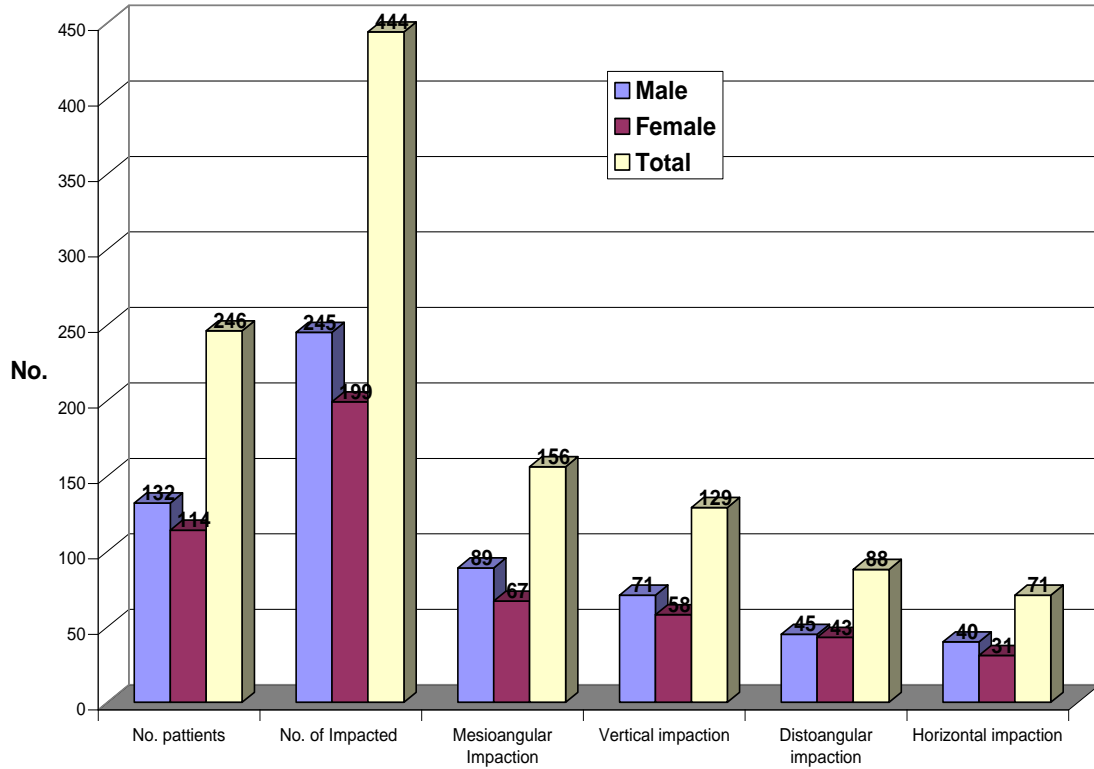


Figure 1: Histogram of the distribution of the number of patients and type of impacted mandibular third molars according to sex

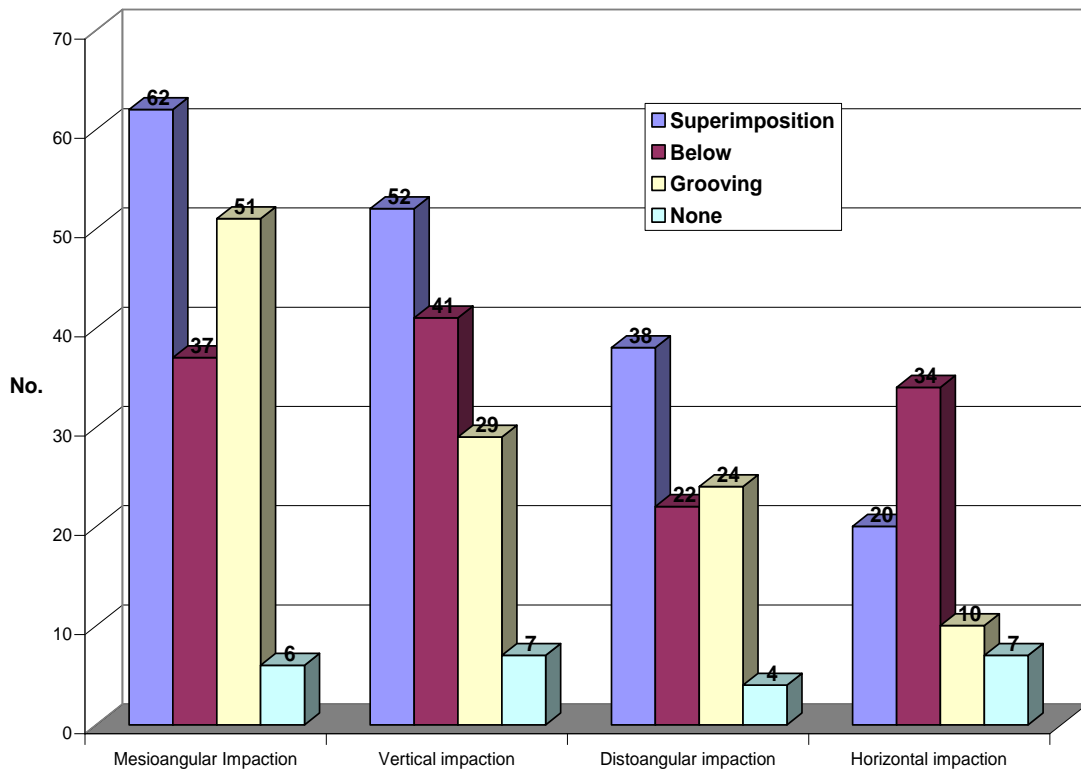


Figure 2: Histogram of the relation between the types of impaction and the inferior alveolar canal and its percentage

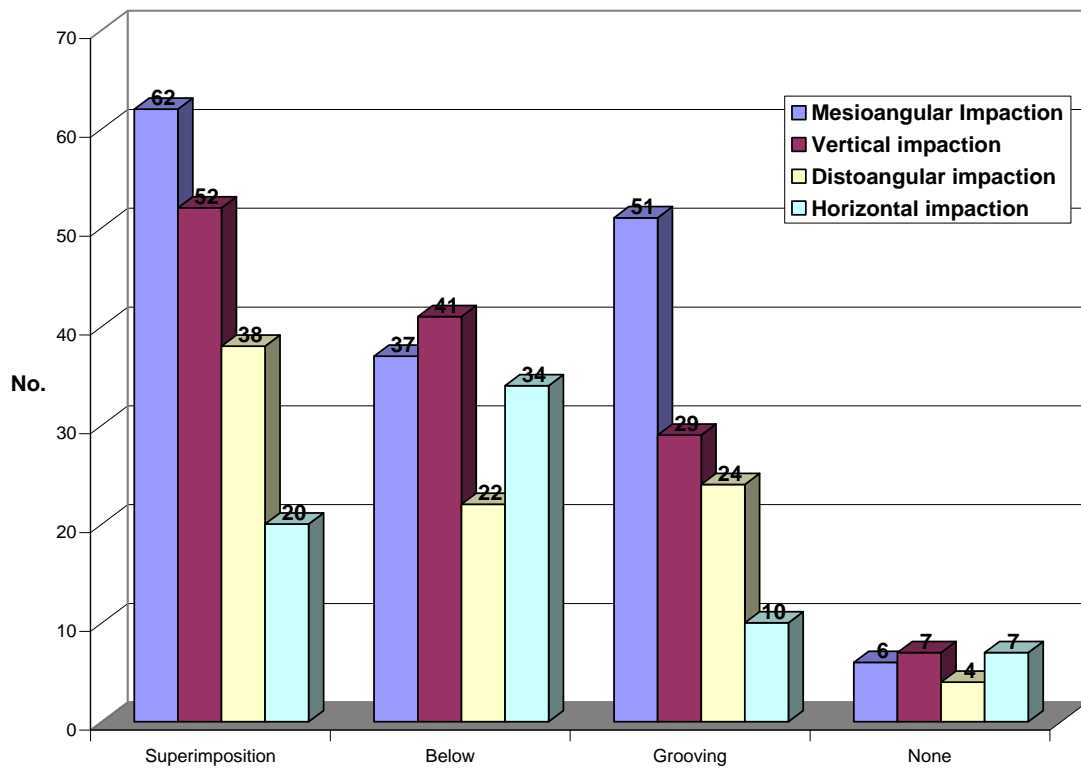


Figure 3: Inferior alveolar canal relationship with the different types of impaction and its percentage