

## Impacted wisdom teeth, prevalence, pattern of impaction, complications and indication for extraction: A pilot clinic study in Iraqi population

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### Key words

impaction  
pattern,  
prevalence,  
complications  
and indications

### Abstract

**Introduction** The third molars are the most frequently impacted teeth in the human oral cavity .The unerupted teeth are not, in themselves, pathological lesion but may induce pathology. Impaction can be present in different patterns and levels. Decision of removal or retention of impacted tooth is a matter of debate .  
**Aim** The aim of the present study was to evaluate the prevalence of impaction, angular position of impacted wisdom , level of impaction, agenesis and the indications for extraction. **Materials and Methods** A sample of 880 patients( 498 males and 382 females ) with age range between 18 to 40 years old with the mean of 28.8 . The study took place in the hospital of surgical specialization in which all patients were evaluated clinically and radiographically by OPG . Of 880 patients 411 patients showed impaction of at least one tooth (table 3) .The total number of impacted teeth in the sample were 1100 and 57 missing teeth (table 4). **Result** Among 880 patients , 411 (46.7%) patients showed impaction of at least one tooth , the total number of impaction was 1100 wisdom teeth . of which 428 ( 38.9%) were in the maxilla and 672 (61.09%) were in the mandible. The most prevalent angular position was vertical angular (59.81%) followed by mesioangular (18.45%). Concerning level of impaction , Level C was the most prevalent in maxilla and mandible . Agenesis of third molar was seen in 57 teeth (1.61%). Of 1100 impacted third molar ,663 were subjected to surgical removal .The most common reasons "indications" for patient referral to our surgical department were orthodontic reasons followed by pericoronitis, while the lowest was fracture mandible. **Conclusion** impaction pattern , the mandibular impaction is more prevalent than maxilla with vertical impaction is the commonest followed by mesioangular impaction while the inverted impaction is negligible. Level C impaction is the most common in both maxilla and mandible. Concerning the indication for extraction , the most common indication was orthodontic followed by pericoronitis , caries with the lowest prevalent were mandibular fracture and lesions even when the lesion represent the absolute indication for extraction. Oral surgeon should build his decision to extract or not extract third molars on the most canonical scientific guidelines and what is best for each individual case.

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## Introduction

The mandibular third molars are the most frequently impacted teeth in the human body (1). Impaction can be defined as the tooth that fails to erupt into a proper, functional position in the dental arch within the expected time (2). Impacted or unerupted teeth are not, in themselves, pathological (Brickley et al 1995, 1) but the impaction may increase the risk of disease, particularly when oral hygiene is poor (SIGN 43, 2000). (3,4).

The prevalence of impaction range between 15.2-35% among the studies (5,6,7,8).

Concerning Pattern of impaction, the Pell and Gregory proposed a classification system which based on the depth or level of maxillary and mandibular third molars (9).

Winter classify the impacted wisdom teeth depending on the angulations of the third molars (10)

Retention of the impacted teeth may be associated with Complication that may include neoplasm, cysts, fracture of mandible and injury to adjacent teeth usually through pathological root resorption or development of periodontitis etc. (11)

Studies have shown that patients with retained impacted third molars are significantly more susceptible to mandibular angle fracture (1, 12)

While there is a consensus about the advisability of removing impacted third molars that cause important pathology or clinical manifestations, The risk of surgery and associated complications are justified and uniformly accepted by most surgeons.

The issue of prophylactically removing of asymptomatic molars has been the subject of debate for years. (13, 14,15 )

An indication for extraction of impacted lower wisdom teeth, reported in studies include

pericoronitis; which is an inflammation of the gingival tissue surrounding the crown of a tooth, (16,17).

Caries and its sequelae involving the lower 7 or 8 is indication for wisdom tooth

extraction that been mentioned in many literatures. (13,18,19,20,21,22)

Periodontal tissue damage on adjacent tooth was considered as a definite indication for extraction for. (19,21,23,).

Pathologic entities like cysts, tumours and root resorption were also reported to be definite indication for extraction (18,24)

Orthodontic reason for extraction; there is little rationale based for extraction of impacted molars to minimize present or future crowding. (25,26,27,28,29)

The specific aims of this study was asses the prevalence of impaction, angulation of impacted tooth according to winter classification and the depth of impaction according to Pell and Gregory classification system, complications of the impacted teeth retention and the indication for extraction.

## Material And Methods

A pilot study that has been undertaken in the Hospital of Surgical Specialization/ Baghdad Medical City for the duration 2011 -2014.

The total number of patients included in the study were 880 patients, the sample consist of 498 (56.59%) male and 382 (43.4) female with age range from 18 to 40.

Age, sex and general health where recorded

All patients were clinically and radiographically examined. The OPG was taken for all patients at hospital of surgical specialization utilizing OPG device (PLANMECA OY 00880 HELSINKY FINLAND).

### Inclusion criteria

- 1- Patients between 18 and 40 years old were included
- 2- Patient with no history of extraction of permanent second and third molar have been undertaken before the study.
- 3- No filling for wisdom teeth or the second molar been undertaken before the study.
- 4- Patients have been viewed clinically and OPG has been taken for them.
- 5- Patients were physically fit with no systemic disease.

### Exclusion criteria:

- 1- Aged younger than 18 years and above 40 years
- 2- A history of dental extraction of permanent second and/or 3rd molar
- 3- Previous orthodontic treatment.
- 4- Any history of abnormal endocrine disturbance.
- 5- Any craniofacial anomaly or syndrome such as Down syndrome; cleidocranial dysostosis;
- 6- The presence of incomplete records of patient medical history or physical finding
- 7- Poor quality OPG.

Third molar was considered impacted if it was not in functional occlusion and at the same time, its roots were fully formed.

**The angulation** was assessed by measuring the angle formed between the long axis of the third molar relative to the long axis of the second molar, using an orthodontic protractor (Table 1).

At the same time **depth of impaction** was assessed according to winter classification in which Level A\_ The impacted tooth occlusal plane, is at the same level as the second molar occlusal plane.

Level B\_ The impacted tooth occlusal plane located between the occlusal plane and the cervical line of the second molar.

Level C\_ The impacted tooth occlusal plane located below the cervical line of the second molar. (Pell and Gregory)

In the current study we analyze the complications and indications for extraction of impacted wisdom teeth and classified the indications for extraction in to (orthodontic reasons, caries, pericoronitis, damage to the adjacent teeth roots or bone, pain and patient request

*The Federation Dentaire Internationale Numbering System (FDI)* was used. In which (the maxillary right quadrant is assigned the number 1, the maxillary left quadrant is assigned the number 2, the mandibular left quadrant is assigned the number 3, and the mandibular right quadrant is assigned the number 4).

### Result:

The total number of 880 patients were included in the study, the sample consist of 498 (56.59%) male and 382 (43.4%) female (table 2) with age range from 18 to 40 and mean of 28.8.

Of 880 patients 411 patients showed impaction of at least one tooth (table 3) .The total number of impacted teeth in the sample was 1100 and 57 missing teeth (table 4). The study demonstrate that there is highest percent for 4 teeth impaction and lowest for 3 teeth impaction (table 5)

The study showed that Radiographic level of impaction according to Pell and Gregory was highest in level C impaction in both mandibular and maxillary wisdom teeth and lowest in level A for maxillary impacted wisdom tooth (table 6)

Total number of mandibular impacted wisdom teeth were 672 while maxillary impacted wisdom tooth were 428 (table 7 and 8).

The highest pattern for impacted teeth was vertical impaction and lowest was inverted for both maxillary and mandibular teeth (table 7 &8) .the highest pattern for impacted upper wisdom teeth.

Orthodontic reason was the main cause for extraction followed by pericoronitis and both of them were significant  $P < 0.05$  Significant (table 9) and lowest was associated lesions (table 9). Fracture, root resorption and associated lesions were insignificant  $p > 0.05$  437 impacted teeth of 1100(39.7%) ,the surgeon decide to leave it without extraction, embark on wait and see policy as the impacted teeth were asymptomatic clinically and sound clean radiographically.

### Discussion

Extraction of third molars remains one of the most common procedures practiced by oral surgeon and indications for referral to Oral and Maxillofacial surgeons. Third molar have been described as different from other teeth in the oral cavity. They have the highest rate of development abnormalities and are the last in the eruption sequences. (13).

1. The prevalence of impaction

The most widely accepted concepts which cause impaction include angulation

of the tooth, available space for eruption (typically regarded as the space from the anterior aspect of the ascending ramus to the distal of the second molar) The space for third molar is found to be diminished when the growth rate in length of the mandible is slight .

The reported prevalence in this study higher than that reported by Eliasson et al , Hattab et al ,Monteluis, (30.3%, 33% ,32 )respectively (30,31,32), and Rajasuo et al (38 %)(33), Ali.H. Hassan (40.5 %) in Saudi population(34)

On the other hand ,the prevalence of impaction is less than that reported by Leukman fawzi omar(50.17 %) in hawler young people (35) Morris and Jerman (65.5 %) in USA respectively (36) . And Quek et al, who reported (68.6%) in Singapore.(37)

In india study shows (41.2% )had impacted third molar (38). which is equivalent to studies done by Kramer and Williams in afro- Americans (8) .And Dachi and hoewel in Columbia.(39)

## 2. Angulations of impaction

The mandibular third molar begins its development in the ramus with its occlusal surface facing mesially; to achieve normal position it must upright to a degree to its original angulations. Failure of this movement Explain the mesial pattern of impaction, and insufficient retromolar space lead to vertical angulations impaction. (40).

The current study shows that vertical pattern of impaction was the highest approaching (59.8 %) table no (7&8) in contrast to other studies which stated that mesial angulation was the highest incidence .Although all the results share the same low incidence of distal angulation .

(41, 42). Ali.H. Hassan,in his study showed that the mesio-angular make the highest percentages (33.4 %) in Saudi population (34).

The most probable explanation for this variation in the result was attributed to different criteria for definition of impaction and the second reason was the previous study used OPG as a sole criteria for classification of teeth as being impacted or erupted in these situations the teeth in level A and some of level B which

is partially erupted and usually vertically oriented will be considered as erupted and will be omitted from the lists.

## 3. level of impaction

Our results show clearly in (table 6) that level C impaction was the most common for both maxilla and mandible (61 .5 %), While Yahya et al study showed that level A was the highest one (65.%). (41) While Tahrir agree with our result although he give less percentage for level C (33%) of the cases.(42).Ali.H. Hassan , the level B( 48.2 %) the most common level in Saudi population(34) .

The protocol for third molar removal include determining the angle and level of impaction by the aid of plain x-ray so as to assess the difficulty and the probable complications during extraction. Accordingly impactions within level B indicating that the extractions would be moderately difficult. Impaction in level C may need extraction under general anesthesia depend on the surgeon's evaluation and the patient's preference, (43).This may explain the higher percentage of level C impaction which was shown in this study because less difficult procedures can be done in private clinics and under local anesthesia mostly. While our research have been executed in hospital of surgical specialization which receive referral for difficult cases .

## 4. Number of impacted teeth

In our sample the study demonstrate that the prevalence of 4 impacted molars in for single person was the highest (36.98 %). Followed by presence of 2 impacted teeth for same individual (29.92%),The least one is with 3 impacted teeth (13.38%),while (19.70%) of cases with single impacted tooth (table 5).

Ali.H. Hassan, found the most prevalent impacted third molar per OPG was one (72.5%) and least common number was four (3.3 %) (34)

The most probable explanation for this variation in the result was attributed to different criteria for definition of impaction and the second reason was the previous study used OPG as a sole criteria to classify the teeth as being impacted or erupted in these situations the teeth in level A and some of level B which is partially erupted be considered as erupted

and will be omitted from the lists. In our criteria the tooth must be reaching the occlusion and stand functionally.

#### 5. Agensis

In our study the percentages of missing third molars was (1.61%) (table 4) is far away from result given by ,Ghada A. Yaseen ,in her study shows the prevalence of agensis was ( 24 % ) .(44) and be little bit narrower than (6.4 %) missing in Leukman fawziomar study at hawler young people.(35) .Impacted third molar Agensis in Indian study was (12.2-12.5 % ).[38]

This variation can be attributed to deficiency of the date obtaining from the patient and consider the absence teeth as congenital missing teeth.

#### 6. Indication for extraction

The National Institute for Clinical Excellence introduced these guidelines in March 2000 to provide guidance for dentists and surgeons on deciding when wisdom teeth should be removed which are Unrestorable caries, Fracture of tooth, Non-treatable pulpal and/ or periapical pathology , Pathology of follicle including cyst/tumour ,Cellulitis or abscess formation ,Osteomyelitis ,Tooth /teeth impeding surgery e.g. Reconstructive jaw surgery, pre-prosthetic/implant surgery, orthognathic surgery, tooth involved within the field of tumour resection and Internal/external resorption of the tooth or adjacent teeth.

The prophylactic removal of third molars was not recommended by NICE (45, 46).

Routine removal of the impacted wisdom teeth should be avoided as the operations have some draw back that may include Pain , hemorrhage trismus dry socket , periodontal damage TMJ problem sinus exposure and paresthesia or anesthesia, iatrogenic damage to adjacent structures , fractures of adjacent tooth , in addition the surgical removal is costly procedures all these reasons make prophylactic removal of sound a symptomatic impacted molar as hazardous procedures (47,48)

In the context of orthodontic indication , extraction was in done in about 18.25% of the extracted cases (table 10 ) that equal to 11 % (table 9) of patients with impacted

teeth in the current study . Studies demonstrate variable result ranging from 14% up to 35% for orthodontic reasons. (18, 49)

Many studies found a greater percentage of dental crowding in subjects with erupting third molars in comparison to subjects with congenitally missing third molars, (50). For this reason many orthodontist used to send their patients for extraction of third molars in our surgical department.

At present time there is little rationale based as evidence for extraction of lower third molars solely to minimize the present or future crowding of lower anterior teeth (25, 26, 27, 28, 29).

The pericoronitis 14.7 % was the second cause for extraction in our surgical department according to our study, Nordenram et al mentioned in his study that the pericorontis is the main pathological indication in about (60 % )of the cases.(51)While Adeymo et al in his study found that carries and its sequel was the main cause for surgical removal followed by recurrent pericoronitis . (13).The proportions in other studies have varied between 8-59% (18).

Caries as an indication for extraction in our study was 12.97% with reported incidence in varies from 13 % up to 63.2% (18, 19).

Bone resorption and periodontal damage to the adjacent teeth was responsible for 10.4% of the indication for extraction( table10) , that coincide with reported in the literatures which been estimated ( 1% - 8.9%).(19,21,23)

Root resorption of second molars by the impacted 2<sup>nd</sup> molar in our study was 3.9% (table10) and this is coincide with Mercier and Precious (1992) in their review quoted the prevalence ranging between 00/0 - 3.10/0. (21)

Pathologic entities like cysts, tumours in our study was 2.56 of the extracted wisdom teeth that equal to 1.45% of the whole impacted teeth sample (table 9) and these finding coincide with the finding by Lysell L et al and Guven O et al whom reported less than 3% (18,24). In our sample even the impacted teeth with enlarge follicular cyst have been removed together and send for biopsy and this

coincide with recommendation of national institute of dental research. (23)

Prophylactic removal of the wisdom teeth was 8.26 of the impacted sample (1100 teeth) (table 9) that equal to 13.72 of the extracted sample (table 10)

The prophylactic removal of the teeth was reported as low as low as 7.7%.up to the extreme of 51% (18,49,52).These variation attributed to method of measuring the sample weather the percentage from the whole impacted sample or from the extracted wisdom teeth in addition the prophylaxis may include many items (before irradiations , when the patent develop lesions in one quadrant we remove other wisdom teeth as precaution , when patient admitted to remove single tooth for any other reasons under GA we remove all other wisdom teeth

Under the cover of Others as an indications for removal of impacted teeth include (orthognathic surgery, preprosthetic surgery and implant) have been reported to be 3.31 in our study

Vague Pain as indication for removal of 3<sup>rd</sup> molar was 11.3 of the extraction sample

Mandibular fracture on other hand as an indication for removal was 2.41.Mandibular fracture occur due to abrupt change in the angulations of mandible at the angle of mandible and the presence of tooth structure which quantitatively affect the existing bone increased risk of mandibular fractures which is one of the most common fracture site especially the incompletely erupted 3<sup>rd</sup> molar (53).Teeth in the fracture line can interfere with and or fixation of fractures segment therefore its removal is encouraged in most situations

Pain and patient request and other none significant indication can be seen under the cover of prophylactic or others, in various literatures therefore could not find research to compare with in isolation.

## Conclusion

A- Concerning impaction pattern, the mandibular wisdom teeth impaction is more prevalent than maxillary wisdom teeth with vertical impaction is commonest followed by mesioangular

impaction while the inverted impaction is negligible .Level C impaction is the most common in both maxilla and mandible

B- Agenesis of third molar may occur but of low significant 1.61 %

C- Indications for extractions

1. Although orthodontic reason was the commonest reason for extraction , but up to this moment , there is no clear and consensus evidence for extraction , the debate will continue until clear cut evidence appear .
2. Pericoronitis and caries appear to be the most practical and logical reason for extraction especially after failure of other treatment modalities .
3. Root resorption or bone and periodontal damage of the adjacent tooth took place as a good reason for extraction of impacted wisdom teeth .
4. Pathological reason is absolute indication for removal of impacted teeth , even though its occurrence rate was low 1.54 %
5. Prophylactic removal of the impacted teeth should be prohibited as surgical treatment is not without complication .Even prophylactically to avoid mandibular fracture is not without complication and better to be avoided .
6. If prophylactic treatment involving tumor , biopsy , to prevent post irradiation osteoradionecrosis , or the patient is medically compromised or as a part of preparation to orthognathic surgery or prosthetic surgery in these situation it is indicated
7. The study demonstrate higher level of wait & see policy and this is obvious from number of impacted teeth that have been left insitue which proved to be effective and good measure as proved also by many literatures . (25,26,27,28,29,45,46, 51.52)
8. The oral surgeon should build his decision to extract or not extract third molars on the most canonical scientific guidelines and what is best for each individual case.

**Table1: Angulations of impaction**

Impaction	Angulations
Vertical impaction	10° to -10°
Horizontal impaction	80° to 100°
Mesioangular impactions	11° to 79°
Distoangular impaction	-11 to -79
Inverted impaction	101 to 180/ -101 to -180
Buccolingual impaction	That orientation in buccolingual direction with crown overlap roots

**Table 2: Female to male number and percentages.**

Patients	No.	%
Female	382	43.41%
Male	498	56.59%
Total	880	100%

**Table 3: Number and percentages of the patients with & without impaction.**

Total Patients number	880	100%
Patients with Erupted teeth	469	53.29
Patients with Impacted teeth	411	46.7

**Table 4: Teeth status.**

Supposed Total teeth number	3520	100%
Erupted teeth	2363	67.13
Impacted teeth	1100	31.25
Missing teeth	57	1.61

**Table 5 : Impacted teeth's number for each patients ; IN= patient with single tooth impaction , N2= patient with 2 impacted teeth , IN3= patient with 3 impacted teeth , IN4= patient with 4 impacted teeth.**

Impaction number	No.	% of total patient=880	% of total impaction =411
IN.1	81	9.2	19.70%
IN.2	123	14	29.92%
IN.3	55	6.25	13.38%
IN.4	152	17.3	36.98%

**Table 6: Impaction level according to Pell and Gregory, LEV= level, MX= maxillary, MD=mandibular.**

Radiograph impaction level	No.	%
LEV A MX	4	0.36
LEV A MD	208	18.9
LEV B MX	56	5.09
LEV B MD	156	14.2
LEV C MX	363	33
LEV C MD	313	28.5
Total	1100	100

**Table 7: Aangulations of impacted lower wisdom teeth, MD =mandibular, MI =mesioangularr impaction, VI=vertical impaction, DI=distoangularr impaction, HI=horizontal impaction. IN= inverted impaction, Buco =bucolingual impaction.**

Angulations	Patients No.	% related to mandibular wisdom	% related to total impaction number (1100)
M.I.MD	184	27.38	16.7
V.I.MD	407	60.56	37
D.I.MD	14	2.08	1.27
H.I.MD	51	8.18	4.64
IN.I.MD	3	.44	0.27
buco Man	13	1.93	1.18
Total mandibular impaction	672	% related to mandibular wisdom	61%

**Table 8: Angulations of upper impacted wisdom teeth MX=maxillary.**

Angulations	Patients No.	% related to max wisdom	% related to total impaction number(1100)
M.IMX	19	4.4	1.73
V.IMX	251	58.6	22.8
D.IMX	150	35.04	13.6
H.IMX	5	1.16	0.45
IN.IMX	1	0.23	0.09
bucoMx	2	0.46	0.18
Total maxillary impaction	428		% related to total impaction number(1100)

**Table 9: Demonstrating the appropriate management modality for impacted wisdom teeth extraction in the current study \*P<0.05 Significant . \*\*P>0.05 Non-significant.**

Indication	Extraction	Leave it	No.	%	P-value
Orthodontic	Extraction		121	11.2	0.026
pericoronitis	Extraction		98	8.89	0.023
Prophylactic	Extraction		91	8.26	0.027
Caries	Extraction		86	7.8	0.018
Pain	Extraction		75	6.81	0.013
bone resorption	Extraction		69	6.26	0.006
Root resorption	Extraction		43	3.9	0.096
Patient request	Extraction		25	2.27	0.072
Other	Extraction		22	2	0.092
Associated lesions	Extraction		17	1.54	0.145
#line	Extraction		16	1.45	0.135
Asymptomatic teeth that appear sound clinically & radiographically		Leave it	437	39.7	0.002
Totals			1100	100	-

Table 10: indications for extraction.

Indication	No.	%
Orthodontic	121	18.25
pericoronitis	98	14.7
Prophylactic	91	13.72
Caries	86	12.97
Pain	75	11.3
bone resorption	69	10.4
Root resorption	43	6.4
Patient request	25	3.7
Other	22	3.31
Associated lesions	17	2.56
#line	16	2.41
Totals	663	100%

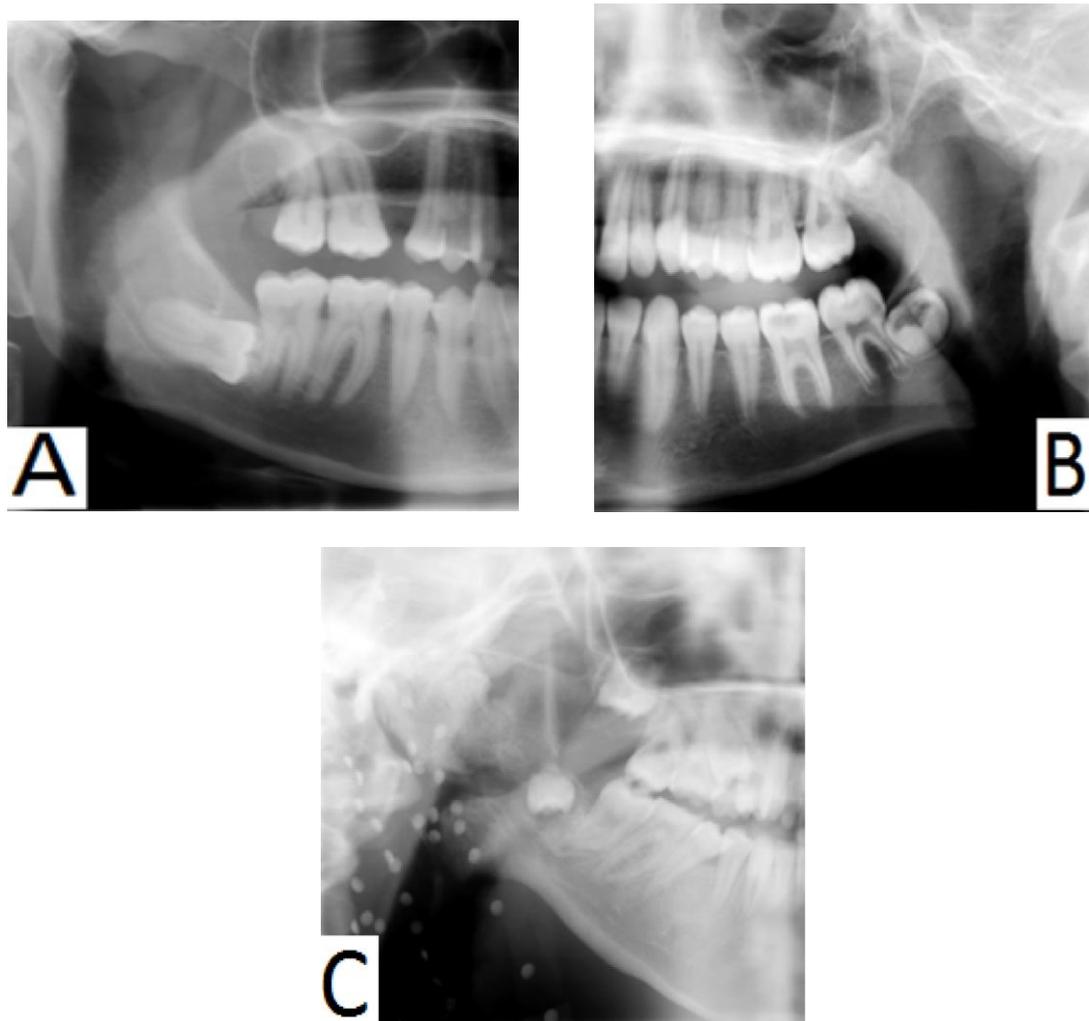


Figure 1: A-Horizontal impaction, B-Buccolingual impaction, C-Inverted mandibular impaction and vertical impaction of maxillary 3<sup>rd</sup> molar.

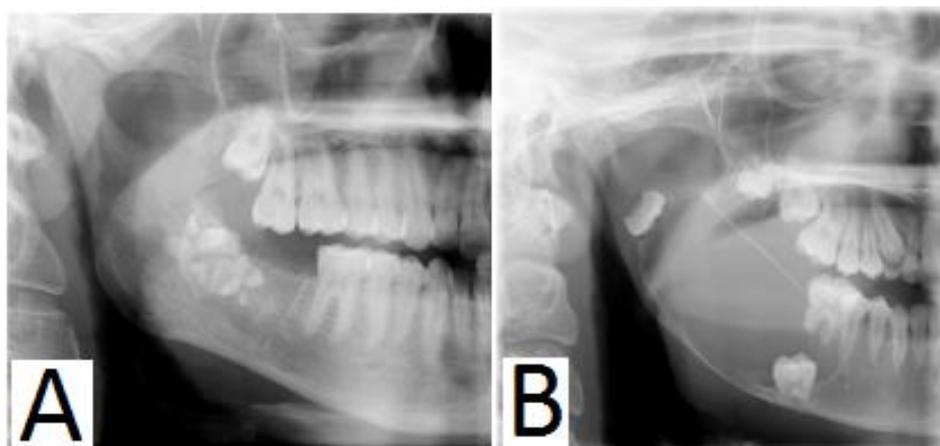


Figure 2: A-Odontoma, B- Cystic lesion.

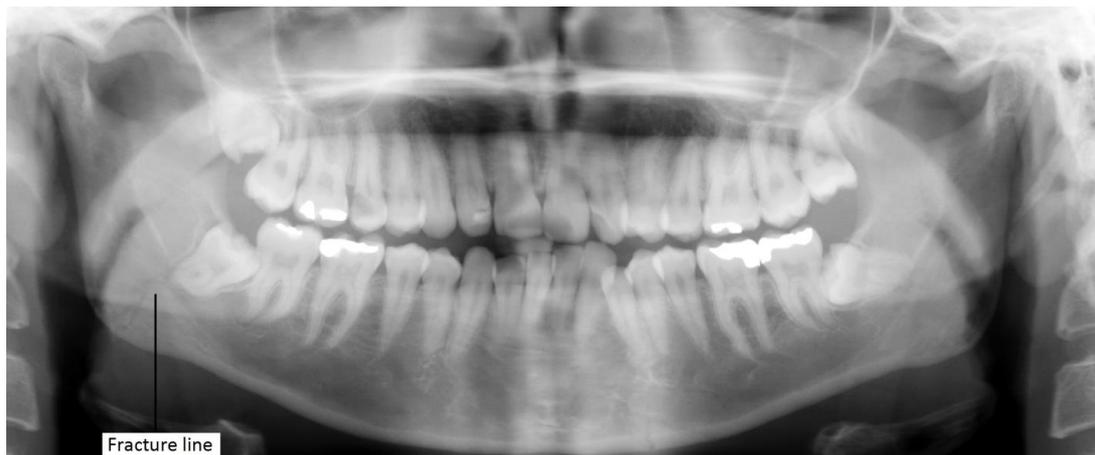


Figure 3: Fracture mandible and mesioangular impaction.

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