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Department of Oral & Maxillofacial Surgery

Post-operative Complication of Impacted Lower Third Molar

A graduation project is submitted to the dentistry department in partial fulfillment of the requirements for degree of B.D.S

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صدق الله العلي العظيم

سورة المجادلة اية 11

Dedication

اهدي تخرجي الى الذي اوصاني الله به برآ وأحسانا وأهدى لي سنين عمره الذي احنى ضهره التعب في سبيل وصولي لهذه المرحلة والدي الحبيب

الى بحر الحب والحنان والنبض الساكن في عروقي التي لم تنام يوما ألا ورفعت يدها للسماء تدعوا الله ليحقق حلمي امي الحنونة

الى من وقفو معي دائما سندي في الحياة اخوتي واخواتي والى اعز اصدقائي والشكر كل الشكر الى اساتذتي واصدقائي الذين وقفو معي خلال هذه الرحلة الطويلة من النجاح

Abstract

Impaction of tooth presents a clinical event in which the tooth does not reach its intended final position in oral cavity and is not expected to do so after end of eruption age
lower third molar The most frequent impacted tooth (ILTM), which has a prevalence of 66–77%. ILTM frequently causes repeated wisdom tooth pericoronitis adjacent tooth caries, lower anterior arch crowding, periodontal defects of adjacent molars, tooth root resorption and even temporomandibular joint disorders. Most scholars believe that ILTM with pathological symptoms, especially Third molar surgery involves a few postoperative complications such as pain, swelling, and trismus, which are inflenced by many factors and variables. Certain challenges cause esthetic and functional problems for surgeons and patients. the outcome of various clinical and surgical procedures in the third molar surgery is affected by several factors such as the patient, the defect, and surgical procedure. An awareness of systemic conditions and medications that could affect bone and adjacent soft tissues may be important to identify patients at higher risk of poor clinical and postoperative results
Procedure of Surgical Remove of Impacted Lower Third molar involve X-ray, anesthesia, flap design, bone remove, tooth separation, wound debridement, Wound Closure(suturing).
Complications related to third molar extraction range from 4.6% to 30.9%. They may be occurring intraoperatively or develop in the postoperative period. The four most common postoperative complications of third molar extraction are localized alveolar osteitis (AO), infection, bleeding, and paresthesia. Mandibular fracture, severe hemorrhage, or displacement of third molar teeth, Surgical removal of third molars is often associated with postoperative pain, swelling, and trismus. They are expected and typically transient and are not considered complications.
Age, gender, medical history, oral contraceptives, presence of pericoronitis, poor oral hygiene, smoking, type of impaction, relationship of third molar to inferior alveolar nerve, surgical time, surgical technique, surgeon experience, use of perioperative

antibiotics, use of topical antiseptics, use of intra-socket medications, and anesthetic technique are all thought to influence
the incidence of complications after third molar removal.

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LIST OF ABBREVIATIONS

Abbreviation	Definition
ILTM	Impacted lower third molar
CBCT	Cone Beam Computer Tomography
AO	Alveolar Osteitis
TMJ	Temporomandibular Joint
IAN	inferior alveolar nerve
DOI	Delayed-onset infections

1. CHAPTER ONE

1.1. Introduction

Impaction of tooth presents a clinical event in which the tooth does not reach its intended final position in oral cavity and is not expected to do so after end of eruption age [1].

Third molars have been described as being different from the other teeth in the mouth. They have the highest rate of developmental problems and, most important, they are the latest to erupt. In order. Anomalies of the third molars are common. Inclusion, retention, impaction, or inclusion are examples of eruptions. 71 percent of the time, deterioration affects the population [2].

lower third molar the most frequent impacted tooth (ILTM), which has a prevalence of 66–77%. ILTM frequently causes repeated wisdom tooth pericoronitis adjacent tooth caries, lower anterior arch crowding, periodontal defects of adjacent molars, tooth root resorption and even temporomandibular joint disorders. Most scholars believe that ILTM with pathological symptoms, especially mid-to-high mesial inclination, should be prophylactically removed early [3].

The dentist, on the other hand, must first do a more thorough examination. panoramic radiography for pre-operative diagnosis and in-office diagnostics, in some circumstances, cone-beam computer tomography is used (CBCT) In order to examine the wisdom tooth's position and relationship to the mandibular canal, it must be known pre-operatively. the risk of complications. With this knowledge, a risk-benefit analysis and optimal patient information can be conducted if surgery is indicated. A detailed overview of indications and contraindications for third-molar removal is given by Jaquiéry et al. (1994). In daily practice, the classification of the respective tooth by degree of difficulty into simple, advanced, and complex (SAC) has become established [4].

Age, gender, medical history, smoking, use of oral contraceptives, poor oral hygiene, presence of pericoronitis, and the connection of the third molar to the inferior alveolar nerve, type of impaction, surgeon’s experience, anesthetic technique, surgical time, surgical technique, topical antiseptics, intrasocket medications, and perioperative antibiotics are all thought to affect the occurrence of complications after third molar removal [5].

Third molar surgery involves a few postoperative complications such as pain, swelling, and trismus, which are inflenced by many factors and variables. Certain challenges cause esthetic and functional problems for surgeons and patients. the outcome of various clinical and surgical procedures in the third molar surgery is affected by several factors such as the patient, the defect, and surgical procedure. An awareness of systemic conditions and medications that could affect bone and adjacent soft tissues may be important to identify patients at higher risk of poor clinical and postoperative results [6].

The assessed complications included pain, swelling, trismus, paresthesia, bleeding, dry socket, infection and fracture. Immediate complications were assessed during the first 3 days following the surgery and late complications were assessed 7–14 days later in the clinic in postoperative visits. Patients rated the severity of postoperative pain by choosing a number from 0 to 10 on a visual analogue scale. The severity of swelling was evaluated by the investigator (Z.M.) and was subjectively categorized into:

1-slight 2- moderate 3-severe

depending on the size of the swelling in relation to the face:

-slight swelling: if less than one third of the cheek on the side of the surgery was involved

-moderate swelling: if one to two thirds of the cheek was involved

-severe swelling: when more than two thirds of the cheek were affected. Trismus: was assessed by measuring the mouth opening before surgery and postoperatively into slight, moderate and sever, If the mouth opening was reduced by one third this was considered as slight trismus; up to two thirds trismus was considered to be moderate and if the reduction was more than two thirds of the preoperative mouth opening, trismus was considered to be severe [5].

1.2. Aim of study

To study how reduce or avoided of the complication after surgical remove of impacted lower third molar, and facilitation of surgery and treatment plane.

2. CHAPTE TWO

2.1. Definition

Tooth impaction is a pathological situation where a tooth fails to attain its normal functional position. Third molars that have been impacted are a regular occurrence in dental practice When compared to other teeth, lower third molars have a higher rate of impaction [7].

Systematic and meticulous classification of the position of impacted molar teeth helps in determining the best possible path of removal of the impacted teeth and also in encountered during removal.

Prediction of operative difficulty before the extraction of impacted third molars allows a design of treatment that reduces the risk of complications. Both radiological and clinical data must be taken into account [7].

Sex, age, the position of the molar teeth in relation to the occlusal plane, and the surgeon's assessment of surgical difficulties have all been linked to a much longer period of postoperative recovery. Patients who are thought to be at a higher risk of delayed recovery are likely to benefit from a more thorough postoperative follow-up and particular postoperative recovery therapies [7].

Prediction of operative difficulty is therefore critical for proper management. Various methods have been proposed for the pre-operative evaluation of difficulty, but these have often been of limited validity. To overcoming the limitations of these systems, the classification systems can be used in conjunction with each other to determine the difficulty of removal of the impacted tooth [7].

2.2. Classification of Impacted Mandibular 3rd Molars

•Based on the nature of the overlying tissues

•Winter’s classification

•Pell & Gregory’s classification

2.2.1. Based on the Nature of the Overlying Tissue

Based on the nature of the overlying tissue impaction, impacted lower wisdom teeth can be classified into:

1- Soft Tissue Impaction. When the height of the tooth's contour is above the level of the surrounding alveolar bone and the superficial portion of the tooth is covered only by soft (though this can be dense and fibrous) tissue. Soft tissue impaction is usually the easiest of type of impacted tooth to remove

2- Hard Tissue ('Bony') Impaction. This is where the wisdom teeth do not erupt because being obstructed by the overlying bone. This can be sub-divided into Partial and Complete Bony Impactions:

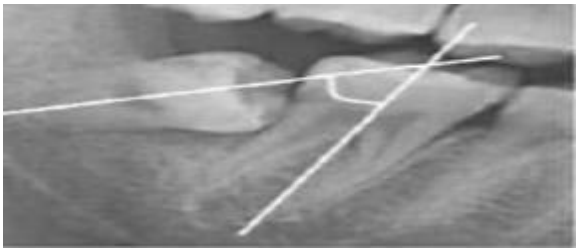
• Partial Bony: The superficial portion of the tooth is covered only by soft tissue but the height of the tooth's contour is below the level of the surrounding alveolar bone. Apart from cutting the gingiva (gum) & from behind the tooth the bone is possible removal, the tooth's roots may need to be divided.

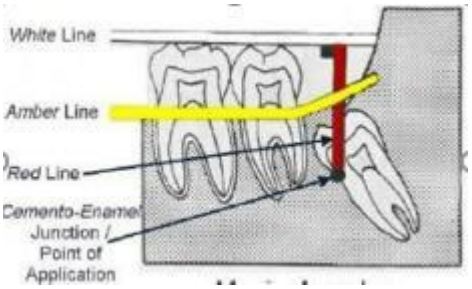
• Complete Bony. The tooth is completely encased in bone so that when the gingiva is remove and reflected back, the tooth is not seen. Bone removal (large amounts) together with root sectioning will be needed to remove the tooth. These are often the most difficult teeth to extract [7].

2.2.2. Winter's Classification

The classification is based on the inclination of the impacted wisdom tooth (3rd molar) to the long axis of the 2nd molar, can subdivide into:

- Mesio-Angular. The impacted tooth is tilted toward the 2nd molar in a mesial direction as shown in Figure 1 [7].

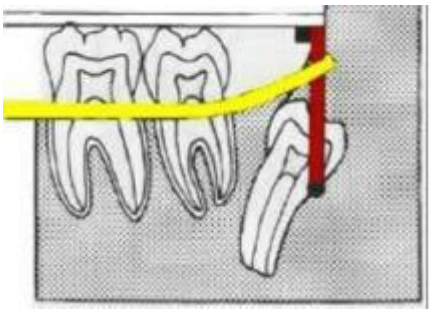




Right Side Left Side

Figure 2.1: Mesio-Angular

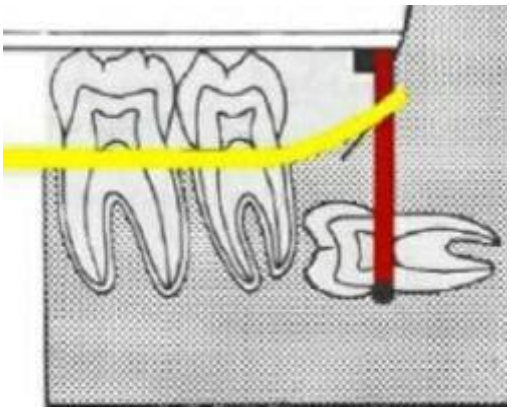
-Disto-Angular. The long axis of the 3rd molar is angled distally / posteriorly away from the 2nd molar as shown in Figure 2.



Right Side Left Side

Figure 2.2: Disto-Angular

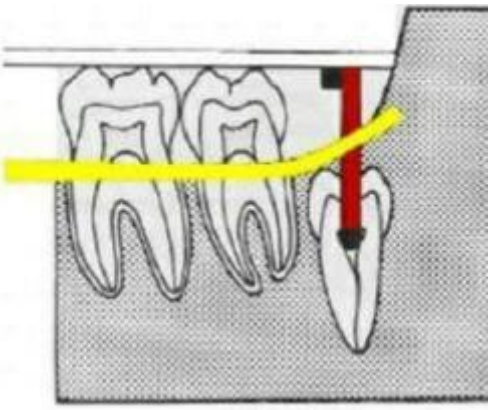
- Horizontal. The long axis of the 3rd molar is horizontal.



Right Side Left Side

Figure 2.3: Horizontal Lower Wisdom

-Vertical. The long axis of the 3rd molar is parallel to the long axis of the 2nd molar.



Right Side Left Side

Figure 2.4: Vertical Lower Wisdom

-Buccal / Lingual Obliquity. In combination with the above, the tooth can be buccally (tilted towards the cheek)

Right Side Left Side

Figure 2.5: Buccal / Lingual Obliquity(Transverse)

- or lingually (tilted towards the tongue) impacted.

- Transverse. This is where the tooth is in effect horizontally impacted but in a cheek-tongue direction

2.2.3. Pell & Gregory's Classification

This is based on the relationship between the impacted lower wisdom tooth (3rd molar) to the anterior border of ramus of the

mandible (lower jaw) and the 2nd molar (based on the space available distal to the 2nd molar) [7].

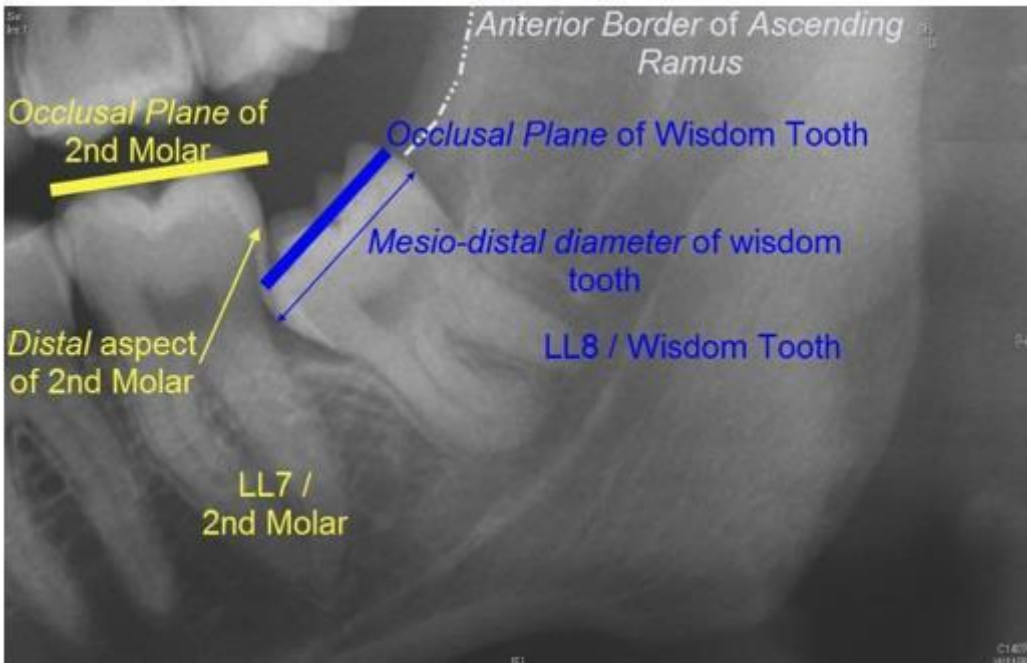


Figure 2.6: Pell& Gregory Impaction Classification- Terms of Reference

Can be classified into:

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

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

Class C. The impacted tooth is below the cervical margin of the 2nd molar. (The highest portion of impacted 3rd molar is below the cervical line of the of 2nd molar).
Class 1. There is enough space available between the anterior border of the ascending ramus & the distal aspect of the 2nd molar for the eruption of the 3rd molar

Class 2. The distance available between the anterior border of the ramus & the distal aspect of the of the 2nd molar is less than the mesio-distal 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 anterior border of the ascending ramus because of the severe lack of space. It is obvious that Class 3 teeth present more difficulty in removal as a relatively large amount of bone has to be removed and there is a risk of damaging the ID nerve or fracturing the mandible (or both).

2.3. Relative depth of the third molar in the bone

This is having three positions [7]:

• Position A: The highest part of the tooth is on a level with/above the occlusal line

• Position B: The highest part of the tooth is below the occlusal plane, but above the cervical line of the second molar

• Position C: The highest part of the tooth below the cervical line of the second molar teeth in relation to the long axis of impacted second molar.

2.4. Indication of Lower Third Molar Extraction

Pathological alterations in the mandibular third molar may include pericoronitis, an increased risk of caries and periodontal disease in adjacent teeth, and orthodontic problems in later life or remain asymptomatic. There is always a debate on whether to retain or extract an asymptomatic impacted mandibular third molar. Most of the time third molars are considered as a troublemaker and functionally non-essential thus extracted most frequently [8].

The decision of whether to retain or remove impacted mandibular third molars might be difficult. Surgical removal of impacted third molar may expose the patients to the risks of surgery such as nerve damage, dry socket, infection, damage to the adjacent teeth,

bleeding, fracture of the mandible, and rarely death. At the same time, retention of the impacted third molar may lead to development of pathologies requiring more extensive surgery that too at the older age when surgery itself is more complicated due to systemic conditions. Therefore, a surgeon must weigh the risk-benefit ratio before choosing the appropriate treatment option [8].

2.5. Complications and Risks Following Surgery

Complications related with the extraction of impacted teeth are relevant, and they are facilitated by local and general factors such as tooth position, patient age, health state, dental surgeon education and experience, and surgical equipment employed. Most common complications associated with the removal of the third molar include Damage to the pain, sensory nerve leading to paresthesia, dry socket, infection, and bleeding are the most common consequences linked with the removal of the third tooth. Iatrogenic mandibular fracture, severetrismus, oroantral fistula, buccal fat herniations, iatrogenic damage to the adjacent second molar, and iatrogenic injury to the neighboring second molar.

After third molar surgery, the rate of sensory nerve injury varies from 0.5 % to 20%. The overall rate of dry socket varies between research, ranging from 0% to 35%. Lack of surgical skill and tobacco use increase the incidence of dry socket, although this does not justify prophylactic removal. Many of these problems are temporary; but, in other situations, paresthesia can become permanent and cause problems. After a thorough study of the literature, the pathological characteristics associated with impacted third molars are summarized in Table 1 [7].

Table 2.1: Classification of pathologies associated with partial impacted mandibular third molars

Pericoronitis Noninflammatory radiological changes
Pain
Clinical signs and symptoms

Caries Swelling Paresthesia Periodontal pocket Caries Root resorption (internal or external) Interdental bone loss Hyperplastic dental follicle Mild inflammatory radiological changes

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] .

Table 2.2: 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 Il 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

2.6. Coronectomy

Described by Pogrel et al, it is the technique of removing the crown of the tooth by raising a full thickness mucoperiostial flap, retracting the lingual soft tissues so as to protect the lingual nerve and completelysectioningthecrownat45ºtoattempttoavoidmobilizing the roots.31 The coronal portion is then reduced with burrs until the roots lie are 3 mm below the alveolar bone and no enamel remains, left them in place so as to reduce the risk to the ID nerve. 31 No pulp

treatment should be performed on the retained roots as this increases risk of postoperative infection.

Coronectomy is not indicated for teeth with caries involving the pulp, or teeth which are mobile. In principle this method should reduce incidence of ID nerve damage. A systematic review in 2015 investigated the comparison between Coronectomy and surgical removal of the crown and roots. It was found that temporary ID nerve injury occurs in 0–9.5% of coronectomies32 compared with up to 19% for surgical removal.

These data do not account for failure of Coronectomy which is due to either post-operative infection or mobilization of the roots during surgery. Mobilizing the roots are thought to devitalize them, resulting in a foreign body response, increasing the risk of post-operative pain and infection. I Once the crown is sectioned from the roots they are essentially disimpacted, which gives rise to another complication of Coronectomy: migration of the roots.

Some may argue that this is not a complication as the roots are going away from the ID nerve and towards the surface. However, this can cause irritation and this situation often demands surgical removal. Root migration occurs in up to %85.3of cases37 and this migration can be up to 4 mm after 24 months.38 This can translate to a re-operation rate of 6.9% but this can be due to infection as well as root exposure following migration.39 There was no significant difference in risk of post-operative pain and dry socket between Coronectomy and surgical removal in the systematic review carried out.32 Overall Coronectomy is a good treatment option to reduce the incidence of ID nerve injury in high risk cases. Root migration and re-operation are risks [9].

Table 2.3: complication of Coronectomy of mandibular third molar

Complication	Risk
Damage to the inferior alveolar nerve	0-9.5%
Damage to the lingual nerve	0-2%
Failed Coronectomy (mobilizing the roots)	0%-38%
Root Migration	85.3%

Further procedure to remove the roots	6.9%

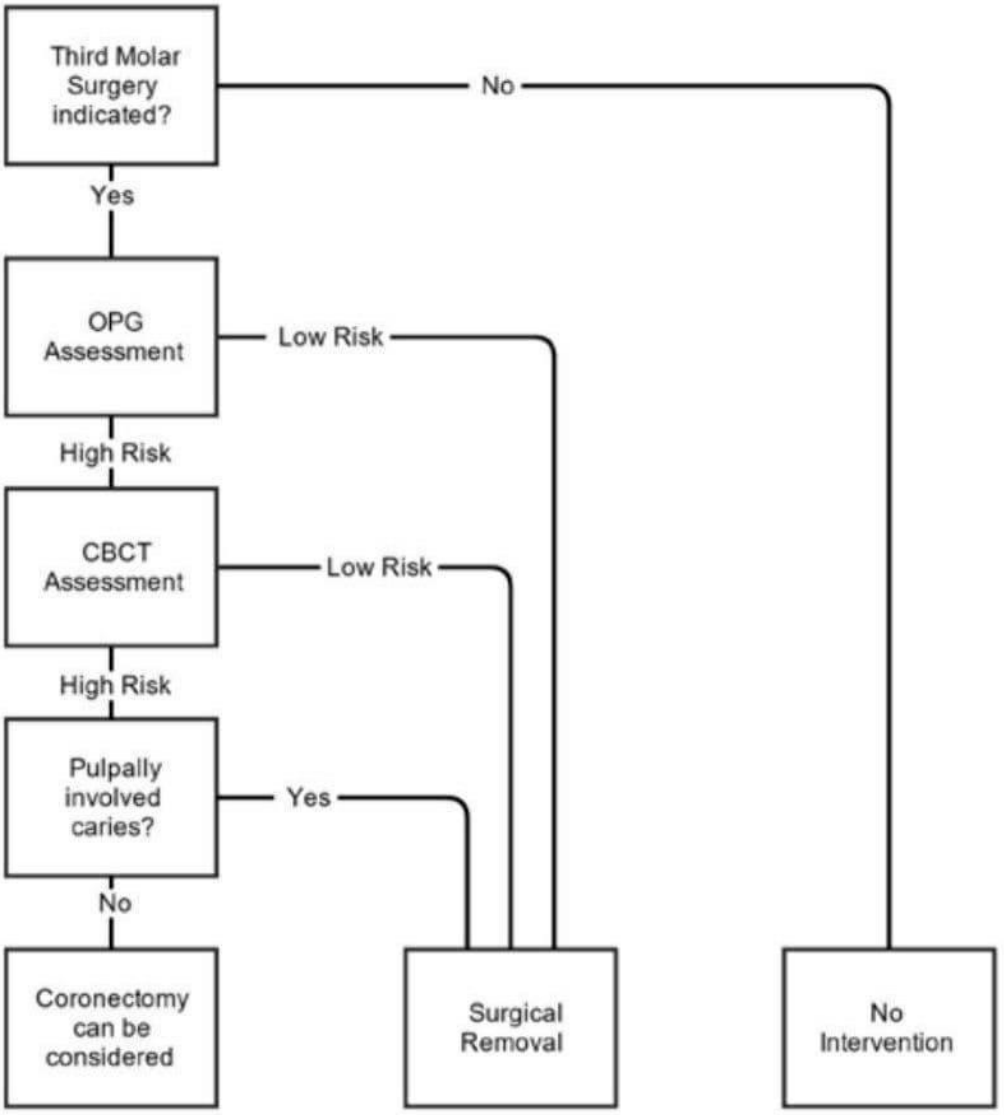


Figure 2.7. Algorithm to aid the treatment planning process

2.7. Related Disease of impacted lower third molars (Pathological Changes Associated with Impacted Third Molars).

The retained, unerupted mandibular third molars are usually associated with varied diseases which are listed in Table 1 [7].

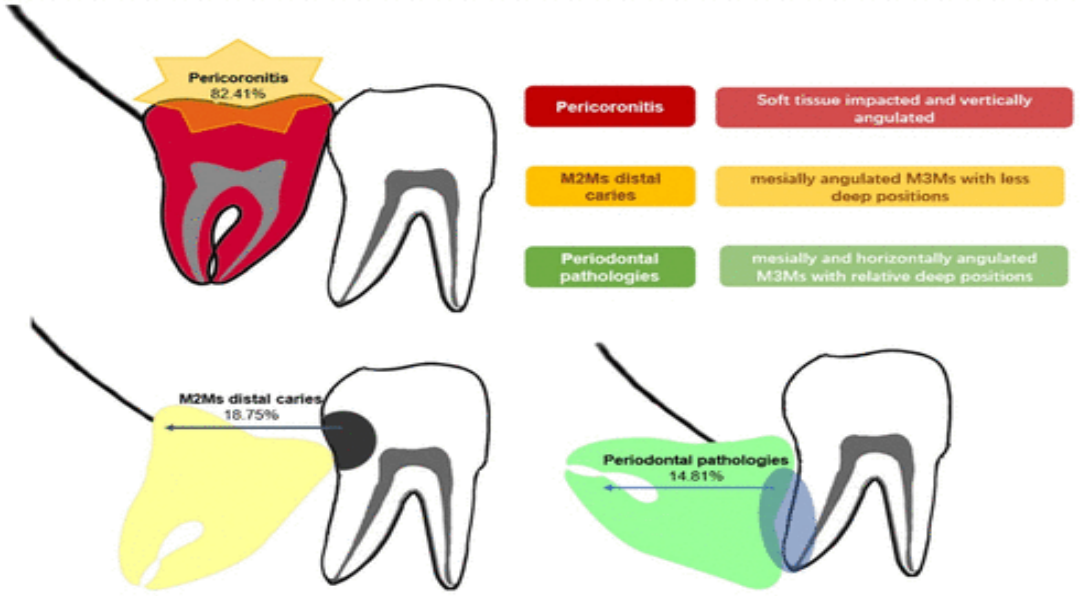


Figure 2.8: The associations of impaction patterns of mandibular third molars (M3Ms) with pathologies.

2.7.1. Pericoronitis

is an inflammation of the tissue around a third molar, often known as a wisdom tooth, The condition most often occurs in molars that are partially impacted, or not fully visible. It's also more common in lower molars than in the upper molars. Most people with pericoronitis have a flap of gum tissue partially covering the crown of the erupting tooth [7].

-the symptoms of pericoronitis

Pericoronitis symptoms differ depending on whether the condition is acute or chronic.

The following are symptoms of acute pericoronitis:

- severe pain near your back teeth
- swelling of gum tissue
- pain when swallowing
- the discharge of pus
- trismus (lockjaw)
- The following are symptoms of chronic pericoronitis:
- bad breath
- a bad taste in your mouth
- a mild or dull ache lasting for one or two days

2.7.2. Dental caries

Because of dental caries, impacted lower third molars are extracted more frequently. involves either the impacted third molar or the second molar's distal surface, majority of studies in this area were conducted on patients who had their third molars removed, hence the true incidence of this condition in the general population cannot be established. Caries accounts for 15% of third molar extractions, according to Nordenram et al. Researchers found increased frequency of caries with increasing age and erupted third molars in prospective investigations of occlusal caries in patients with asymptomatic third molars. [7]

2.7.3.Root resorption

It has been shown in some studies that a third molar left in situ may be cause resorption of distal root of an adjacent second molar. Some studies have also reported an association between root resorption at the apex and increasing age. [7]

2.7.4. Late Crowding in Lower Incisors

The theory that the presence of lower third molars may result in late crowding of the lower incisors is a major controversy for indicating for recommending their removal prophylactically. [7]

2.7.5. Other related pathologies

One of the most commonly reported disorder is an association of pain directly related to the presence of third molar. The prevalence of this condition varies greatly from 5% - 53%. The incidence of cellulitis and osteomyelitis has been reported to be around 5%. Few other conditions which are also believed associated with impacted third molars include functional disorders like as occlusal interference, cheek biting, mastication disorders, trismus and temporomandibular joint problems. [7]

2.8. Management of Impacted Tooth

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

2.8.1. Observation

If the impacted lower 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, so if there are no indications for direct surgical management, an annual/biannual evaluation is recommended.

2.8.2. Exposure

This option is considered if there is probability that it may erupt into useful occlusion but is obstructed by follicle, sclerotic bone, hypertrophic soft tissue, odontoma, etc., If the second molar is absent, exposure of a blocked third molar may be considered. Transplantation of lower wisdom. The variety of crown and root shape on the impacted third molar make them suitable for transplantation to other molar sites, bicuspid and even the cuspid locations depending on the anatomy of the radicular and coronal surface. [7]

2.8.3. Removal

The primary causes to remove impacted teeth are to correct associated pathology and to intercept reasonably expected pathological process. [7]

2.8.4. Causes

Wisdom teeth become impacted when there is insufficient space in the jaws to allow for all of the teeth to erupt into the mouth. Because wisdom teeth are the last to erupt, due to insufficient space in the jaws to accommodate more teeth, the wisdom teeth become stack in the jaws, i.e., impacted. There is a genetic predisposition to tooth impaction. Genetics plays important, albeit unpredictable role in dictating jaw and tooth size and tooth eruption potential of the teeth. [7]

2.8.5. radiograph

There is different type of radiograph such as CBCT& Panoramic radiography:

CBCT is an excellent diagnostic method for selected situations in oral and maxillo-facial surgery, including evaluation of mandibular third molars, but its efficiency has been lesser studied yet. Panoramic radiography may be sufficient in most cases before removal of mandibular third molars, but CBCT may be indicated when one or more signs of close contact between the tooth and the mandibular canal are present in the standard panoramic radiography. In these situations, CBCT might change surgical approach and patient's outcomes. The study have shown that CBCT contributes to optimal risk assessment and an adequate surgical planning, compared with panoramic radiography.

The mandibular morphology at the third molar region with impacted teeth and location of the mandibular canal could be distinctly determined using cross-sectional CBCT images. [7]

3. Chapter Three

3.1. Perioperative drug therapy

Various drugs may be given preoperatively just before, during or at completion of treatment to help to reduce complications [10].

3.1.1. Analgesics

Despite the availability of a reasonable spectrum of analgesics patients often experience pain. There is some evidence that preoperative analgesia leads to less pain and reduced analgesic consumption. Aspirin or ibuprofen appear effective. When taken postoperatively, soluble aspirin would appear to be better than paracetamol. [10]

3.1.2. Steroids

Steroids (e.g. dexamethasone 8 mg) reduce facial swelling and discomfort if given at the time of operation, although not all surgeons routinely use them. They do not appear to delay wound healing. [10]

3.1.3. Antibiotics

Although some favor the routine use of prophylactic antibiotics there is no strong evidence that it reduces the infection rate. Indiscriminate use increases the risk of unwanted side effects such as allergy/anaphylaxis or emergence of bacterial resistance. Some surgeons reserve the use of antibiotics for an operation which has taken longer than expected, if the bone appears denser, in older patients and when using chisels.

Prophylactic antibiotics are recommended in a patient who has had radiotherapy involving the jaw bone or who is at risk of infective endocarditis. In general, short courses of high doses appear to be better than long courses of low doses. Preoperative antibiotics appear more efficacious than those given postoperatively. The latter appears not to contribute to better wound healing or less pain. [10]

3.2. Procedure of Surgical Remove of Impacted Lower Third molar

Most mildly impacted wisdom teeth can be elevated following removal of sufficient overlying bone. In more severe impactions the whole crown may require sectioning and removal before elevation of the remaining roots. Sometimes the roots may appear to diverge only to meet again at the apices. The inter-radicular bone can prevent such a tooth being elevated, and thus may require vertical division, allowing the elevation of one root at a time [10].

3.2.1. X-ray for impacted lower third molar

Figure 3.1 OPG for impacted lower third molar

3.2.2. Flap design

Keeping a finger on the external oblique ridge to place the soft tissues under tension and define the bony landmarks, the scalpel blade is inserted onto bone at a point immediately distal to the second molar. The incision is extended down to bone, along the
external oblique ridge (upwards, outwards and backwards) for

approximately 1 cm. The incision must not be carried directly backwards in the line of the posterior teeth as the mandible flares laterally and there is a risk of damage to the lingual nerve. The lingual nerve may lie on or near the alveolar crest in up to one in five cases. The anterior relieving incision curves down from the distal aspect of the lower second molar towards the buccal sulcus. It should not be extended too far towards the sulcus as this can result in troublesome bleeding. The mucoperiosteal flap is raised (using a Howarth's or similar periosteal elevator), starting in the anterior relieving incision. Opinion varies as to whether the lingual tissues should be protected by insertion of a retractor between periosteum and bone. Traditionally this has been done in the UK, although it is less common in Europe and the USA. Where a lingual retractor has been placed, temporary lingual nerve dysesthesia can be expected in approximately 10% of cases. This is probably due to blunt trauma but also possibly to stretching of the nerve or compression against the mandible if trapped between bone and retractor. There is no evidence that the incidence of permanent nerve injury is higher without a retractor. Avoidance of a lingual nerve retractor may reduce this temporary dysesthesia although it does not guarantee that the lingual nerve will not be damaged: for example, the nerve may be damaged whilst suturing if it is near the alveolar crest. Although inexperienced operators generally find inserting a lingual nerve retractor difficult (e.g. problems finding the correct tissue plane, or where the lingual ridge is undercut), it does improve visibility by retracting the lingual tissues. A lingually placed retractor may reduce the likelihood of permanent anesthesia if the lingual plate is penetrated by a bur. However, this may be at the expense of increasing the chances of a temporary paraesthesia due to blunt trauma from the retractor. It is essential to check that there is no soft tissue lying between the retractor and lingual bone. Where there has been infection of the surrounding soft tissues the flap may be more difficult to raise due to fibrous tissue. Whether a lingual retractor is used or not, it is important to avoid penetrating the lingual cortical plate with the bur because this is often associated with permanent
damage to the lingual nerve.

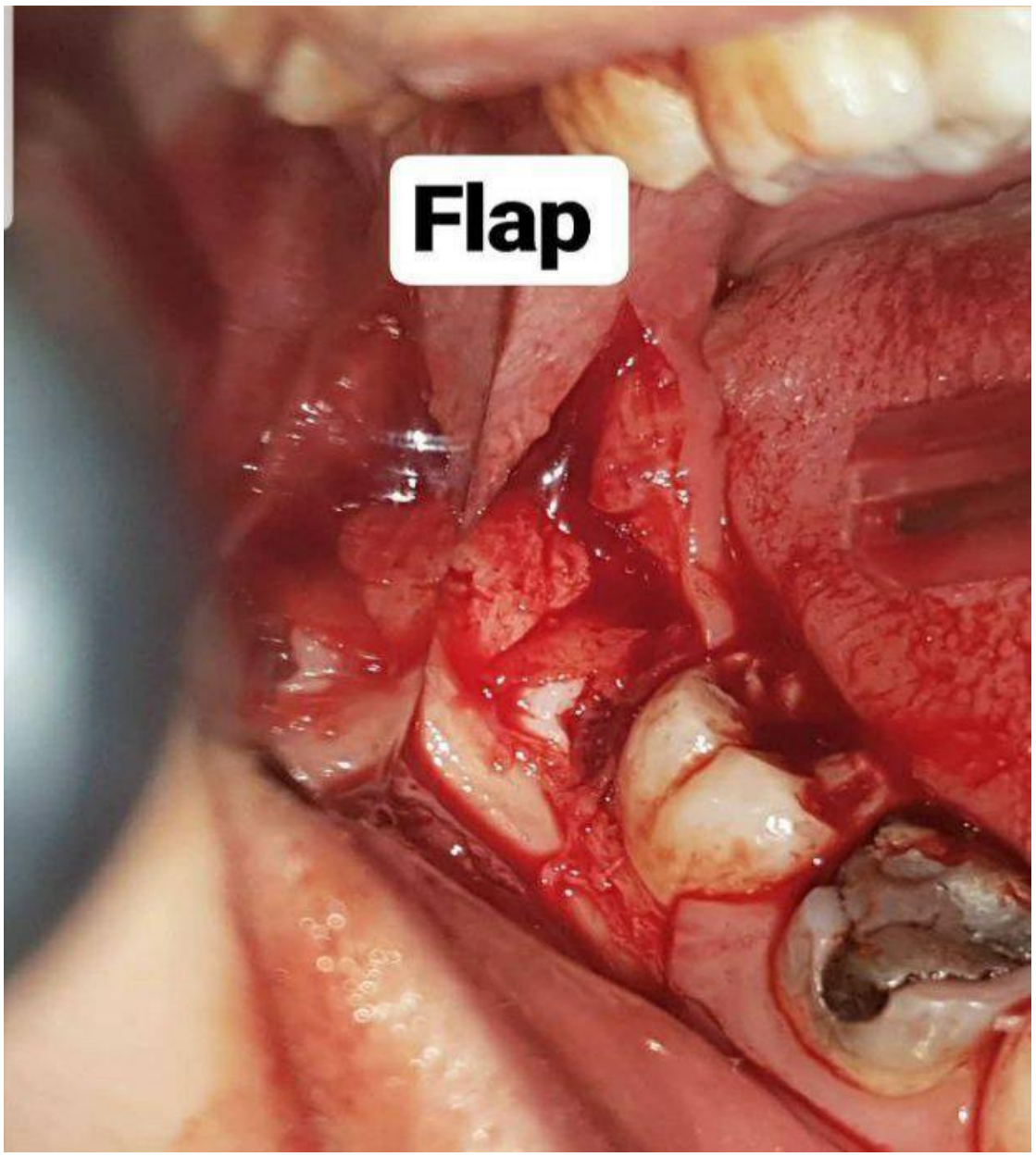


Figure 3.2 design flap of operation (two side flap)

3.2.3. Bone Remove

If the tooth cannot safely be elevated intact, then bone is usually removed using a round bur. If operating under general anesthesia some prefer the use of chisels. The bur should rotate in the correct direction and at maximum speed. Cutting instruments that introduce air('airrotor')shouldnotbeusedbecausetheycanresultinsurgical emphysema. The handpiece should not rest on the soft tissues of the cheek and lips, because burning could occur if it overheats. Adequate delivery of sterile saline through an integral part of the

handpiece or from a syringe should ensure that the debris is flushed away and that the bone and bur do not overheat. The patient should be warned to expect the sound of the drill and the assistant should endeavour to keep all excess fluid sucked away. The crown of the impacted tooth should be exposed (usually to the cementoenamel junction) by removal of surrounding bone:

(a) mesially (to create a point of application but beware of adjacent root of second molar)

(b) buccally (cutting a trough or gutter around the tooth to the root furcation);

(c) distally (remember that, even if the lingual tissues are retracted, the lingual nerve may not be adequately protected, hence ideally the lingual plate should not be breached).

If lingual tissues are not retracted, access to distolingual bone is severely restricted. Distoangularly impacted third molars, particularly if partially erupted, may appear relatively straightforward to the inexperienced. However, more distal bone is usually required to be removed than with a mesioangular impaction, and it may be better to remove the crown and roots separately, once the tooth has been mobilized.

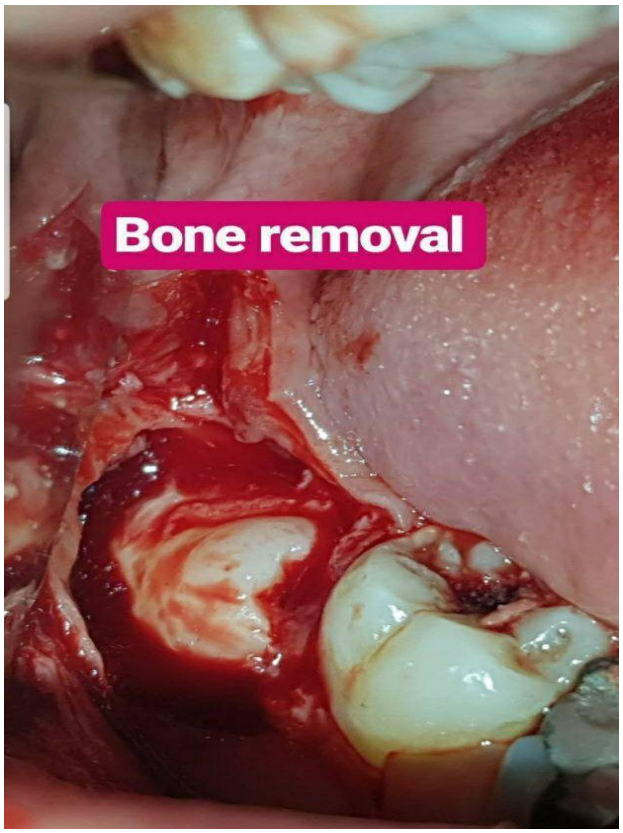


Figure 3.3 Bone Remove

3.2.4. Tooth Separation

if the roots are not fused then a choice between sectioning the tooth in the vertical axis (with a bur or, if operating under GA, an osteotome; thus removal in two halves) or horizontal axis (removal of the whole crown and then elevation of the roots) should be made. The choice will to some extent depend upon the inclination of the crown, and the root apices. When using a drill, it is easier to cut at an angle approximating to that which the drill takes on entering the mouth. It is easier to section the crown off a distoangular or horizontal tooth (Fig. 5.15) and to split a mesioangular tooth along its length (Fig. 5.16). When cutting into enamel, with practice it is possibleto'feel'whentheburhasreachedtheenamelonthe lingual aspect of the tooth, which, ideally, should not be breached. The crown can be split and removed from its other half (if vertically sectioned) or from the root (if horizontally sectioned) by inserting a Coupland's elevator. The patient should be warned to expect a cracking sound due to splitting of the tooth. In older patients there may be an increased risk of mandibular fracture due to possible ankylosis, reduced mandibular thickness and less flexible bone. Where there is a large distal restoration on the second molar, the patient should be warned that it could be dislodged by elevating the tooth.

Following removal of the crown it may be necessary to remove more bone (buccally, mesially and/or distally) to obtain a point of application for removal of the root. A point of application cut into the root may allow its removal using a Cryer's or Warwick-James elevator. Sometimes the individual pulp canals can be visualized and a cut made between them buccolingually. This should be deep enough to allow the insertion of a Coupland's elevator which, when rotated, splits the roots. Do not use the adjacent molar as a fulcrum. Once one root is removed the other may be elevated, by inserting either a Cryer's or WarwickJames elevator in the space cut around the root. If the apex (or apices) fracture, then they are best removed at the time. Exceptions include a vital tooth in which the fragment is small and the surgeon considers the inferior dental nerve to be at risk by its removal, or where under local anesthesia the patient would find further surgery unduly stressful (Fig. 5.18). The patient

should always be informed of this decision, which should be recorded in the notes, and told to return if symptoms arise. It is wise to take a periapical radiograph after surgery.

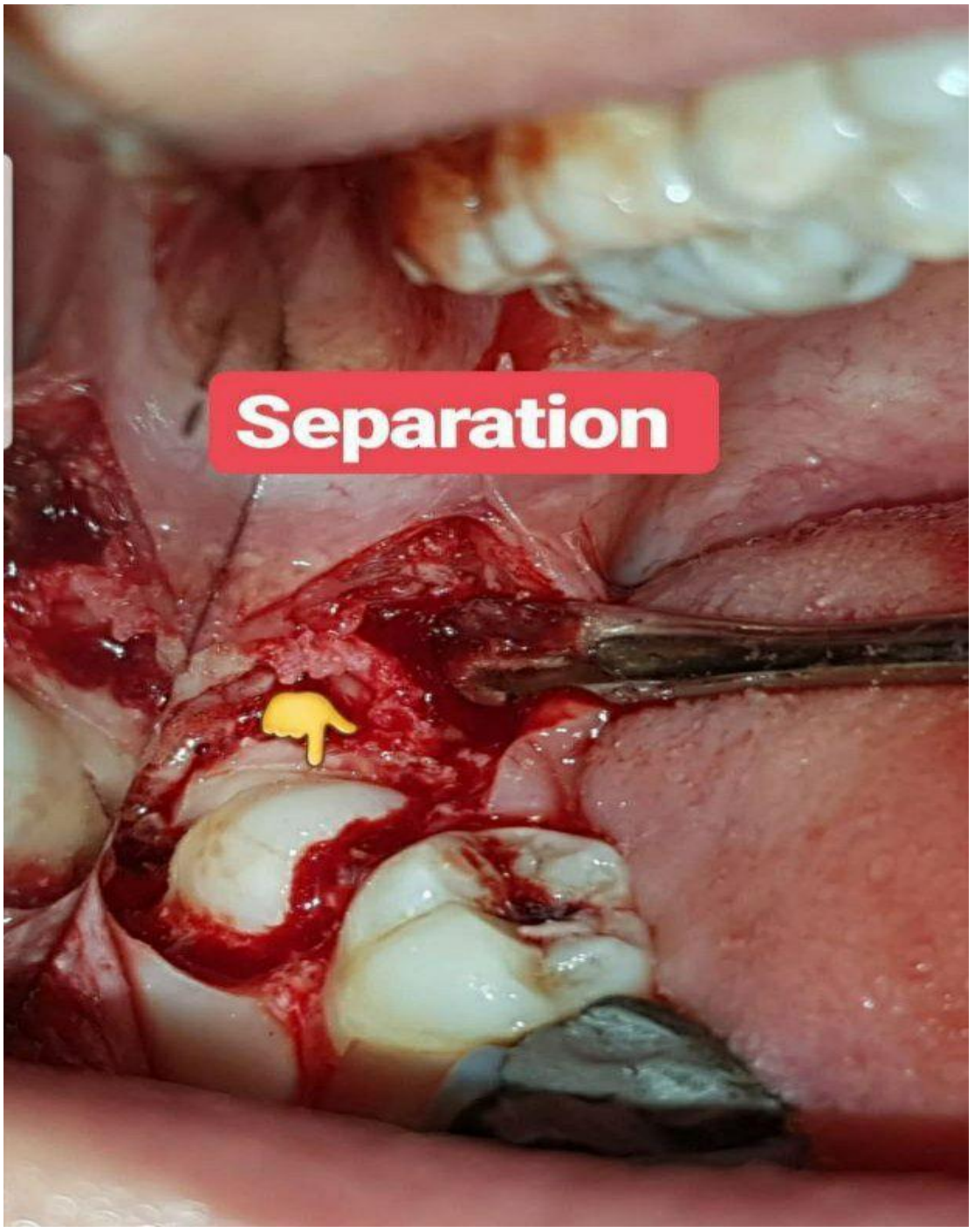


Figure 3.4 Tooth Separation

3.2.5. Wound debridement

Check that the whole of the tooth, including all roots, has been removed. The buccal and lingual margins of the socket should be smoothed using a round bur, bone file or rongeurs to remove loose, sharp bits of bone or any that has been devitalized. The wound should be irrigated with sterile saline, paying particular attention to the area underneath the soft-tissue flaps. The sequestration of small pieces of bone may cause severe discomfort out of all proportion to their size and can foster infection over a period of months postoperatively.

3.2.6. Wound Closure

Although healing by primary intention is the ideal, in practice this is rarely achieved because the wound margin does not always rest on bone. Where a partially erupted tooth existed, a choice between complete closure or retaining the gap needs to be made. If the gap is retained then food debris may collect, causing pain, halitosis and bad taste. However, whilst primary closure may lead to faster healing there may be more pain and tethering of the cheek.

Sutures may be either resorbable (e.g. polygalactin) or non-resorbable (e.g. silk). A 3/0 suture should be used. The first suture should be placed just distal to the second molar, from buccal to lingual tissue. If a triangular flap is used, the anterior relieving incision rarely requires suturing. However, the distal relieving incision usually does.

Figure 3.5 wound closing

3.2.7.Summary of surgical removal

- Flap design—triangular or envelope
- Bone removal and tooth division: round bur cooled and irrigated with saline
- Tooth removal
- Wound debridement
- Suture
- Drug therapy (e.g. antibiotics, analgesics, steroids)?
- Postoperative instructions

3.3. Complications related to surgical remove of lower third molar

Complications related to third molar extraction range from 4.6% to 30.9%. They may be occurring intraoperatively or develop in the postoperative period. The four most common postoperative complications of third molar extraction are localized alveolar osteitis (AO), infection, bleeding, and paresthesia. Mandibular fracture, severe hemorrhage, or displacement of third molar teeth, Surgical removal of third molars is often associated with postoperative pain, swelling, and trismus. They are expected and typically transient and are not considered complications.

Age, gender, medical history, oral contraceptives, presence of pericoronitis, poor oral hygiene, smoking, type of impaction, relationship of third molar to inferior alveolar nerve, surgical time, surgical technique, surgeon experience, use of perioperative antibiotics, use of topical antiseptics, use of intra-socket medications, and anesthetic technique are all thought to influence the incidence of complications after third molar removal [11].

3.3.1.Bleeding and hemorrhage

Clinically significant bleeding as a result of third molar extraction has been reported in the range of 0.2% to 5.8%, and can be classified as intra- or postoperative, with local or systemic causes, the investigators found an intraoperative frequency of unexpected hemorrhage of 0.7 percent and a postoperative frequency of unexpected or prolonged hemorrhage of 0.1 percent in the recent American Association of Oral and Maxillofacial Surgeons Age-

Related Third Molar Study. Bui and colleagues found that the frequency of clinically significant bleeding was 0.6 percent in a sample of 583 individuals, and that the variation in reported rates is at least partly due to varied definitions. This value is similar to what Chiapasco and colleagues found. Hemorrhage can be caused by either local or systemic causes. Hemophilia A or B, as well as von Willebrand's disease, are generally diagnosed early in a patient's life, and extractions can be done in a systematic way to maximize the patient's ability to form a stable clot. Patients with severe hemophilia A who have previously been treated with plasma-derived or recombinant factor VIII products may develop inhibitors to the factor products, making management challenging. Alloantibodies against foreign factor VIII develop in 25% to 30% of patients with severe hemophilia A who receive therapeutic infusions of factor VIII. Local factors resulting from soft-tissue and vessel injury are the most common cause of postoperative hemorrhage, and they respond best to local control, which includes meticulous surgical technique that avoids the inferior alveolar neurovascular bundle and particular care to the mandible's distolingual aspect. If postoperative bleeding continues, patients should be told to apply gauze pressure to the extraction site for 45 minutes. Re-examine the patient's medical history, and keep an eye on his or her vital signs. If applying pressure does not work, the patient and the extraction site should be thoroughly checked. To allow proper diagnosis of the origin of bleeding, local anesthetic should not contain a vasoconstrictor at this time. The extraction site can be gently suctioned and curetted. If the bleeding is caused by soft tissue and is arterial in origin, but does not involve the neurovascular bundle, cautery is usually an option. Bone wax or various hemostatic compounds can be used to treat bleeders on the bone as (table 1). Sutures can be used to support and preserve these materials within the socket.

In some cases, salivary enzymes may cause oral fibrinolysis, and fibrin-stabilizing agents such as epsilon-aminocaproic acid (Amicar) or tranexamic acid (Cyclokapron) may be helpful (Table 1). Massive intraoperative bleeding is a rare occurrence and can be secondary to a mandibular arteriovenous malformation, which can be either low

flow (venous) or high flow (arterial), The presence of such a malformation in the maxilla or mandible might be life-threatening since it causes uncontrollable bleeding when a tooth is extracted. In the study by Guibert-Tranier and colleagues, 8% of patients died as a result of excessive bleeding following tooth extraction. Arteriovenous malformations are rare in the maxillofacial region, but they are more common in other parts of the body. Physical examination and panoramic radiography are frequently used to detect arteriovenous malformations in the maxillofacial region.

A history of recurrent spontaneous bleeding from gingival is the most frequent objective sign. Other physical findings include gingival discoloration, hyperthermia over the lesion, subjective feeling of pulsation, the presence of a palpable bruit. Mandibular arteriovenous malformations usually appear as multinodular radiolucencies on radiographic studies, although significant lesions may be nonapparent. Angiography is necessary and essential to confirm the diagnosis and assess the extent and vascular architecture of the lesion. Treatment of mandibular arteriovenous malformations involves either embolization or surgical excision. Many reports describing the use of permanent embolic agents support their use and suggest that many arteriovenous malformations with angioarchitecture that supports a transvenous approach can be treated without surgery.

3.3.2. Damage to adjacent teeth

The incidence of damage to adjacent restorations of the second molar has been reported to be 0.3% to 0.4%. Teeth with carious lesions large restorations are always at risk of fracture or damage upon elevation. Correct use of surgical elevators and bone removal can help prevent this occurrence.

3.3.3. Mandibular fracture

Mandibular fracture after third molar extraction is a well-known complication with important medicolegal and patient-care implications. It should be included on all consent forms for third molar extraction. A rare yet serious consequence of surgical third

molar removal is mandibular fracture. Mandibular fracture is reported to occur 0.0049 % after or after third molar removal. According to some studies, the incidence is significantly lower. In a retrospective study, Alling and colleagues found that 1 in 30,583 patients had a preoperative mandibular fracture and 1 in 23,714 had a postoperative mandibular fracture, whereas Nyul found one fracture in 29,000 cases. Predisposing factors include increasing age and mandibular atrophy. The presence of a cyst or tumor, as well as osteoporosis, have all been linked with an increased risk of mandible fracture The preangular region of the mandible is an area of lowered resistance to fracture secondary to its thin cross- sectional dimension, and an impacted tooth occupies a relatively significant space within the bone of this region. The concurrent presence of a dentigerous or follicular cyst around third molar or a radicular cyst around second molar and removal of the tooth and any surrounding bone necessary to mobilize it further mechanically weakens this area.

3.3.4.Displacement of third molars

Iatrogenically displaced of mandibular third molars can be seen in the sublingual, submandibular, pterygomandibular, and lateral pharyngeal spaces. Anatomic considerations such a distolingual angulation of the tooth, a thin or dehisced lingual cortical plate, and excessive or uncontrolled force upon luxation can all contribute to this complication. Lower third molars that pass through a perforation in the thin lingual alveolar bone are usually pushed inferiorly to the mylohyoid muscle. Pogrel recommended that the operator put his or her thumb underneath the inferior border of the mandible in an attempt to direct the tooth back along the lingual surface of the mandible. The lingual gingiva may be reflected as far as the premolar region and the mylohyoid muscle incised to gain access to the submandibular space and deliver the tooth. In this approach, care should be taken to avoid injury the lingual nerve in this anatomic region.

Locating the displaced tooth is challenging secondary to limited working area and hemorrhage with resultant compromised visualization and blind probing that may result in further

displacement. Yeh described a technique that is a combination intraoral and lateral neck approach in which the original wound is extended lingually to distal of the first molar. A 4-mm skin incision is made in the submandibular region and a hemostat placed along the lingual surface of the mandible to stabilize the tooth while the surgeon palpates tooth with an index finger. A Kelly clamp can be inserted to deliver the tooth upward into the mouth.

The author believed this method prevents additional displacement of the tooth and limits length of lingual flap reflection necessary. Displaced roots Maxillary and mandibular root tips rarely may be displaced into the aforementioned spaces. The management of these displaced roots remains much the same. A mandibular third molar root may be displaced into inferior alveolar canal. Attempts at retrieval may further injure the neurovascular bundle and should be limited to one attempt with suction.

3.3.5.Aspiration

Tooth aspiration is a danger with all third molar extraction procedures. The use of intravenous deep sedation by definition compromises the protective reflexes of the airway. The aspiration or swallowing of a tooth or portion of a tooth is usually the result of a patient gagging or coughing.

Note: should give appointment to the patient after one week to remove suturing, and give instruction to patient such as eating soft food, not spiting….

3.4. Postoperative Complication

3.4.1.Alveolar osteitis

AO is a clinical diagnosis characterized by the development of severe, throbbing pain several days after the removal of a tooth and frequently is accompanied by halitosis. extraction socket is commonly filled with debris and is conspicuous by partial or complete loss of the blood clot. The frequency of AO ranges from 0.3% to 26% AO is known to occur more frequently with lower wisdom extraction sockets, although the exact reason is not clear The cause of AO is also poorly under- stood. (Birn) suggested that AO is the result of release of tissue factors leading to activation of

plasminogen and the subsequent fibrinolysis of the blood clot. This could also may explain the apparent increased incidence of AO when surgery is more difficult and traumatic. (Nitzan) suggested that.

A localized bacterial infection is the primary cause of AO. A complex pathophysiology involving a localized bacterial infection and subsequent fibrinolysis is likely to cause AO.

In an extensive review of the literature, (Alexander) discovered multiple research that supported increasing age, female gender, oral contraceptives, smoking, surgical trauma, and pericoronitis as risk factors for AO.

although a significant number of studies also refuted these purported associations. same author found a majority of studies that supported the use of generous intraoperative lavage, perioperative antiseptic mouth wash, intra-alveolar medicaments & systemic antibiotics to reduce the incidence of AO [11].

3.4.2. Swelling

The extraction of impacted mandibular third molars is one of the most common surgical events. Patients' postoperative facial swelling following third molars extraction is very common. The severity of the facial swelling is depending on the case and the facial swelling originated in an inflammatory process that initiated by surgical trauma. The facial swelling is more likely occurring in those patients who received impacted mandibular third molars extraction with utilizing flap operation and bone removal. The factors thought to influence the incidence of facial swelling after third molar removal include patients' age, gender, physique and oral hygiene. In addition, the incidence of facial swelling is related to the type of third molar, the degree of impaction, and ease of extraction operations. As far as a specific patient is concerned, most of oral surgeons could predict the incidence of the facial swelling solely based on their personal experience [12].

3.4.3. Trismus

is one of the common complications which occur following the extraction of mandibular impacted third molars. The extraction of

mandibular impacted third molars, a routine outpatient surgery performed by oral and maxillofacial surgeons. The most severe cases of trismus usually occur at 2 days post-operatively. The primary causes include elevation of flap beyond the external oblique ridge, low-grade infection following local anesthesia and repeated stimulation of the medial pterygoid muscle (inferior alveolar nerve block), as well as other causes. The symptom of trismus is alleviated by the post-operative local injection of dexamethasone. Generally, trismus is gradually alleviated or disappears within approximately 1 to 2 weeks post-operatively; however, in very rare cases, trismus persists for >1 month. The present study reports the case of a patient who exhibited trismus for 45 days following mandibular third molar extraction. The patient received local and systemic anti-inflammatory treatment, as well as incision and drainage therapy under local anesthesia. Furthermore, the factors associated with the occurrence and development of trismus were also analyzed, and appropriate management strategies are discussed in order to provide an effective treatment method for affected patients, as well as to prevent the occurrence of trismus in the future [13].

3.4.4. Dry socket

The incidence of dry socket varies a lot from study to study. According to a 2014 systematic review shows a median incidence of 2.9% when using a triangular flap or 10% with an envelope flap. Treponema denticola and other spirochetes are sometimes implicated in the condition and have been shown to produce fibrinolytic enzymes which break down the all-important blood clot. Many risk factors are including, such as female gender, surgeon's skill and difficulty of extraction. Surgical removal presents a risk of nine times greater than normal forceps extraction. Smoking is thought to be a significant risk factor: one study demonstrated that smoking following surgery tripled the risk of developing dry socket. A recent randomized controlled trial gave an overall incidence of 4% in lower third molar surgery. In this study an incidence of 10% was had observed in control group, this was reduced to 2% when chlorhexidine gel was applied to the socket and there were no cases

with postoperative application of non-resorbable eugenol based

paste Coronectomy Once the investigations have been assessed the surgeon can then advise the patient of the risks and benefits between surgical removal and Coronectomy [9].

3.4.5. Paresthesia

is an altered sensation of the skin, manifesting as numbness, partial loss of local sensitivity, burning, or tingling. Facial paresthesia has a known etiology in 83% of cases, and 48% of these have been attributed to a dental procedure [2]. In paresthesia resulting from dental procedures, the inferior alveolar nerve (IAN) and lingual nerves are the most commonly implicated nerves

IAN paresthesia occurs in 0.35% to 8.4% of patients, and the neurologic symptom duration varies greatly from days or weeks to several months. In general, neurosensory deficits after third molar surgery spontaneously recover in the first 6 postoperative months and the incidence of permanent sensory disturbance was reported as 0.12%. Direct trauma to the IAN during dental procedures and indirect trauma from edema or hematoma are reported mechanisms of IAN paresthesia.

The altered sensation is usually noted by the patient on the day of surgery, once the effects of any local anesthetic have resolved. However, on rare occasions, patients report onset of paresthesia a few days to months after the procedure. Delayed paresthesia was represented by only 5% of the 60 cases of paresthesia reported in a study of 1477 third molar surgeries. The biggest difference between classic paresthesia and delayed paresthesia is that the former begins immediately after the procedure and healing is not guaranteed, while the latter occurs later, with restoration to original condition [14].

3.4.6. Infections

are reportedly one of the possible complications after this procedure, but few studies have considered a follow-up beyond the first week after surgery, which is usually when patients return for suture removal.

Delayed-onset infections (DOI) after mandibular third-molar extractions have been described as a rare complication

characterized by swelling, usually with a purulent discharge at the extraction site, developing approximately a month after surgery. The incidence of such DOI reported in the literature ranges between
0.5% and 1.8%. The risk factors identified as being associated with this complication are gender (female) and tooth position (mesioangular or vertically tilting, with total mucosa retention, or deep bony impaction). It is not clear whether the ability of the surgeon can influence the occurrence of this complication.
In most cases, the treatment of choice involves systemic antibiotics (generally amoxicillin clavulanate) and local antimicrobial mouthwashes (e.g., chlorhexidine 0.2%). When the antibiotic treatment is ineffective, then surgical debridement of the extraction site becomes necessary. The bacteria identified in DOI are Fusobacterium, Prevotella, Bacteroides, and Peptostreptococc us. DOI usually occur about thirty days after the extraction, but they may also develop much later on [15].

3.4.7. Temporomandibular joint complications

There is currently little evidence to support a causal association between third molar extraction and temporomandibular (TMJ) damage, it has been suggested that because the extraction of mandibular third molars requires the patient to open his or her mouth wide for an extended period of time and exerting a varied amount of force on the mandible, it is possible to overload or injure one or both temporomandibular joints. This result would be the case especially if the surgeon did not use correct surgical technique or failed to support the mandible while removing the mandibular third molars or if the patient's protective mechanism for opening was exceeded while under general anesthesia. Oral and maxillofacial surgeons should include an examination of the temporomandibular region, including the evaluation of joint sounds, opening and excursive movements, temporal/masseter/ pterygoid muscle tenderness in all preoperative third molar extraction patients. Care should be taken in judicious application of force and a bite block should be used to stabilize the mandible upon surgical mobilization of the lower third molar teeth [11].

4. Chapter four

Discussion

In our study, the overall complication after the removal of mandibular wisdom teeth are pain, swelling, and trismus, which are inflenced by many factors and variables. Certain challenges cause esthetic and functional problems for surgeons and patients. Which agrees with (suha mohammad, 2013) which involve the surgical remove of impacted lower third molar have some post-operative complication like pain, swelling, infection, truisms, dry socket. [16]

Our study also agrees with (Yuan Zhang et al, 2021) that say The ILTM extraction is a complicated surgery because of its special location, adjacency to important anatomical structures and small surgical fields. Extraction involves the manipulation of both soft and hard tissues, so the patient usually experiences pain, swelling, trismus, inferior alveolar nerve and lingual nerve injury in the immediate postoperative period. [3]

Also agrees with complication mentioned in the literature of (Bello et al, 2011) that involve the severity of pain, amount of swelling and degree of trismus are the primary indicators of patient's discomfort following surgical extraction of an impacted third molar tooth. [17]

Gary F. Bouloux et al (2007) they said surgical removal of third molars is often associated with postoperative pain, swelling, and trismus. They are expected and typically transient and are not considered complications or discussed further which also agree with our study. [11]

On the other hand, some articles disagree with our study such as in the study of Nabeel Sayed et al (2019), that involve the most commonly reported postoperative complication of third molar removal in the literature are dry socket, infection, bleeding and sensory disturbances due to nerve injuries. And minor complication like pain, infection, swelling. [18]

5. Chapter Five

5.1. Conclusion

As we mentioned above the tooth impaction is a pathological situation where a tooth fails to attain its normal functional position. The mandibular third molars are the most common impacted teeth when compared to other teeth.so the classification of impacted lower third molars very important to help us to Prediction of operative difficulty before the extraction of impacted third molars allows a design of treatment that reduces the risk of complications. Both radiological and clinical data must be taken into account. we can classify them according to:

- the nature of the overlying tissues
- Winter's classification
- Pell & Gregory's classification.

The decision of whether to retain or remove impacted mandibular third molars might be difficult. Surgical removal of impacted third molar may expose the patients to the risks of surgery such as nerve damage, dry socket, infection, damage to the adjacent teeth, bleeding, fracture of the mandible, and rarely death. At the same time, retention of the impacted third molar may lead to development of pathologies requiring more extensive surgery.

Pathological Changes Associated with Impacted Third Molars:

- Pericoronitis Noninflammatory radiological changes
- Pain
- Clinical signs and symptoms
- Caries
- Swelling
- Paresthesia
- Periodontal pocket
- Caries Root resorption (internal or external
- Late Crowding

Conclusion

So we have to know Management of Impacted Tooth (The treatment plans depend on many factors such as:

- the presenting complaint
- the history of the patient,
- physical evaluation,
- radiographic assessment,
- diagnosis, and prognosis.

The management includes observation, exposure, transplantation or removal of the impacted tooth.

So when we decided to remove the impacted mandibular lower third molar we must know the Procedure of removal;

- Flap design—triangular or envelope
- Bone removal and tooth division: round bur cooled and irrigated with saline
- Tooth removal
- Wound debridement
- Suture
- Drug therapy (e.g. antibiotics, analgesics, steroids)?
- Postoperative instructions

Complications during third molar extraction range from 4.6% to 30.9%. They may be occurring intraoperatively or develop in the postoperative period:
Bleeding and hemorrhage
Damage to adjacent teeth
Mandibular fracture
Displacement of third molars

Postoperative Complication:
Alveolar osteitis, Swelling, Trismus, Dry socket, Paresthesia, Infections, Temporomandibular joint complications

Note: Various drugs may be given preoperatively just before, during or at completion of treatment to help to reduce complications: Analgesics, Steroids, Antibiotics

5.2. Recommend

Wisdom teeth removal is a common oral surgery procedure that can reduce risk for dental problems such as gum disease, tooth decay, damage to adjacent teeth, bone loss and jaw damage. The decision to remove wisdom teeth is an important one, so this tooth should be remove if there is any defect in it. On the other hand, wisdom teeth should be remove for purpose of orthodontics and prosthodontics.

References

[1] Ashutosh Kumar Singh and Dr Safal Dhungel (2019). Pattern of Impacted Mandibular Third Molar in Patients Presenting to Tertiary Care Hospital in Chitwan, Nepal. Orthodontic Journal of Nepal, 2 (9): 38-42.

[2] Alessandro Espedito Di Lauro, Marius Boariu, Pasquale Sammartino, Fabio Scotto, Roberta Gasparro, Stefan-Ioan Stratul, Darian Rusu, Alexandra Roman, Petra Surlin and Sorina Solomon (2021). Lower Third Molar Inclusion Associated with Paraesthesia: A Case Report. Experimental and Therapeutic Medicine, 22: 2-6.

[3] Yuan Zhang, Xiaohang Chen, Zilan Zhou, Yujia Hao, Huifei Li, Yongfeng Cheng, Xiuyun Ren and Xing Wang (2021). Effects of Impacted Lower Third Molar Extraction on Periodontal Tissue of the Adjacent Second Molar. Therapeutics and Clinical Risk Management, 17: 235-247.

[4] Guido R. Sigron, Pièrre P. Pourmand, Beatrice Mache, Bernd Stadlinger and Michael C. Locher (2014). The most common complications after wisdom-tooth removal. Swiss Dental Journal, (124): 1042-1046.

[5] Zaid Malkawi, Mahmoud K. al-omiri and Ameen Khraisat (2010). Risk Indicators of Postoperative Complications following Surgical Extraction of Lower Third Molars. Med Princ Pract, 20: 321-325.

[6] F Asutay, Ü Yolcu', O Geçör', AH Acar, SA Öztürk and S Malkoç (2017). An Evaluation of Effects of Platelet-rich-fibrin on Postoperative Morbidities after Lower Third Molar Surgery. Nigerian Journal of Clinical Practiee, 12(20): 1531-1536.

[7] Santosh Patil (2015). Impacted Mandibular Third Molars: Review of Literature and a Proposal of a Combined Clinical and Radiological Classification. Annal of Medical and Health Sciences Research, 4(5):229-234.

References

[8] David Normando (2015). Third molars: To extract or not to extract. Dental Press J Orthod, 20(4):8-17.

[9] James Barraclough, Andrew Power and Amit Pattni (2017). "Treatment Planning for Mandibular Third Molars. Dental Update, 44: 221-228.

[10] Jonathan Pedlar and John W. Frame (2007). Oral and Maxillofacial Surgery. china, pp 54-65.

[11] Gary F. Bouloux, MD, BDS, MDSc, FRACDS, FRACDS(OMS), Martin B. Steed, DDS and Vincent J. Perciaccante, DDS (2002). Complication of Third Molar Surgery. J Can Dent Assoc, 68(11): 118-126.

[12] Wei Zhang, Jun Li, Zu-Bing Li and Zhi Li (2018). "Predicting postoperative facial swelling following impacted mandibular third molars extraction by using artificial neural networks evaluation. Scientific Reports, 8: 1-9.

[13] Yingjie Zhang, Peilin Zhuang, Bo Jia. Jing Xu. Qiuju Cui, Lihuan Nie, Zhiping Wang and Zhaoqiang Zhang (2021). Persistent trismus following mandibular third molar extraction and its management: A case report and literature review. World Academy of Sciences Journal, 2: 2-6.

[14] Re-Mee Doh, Sooil Shin and Tae Min You (2018). Delayed paresthesia of inferior alveolar nerve after dental surgery: case report and related pathophysiology. J Dent Anesth Pain Med, 18(3): 177-184.

[15] Giulia Brunello, Marleen De Biagi, Giulia Crepaldi, Fernanda Izaura Rodrigues, and Stefano Sivolella (2017). An Observational Cohort Study on Delayed-Onset Infections after Mandibular Third-Molar Extractions. International Jouranal of Dentistry: 2-5.

References

[16] suha mohammad sami (2013). Surgical removal of impacted lower third molars, classification and complication. A clinical study. Journal of Kerbala University, 1(11): 102-110.

[17] Seidu A Bello, Wasiu L Adeyemo, Babatunde O Bamgoose, Emeka V Obl, Ademola A Adeyinka (2011). Effect of age, impaction types and operative time on inflammatory tissue reactions following lower third molar surgery, 7(8): 2-8.

[18] Nabeel Sayed, Abdulaziz Bakathir, Mehboob Pasha, Salim Al-Sudairy (2019). Complications of Third Molar Extraction. SQU Medical Journal, 3(19): 231-235.