Ministry of higher education and scientific research
Babylon University
Faculty of Dentistry

CLASSIFICATION OF IMPACTED LOWER THIRD MOLAR

A report submitted to the department of surgery, in the Faculty of Dentistry, Babylon University.

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بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنكُمْ
وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ

صَدَقَ اللَّهُ الْعَظِيمُ

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SUPERVISOR CERTIFICATION

I certify that the preparation of this project entitled (Classification Of Impacted Lower Third Molar) prepared by (Amna Saad Jassim , Batool Ali Takleef, Zahraa Sadeq Hatif, Zahraa Abd Alkareem Abd Alhussein, Raneen Mejbel Abd-Alzahra, Yaqeen Akram Najih).

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throughout the project.

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Dedication

We dedicate our graduation to everyone who supported us and wished us good and success, our families and friends.And a great thanks to our beloved parents, who have been our source of inspiration and gave us strength and who continually provide their moral, spiritual, emotional, and financial support.

And lastly, we dedicated this to the Almighty God, thank you for the guidance, strength, power of mind, protection and skills and for giving us a healthy life. All of these, we offer to you.

List of contents

Abstract

Tooth impaction is a pathological situation where a tooth fails to attain its normal functional position. Impacted third molars are commonly encountered in routine dental practice. The impaction rate is higher for third molars when compared with other teeth. The mandibular third molar impaction is said to be due to the inadequate space between the distal of the second mandibular molar and the anterior border of the ascending ramus of the mandible..

From January 1to march 31.2024 individual who have pre existent radiography examination at Babylon university dental hospital provided retrospective data for this this observational cross - sectional study. Data from aged 18-40 years . Data were recorded based on third molars region ,eruption level and impaction class from radiographs.for angulation we use Angular classification determined angulation of long axis of impacted third molars with respect to long axis of adjacent second molar and for other systems pell and Gregory classification used by measuring the distance from distal plan of second molar to anterior ramus .

78 radiographs were included and analyzed (61.5% male and 38.5% female) third molar impaction was higher in male in the age group 18-40 .there was high prevalence of mesioangular 51(33.3% on right side and 32.1% on left side) followed by vertical 50 (30.8% on right side and 33.3% on left side) for mandibular third molar impaction

Aim of the study:

The aim of this investigation was to determine the third molar impaction, prevalence and pattern.

Introduction

Introduction

Tooth impaction is a pathological situation where a tooth fails to attain its normal functional position.Mandibular third molars erupt at 17 to 21 years age and frequency of impaction is more in mandible than maxilla, The mandibular third molar impaction is said to be due to the inadequate space between the distal of the second mandibular molar and the anterior border of the ascending ramus of the mandible.

Impacted teeth may remain asymptomatic or may be associated with various pathologies such as Pericoronitis is the most common followed by dental caries of third molar or adjacent second molar. There could also be root resorption of second molar, periodontal problems, odontogenic cyst

The universal recommendation is to consider each case individually to balance the benefits and risks of retention versus extraction of impacted third molar.[1] Surgical treatment in the form of tooth extraction is known to be frequently performed by oral and maxillofacial surgeons to treat impacted third molars. However, there is no general medical agreement about the removal of pathological diseases and impacted teeth that do not produce symptoms.

Even though surgery is typically regarded as a safe operation, problems might happen during or after the process. Alveolitis, infection, postoperative hemorrhage, temporary and persistent inferior alveolar nerve dysfunction are postoperative problems related to third molar extraction.

In order to design a treatment strategy and assess the difficulty of extracting the impacted teeth, the practitioner must make an accurate assessment of the classification of the impaction. Accessibility, as indicated by the nearby teeth or other structures that provided space for the teeth to erupt, this is the primary determinant of difficulty.

Examination methods is the foundation of the vast majority of classification systems. The location, type, and severity of the impaction are the parameters that are most frequently taken into account (2,3,4)one of the examination methods that can be used to help diagnose impacted teeth is panoramic radiograph To date, several impaction classification methods have been used, in which researchers tried to describe the impaction based on the angulations of the third molars [5], the level of impaction, and the relationship to the anterior border of the ramus of the mandible [6], and Angular classification [5] and Pell and Gregory [5] classifications are most commonly used to classify impacted mandibular third molars. In Angular classification the angulation of impaction of the mandibular third molar is determined by the angle formed between the intersected longitudinal axes of the mandibular second and third molars [5].

Level (depth) of impaction can be classified using the Pell and Gregory classification system, where the impacted teeth are assessed according to their relation- ship to the occlusal surface of the adjacent second molar [7]
Pell & Gregory's classification based on their relationship to the anterior border of the mandible (A) Class 1. There is sufficient space available between the anterior border of the ascending ramus and the distal aspect of the 2nd molar. The space is more than the mesiodistal width of the crown of the 3rd molar.

Class 2. The space available between the anterior border of the ramus and the distal aspect of the 2nd molar is less than the mesiodistal width of the crown of the 3rd molar. It denotes that the distal portion of the 3rd molar crown is covered by bone of the ascending ramus.

Class 3. The 3rd molar is totally embedded in the bone of the ascending ramus because of the absolute lack of the space. It is obvious that class 3 teeth present more difficulty in removal, since a relatively large amount of bone must be removed, and there is a risk of damaging the inferior dental (alveolar) nerve or fracturing the mandible, or both.

(B)Classification based on the amount of bone covering the impacted tooth and relation to the occlusal plane

Position A. The occlusal plane of the impacted tooth is at the same level as the occlusal plane of the 2nd molar, or above. (The highest portion of the impacted 3rd molar is on a level with the occlusal plane, or above).

Position B. The occlusal plane of the impacted tooth is between the occlusal plane and the cervical margin of the 2nd molar. (The highest portion of the impacted 3rd molar is below the occlusal plane but above the cervical line of the 2nd molar).

Position C. The occlusal plane of the impacted tooth is below the cervical margin of (The highest portion of the impacted 3rd molar is below the cervical line of the 2nd molar

Pathological Changes Associated with Impacted Third Molars

The retained, unerupted mandibular third molars are often associated with varied pathologies which are listed in Table 1

Pericoronitis

Many studies have looked at the association of pericoronitis and third molar impaction, and this is still the main cause for extraction of these teeth. However, one of the major flaws in these studies is the fact that there is no standard definition of pericoronitis. The eruption process is also likely to cause minor gingivitis, where the symptoms may be similar to pericoronitis, and the lack of a good definition for this disease may lead researchers and clinicians to misclassify it. Still pericoronitis is undoubtedly the main problem faced by dentists when it comes to lower impacted third molars.[8,9,10]

Dental caries

The impacted lower third molars are extracted more commonly also due to dental caries, involving either the impacted third molar itself or the distal surface of the second molar. Majority of the researches in this context were carried out in patients who were referred for third molar removal and hence, the actual incidence of this disease in the general population cannot be estimated.[11,12,13] According to Nordenram et al.[14] caries accounts for 15% of third molar extractions. Researchers in prospective studies of occlusal caries in patients with asymptomatic third molars reported an increased frequency of caries with an increase in age and erupted third molars.[15,16]

Cysts and tumors associated with the tooth

Odontogenic cysts and tumors may be observed in some patients with impacted third molars, although they are relatively rare.[17] The incidence of large cysts and tumors occurring around impacted third molars differs greatly in various studies, showing a wide range from 0.001% when a biopsy was indicated to 11% when the diagnosis was clinically established.[18,19] This wide variation indicates that the presence of a cyst is a weak indication for prophylactic extraction of impacted third molars. Cystic changes may be encountered in the histopathological examination of the associated soft tissue of the asymptomatic impacted third molars, commonly in patients older than 20 years. The incidence, multiple presentation, and recurrence of aggressive cysts of the jaws and the malignant transformation of cysts have been discussed by Stoelinga and Bronkhorst.[20]

Periodontitis

The incidence of periodontitis has been reported to vary from 1% to 5% on the distal surface of the second molar. The incidence and prevalence of periodontitis increases with age irrespective of the presence or absence of the third molars, and thus a higher incidence of periodontitis has been observed among the older patients in relation to the impacted wisdom teeth. There is a paucity of studies relating periodontitis associated with impacted third molars with oral hygiene, which may be a confounding factor.[21,22]

Root resorption

It has been shown in some studies that a third molar left in situ may cause resorption of the distal root of the adjacent second molar. Some studies have also reported an association between root resorption at the apex and increasing age. However, these studies do not represent the incidence of this problem in the general population since these are retrospective studies and are carried out in secondary care settings.[23,24,25]

Late Crowding in Lower Incisors

One major controversy for indicating the prophylactic removal of lower third molars is the belief that their presence may result in late crowding of the lower incisors. However, it has been observed in a randomized controlled trial that the presence of impacted third molars had no significant clinical influence on the development of crowding in the lower incisors. Previous studies support these findings and suggest that crowding may be caused by other factors.[26,,27] A review of studies related to management of third molars by orthodontists suggested that the role of third molars may be controversial in the alignment of the anterior teeth and there is no evidence exists in support of the fact that third molars may cause late incisor crowding.[28]

Other related pathologies

One of the most commonly reported pathologies is an association of pain directly related to the presence of a third molar. The prevalence of this condition varies greatly from 5% to 53%. The incidence of cellulitis and osteomyelitis has been reported to be around 5%. Few other conditions which are also believed to be associated with impacted third molars include functional disorders such as occlusal interference, cheek biting, mastication disorders, trismus and temporomandibular joint problems.[29,30] These pathologies and symptoms may result in distress and pain, but their correlation with third molars is not yet well-established due to lack of supporting evidence from the current literature.

Growth factor receptor and it has been suggested that this observation should be Studies have shown that smoking causes pathological diversity, by augmenting expression of epidermal taken into account when deciding in case of removal of an asymptomatic impacted lower third molar.

Table 1

Classification of pathologies associated with impacted mandibular third molars

Clinical signs and symptoms
Caries
Pain
Swelling
Paresthesia
Periodontal pocket
Pericoronitis
Noninflammatory radiological changes
Caries
Root resorption (internal or external)
Interdental bone loss
Hyperplastic dental follicle
Mild inflammatory radiological changes
Pericoronal radiolucent areas suggesting pericoronitis
Periapical radiolucent areas suggesting abcess
Severe inflammatory radiological changes
Osteomyelitis
Radiological signs of cysts and benign tumors
Dentigerous cyst
Keratocystic odontogenic tumor
Odontomes
Ameloblastoma
Odontogenic fibroma
Radiological signs of malignant tumors
SCC
Fibrosarcoma
Mucoepidermoid carcinoma

SCC: Squamous cell carcinoma

(Table 1:Classification of pathologies associated with impacted mandibular third molar)

Assessment of Third Molar

Assessment of impacted tooth is done by physical and radiographic evaluation. The physical evaluation includes inspection and palpation of the temporomandibular joint and movement of the mandible, determination of mobility characteristics of lips and cheeks, size and contours of the tongue and appearance of soft tissue overlying the impacted teeth. Radiographic evaluation includes assessment of root morphology, size of follicular sac, density of the surrounding bone, contact with the second molar, nature of overlying tissues, inferior alveolar nerve and vessels, relationship to body and ramus of mandible, relation with adjacent teeth and buccal to lingual position of the third molar.[31]

Management of Impacted Tooth

The treatment plans depend on the presenting complaint and the history of the patient, the physical evaluation, radiographic assessment, the diagnosis, and the prognosis. The management includes observation, exposure, transplantation or removal of the impacted tooth

Observation

If the impacted mandibular third molar is embedded in bone with no perceptible to the follicle, as may be seen in an older individual and has no history, signs of associated pathology, long-term observation is appropriate. Most impacted teeth retain an erupting potential, and annual/biannual evaluation would be recommended if no indications for direct surgical management arise.

Indications for Mandibular Third Molar Extraction

As mentioned earlier, the third molar teeth are the last teeth to erupt with a relatively high chance of becoming impacted. Hence, the surgical extraction of these impacted teeth has become the most common dentoalveolar surgeries.[32] In 1979, the National Institutes of Health Consensus Development Conference agreed on a number of indications for removal of impacted third molars, which included infection, non-restorable carious lesions, cysts, tumors, and destruction of adjacent teeth and bone.[33] Some authors reported the absence of any associated problems over a period of several years due to the impacted third molars in edentulous patients.[34] However, overemphasizing the development of dentigerous cysts due to impacted third molars have also been reported in the literature.[35]

The removal of impacted third molars is indicated for various therapeutic and prophylactic measures. However, no general indication has been agreed upon till date for the need of surgical removal of all asymptomatic impacted third molars.[36,37] The surgical extraction of many impacted mandibular third molars which have been asymptomatic for years are often carried out to prevent the development of any future complications and pathologic conditions[35]

Many investigators have questioned the necessity of removal for patients who are asymptomatic or have no associated pathologies, based on the view that retention of impacted teeth for a longer duration has less chances of pathological change in the tooth itself, or of deleterious effects on adjacent tooth and associated structures.

Few authors have argued over the fact that all impacted third molars should be removed regardless of being asymptomatic; while others suggest that removing such impacted asymptomatic third molars is questionable in the light of the present lack of knowledge about the incidence of associated pathology.[18,22,36,37]

Yet another group of authors considered that prophylactic surgical removal of impacted third molars is not necessary as the risk of development of pathological conditions in or around follicles of third molars is apparently low.[38]

Extraction of the impacted mandibular third molars significantly improved the periodontal status on the distal aspect of second molars, positively affecting the overall health of supporting periodontal tissues.[39] But it is also suggested that periodic exercising of arbitration to enhance the periodontal parameters on the distal surface of the second molar at the time of third molar extraction is not advisable for all subjects.[40,41,42]

The removal of asymptomatic impacted third molars that could not cause any complications for a known period of time thought to be an encumbrance from economic standpoint.

The assessment of health risks and cost effectiveness regarding the prophylactic extraction of asymptomatic impacted third molars should be considered before tooth removal.[43] The dental practitioner, who scrutinize the healthy individual should monitor carefully regarding the pathologies which may incur an impacted third molar.

They should procreate adult patients with asymptomatic third molars, fathom that there is no coercion or it is indispensable to remove the impacted third molars without any pathology. This aforesaid phenomenal proposition needs to be exercised for adolescents and their parents regarding the impact of the extraction of asymptomatic impacted third molar removal on lower incisor crowding at a later period.[44]

Complications and Risks Following Surgery :

Complications associated with the removal of impacted teeth are relevant and is aided by local and general factors which include tooth position, age of the patient, health status, knowledge and experience of the dental surgeon, and surgical equipment used.

Most common complications associated with the removal of the third molar include damage of the pain sensory nerve leading to paresthesia, dry socket, infection, and hemorrhage. Severe trismus, oro-antral fistula, buccal fat herniations, iatrogenic damage to the adjacent second molar, and iatrogenic mandibular fracture may also occur, though very rarely.[38,45] The rate of sensory nerve damage after third molar surgery ranges from 0.5% to 20%.[28,46] The overall rate of dry socket varies from 0% to 35% among studies.[38,47]

The risk of dry socket increases with lack of surgical experience and tobacco use though this does not justify prophylactic removal. Many of these problems are not permanent; however, paresthesia may become permanent and lead to functional problems in some cases.[48,49] The pathological features associated with impacted third molars are summarized in Table 1, after a thorough review of the literature.

According to these features, an attempt has been made to propose the first combined clinical and radiological classification of impacted mandibular third molars [Table 2]. This attempt of proposing the classification will assist the dental practitioners and researchers in accomplishing insight in terms of standardized assessment and categorization of impacted mandibular third molar which will further help in the management of this condition accordingly.

This classification would expedite continued studies to be carried and analogizing to be made in a more categorical and propitious manner and allow an exceptional understanding of the pathophysiology underlying the impacted teeth.

This proposed classification focus on diversified key characteristics that are believed to be of concernment to the dental practitioners and have also been hypothesized by others as important when it comes to various sequel of interest such as practice efficiency, operator satisfaction, and subject outcomes. It also provides a common lexicon and nomenclature for referring to group practices of different kinds and also serves common terminology to facilitate transmission among practitioners, researchers, academicians, and patients.

Table 2

Proposed classification (Dr. Santosh Patil classification) for impacted mandibular third molars

Class	Description
I	No pathology associated
II	Only clinical signs and symptoms
III	Class II features with noninflammatory radiological changes
IV	Class III features with mild inflammatory radiological changes
V	Class IV features with severe inflammatory radiological changes (osteomyelitis)
VI	Class V features with radiological signs of cysts and benign tumors
VII	Class VI features with malignant radiological signs of tumors

{Table 2 :classification of impacted mandibular third molar}

Materials and Methods

Materials and methods:

From January 1 to March 31,2024.78 individuals who have preexistent panoramic radiography examinations at the Babylon University Dental Hospital-provided retrospective data for this observational cross-sectional study.

Data from patients aged 18-40years ,who had second molars that could be used as a guide for classifying third molars and had complete medical records with good quality panoramic radiographs were included in this study. Data from patients with incomplete third molars root formation , dentoalveolar trauma, craniofacial anomalies, congenital deformities , syndromes (such as Down's syndrome) or other pathological conditions in the molar region were excluded from this study . Data that met the criteria were then recorded based on the tooth region , angulation type, and class of impacted third molar.

As for angulation classification : ***Angular*** classification was used ; which is the most commonly used classification system with respect to treatment planning. It uses a determination of the angulation of the long axis of the impacted third molar with respect to the long axis of the adjacent second molar :

Vertical impaction: the long axis of the third molar is parallel to the long axis of the second molar (from 10 to-10°).

***Mesioangular impaction*:** the impacted tooth is tilted toward the second molar- in a mesial direction (from 11 to 79°).

Horizontal impaction: the long axis of the third molar is horizontal (from 80 to 100°).

***Distoangular impaction*:** the long axis of the third molar is angled distally/posteriorly away from the second molar (from-11 to-79°); others (from 101 to-80°).

As for the other systems, ***Pell and Gregory*** Classification ,used by measuring the distance from the distal plane of the second molar to the anterior ramus, this Classification was used to establish the type of impaction and evaluate whether there is room for the third molar (Figure 1).

Class I refers to the situation where there is enough room for the third molar's mesiodistal crown.

Class II refers to the situation where the distance between the ramus and the second molar's distal side is smaller than the third molar's mesiodistal diameter.

Class III refers to the situation where the third molar is situated within the ramus.

Figure (1)

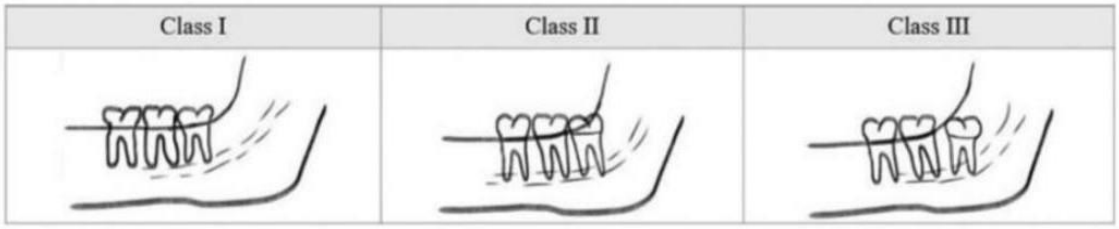


Figure 1. Eruption level (top) and class (bottom) of impacted third molars based on Pell and Gregory classification

Statistical Data Analysis:

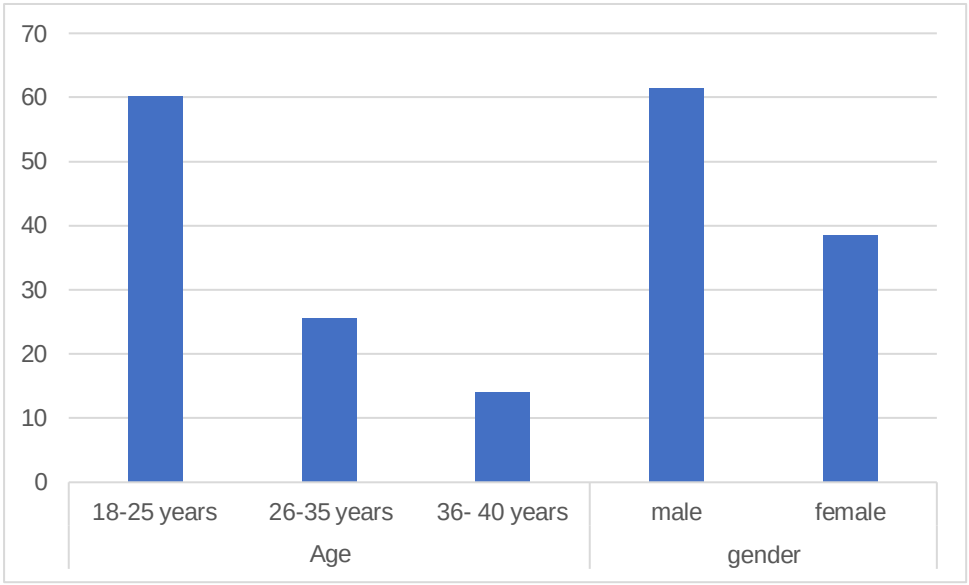
Several statistical measures were used by using Statistical Package of Social Sciences (SPSS) version 26, and Microsoft excel (2016) in order to analyze and Evaluate the results of the study.

Results

Results:

Table 1:

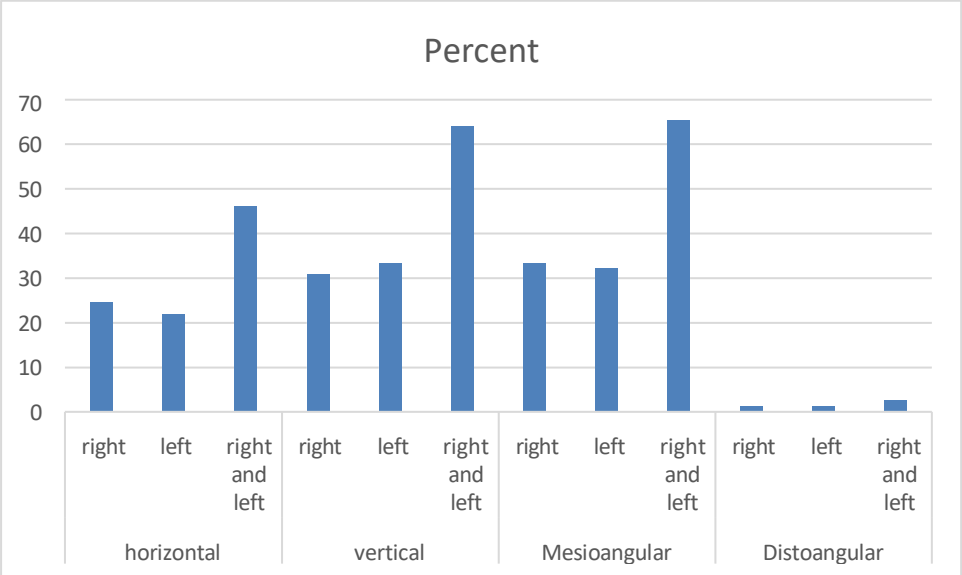
Demographical data		Frequency	Percent
Age	18-25 years	47	60.3
	26-35 years	20	25.6
	36- 40 years	11	14.1
gender	male	48	61.5
	female	30	38.5



The results of our study revealed that 60.3% of the participants were between 18-25 years old, 25.6% between 26-35 years old, 14.1% between 36-40 years old, 61.5% men and 38.5% women.

Table 2: Presentation

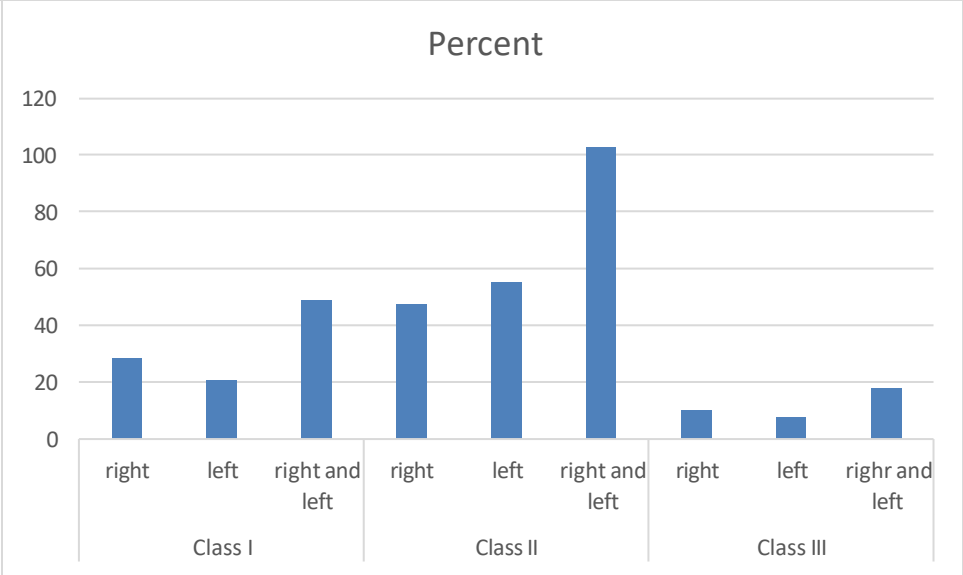
Type		Frequency	Percent
horizontal	right	19	24.4
	left	17	21.8
vertical	right	24	30.8
	left	26	33.3
Mesioangular	right	26	33.3
	left	25	32.1
Distoangular	right	1	1.3
	left	1	1.3



The results of our study revealed that 30.8% of the participants were vertical on the right side, 33.3% were also vertical on the left side, 24.4% were horizontal on the right side, were 21.8% was horizontal on the left side, 33.3% were Mesioangular on the right side, and 32.1% were Mesioangular on the left side. 1.3% Distoangular in the right, and the same percentage in the left side

Table 3: Classification

Type of class		Frequency	Percent
Class I	right	22	28.2
	left	16	20.5
Class II	right	37	47.4
	left	43	55.1
Class III	right	8	10.3
	left	6	7.7



The results of our study revealed that 28.2% of the participants were Class I on the right side, 20.5% of them were Class I on the left side, 47.4% were Class II on the right side, 55.1% were Class II on the left side, and 10.3% were Class III on the right side. 7.7% row on the left side.

Discussion

Discussion:

The decision to extract the third molar teeth may be affected by the surgeon's opinion on the eruption potential of the tooth. A tooth that may appear impacted at the age of 18 years may have as much chance as 30 to 50% of erupting fully, except horizontally impacted molars . The selected group of age (18 years to 26 years) that were included by the study covers the age range that most likely to show significant lower third molar movement [13].

The study showed the age of patients in 60.3% between 18-25 years. This finding supported by several studies, except that they found an earlier eruption of third molars compared with males . The lower third molar teeth in this study showed a significant increase in angulations between the ages 20–23 years, in which studies from Europe and United States of America had similar findings [14].

The mesioangular and vertical impaction were the most frequent impaction by 33.3% for each one, while the Distoangular impaction was the least common 1.3%. mesioangular impaction was also found to be the most common in Turkey, Singapore, and China. In Sweden, vertical impaction was found to be the most common , whereas the vertical impaction was 18.8% in our population.[15]

More vertically angled third molars are seen in older age group, this angulation is the significant point the surgeon looks for when deciding to extract, taking into consideration patient's age. In studies, the prevalence of vertical impaction in patients older than 20 years was significantly higher (21.4%) and the prevalence of horizontal impactions was significantly lower (11.7%) than that in younger patients whose incidences were (14.0%) and (21.3%), respectively.

The result of our study revealed that the prevalence of impaction was higher in male 61.5%, while in female 38.5%.Additionally, as found by others , a constant pattern of an increase in the retromolar space was noticed with increasing age of patients ($P < 0.001$). This was reflected in a constant pattern of increase in Pell-Gregory ramus class 1 with increasing age, which will have a big effect to reduce surgical complications since the tooth may favor eruption. This signifies the importance of re-evaluating patient's radiograph considering the possible changes of impacted lower third molar teeth that could occur with time, especially for younger patients . Moreover, third molars remain impacted after the age of 25 may still change in position afterward [16].

We believe this study has limitations that should be considered in future projects. Following patients' clinical and radiological data in a cohort study design or retrospectively in a case-control design will provide a quality evidence on the prophylactic removal, complications, and outcome of third molars.

Conclusions:

The pattern of lower third molar impaction in the present sample was characterized by the male having more likely impacted lower third molar. The most common angulation was the Mesioangular followed by Vertical angulation. And class 2 of the Pell and Gregory classification being more dominant in third molar impaction followed by class 1. By understanding the classification and pattern of impaction of third molars, appropriate management strategies can be implemented and the risk of post-treatment complications can be minimized.

Recommendations:

This study's objective was to look into the prevalence along with the pattern of the third molar impaction in patients at the Babylon University Dental Hospital. Its reduced sample numbers and limited area coverage are its main limitations. So we advise the next studies to include a wider area So it would be more comprehensive.

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