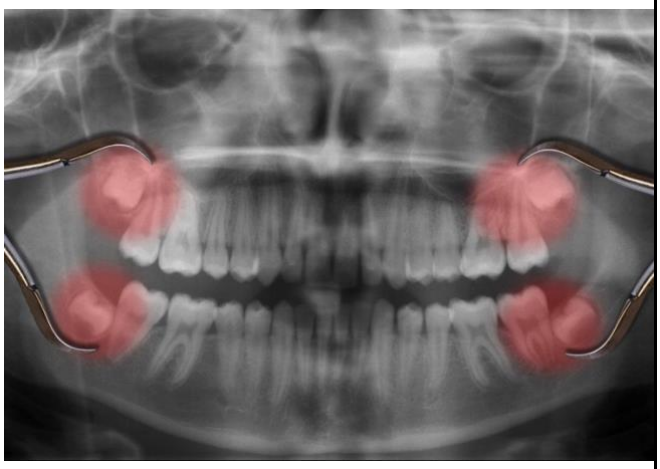

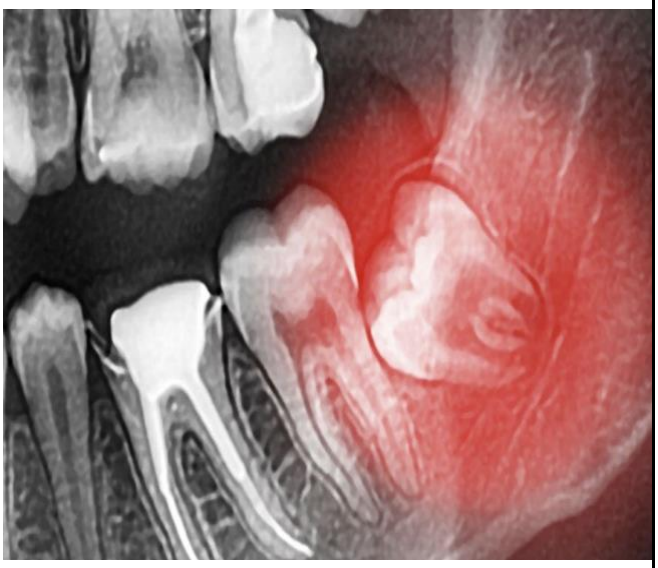

Relation of third molar to malocclusion

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Introduction

Tooth eruption is defined as the movement of the tooth from its site of development in alveolar bone to the occlusal plane in the oral cavity. The tooth erup- tion is a complex and tightly regulated process which is divided into five stages: preeruptive movements, intraosseous stage, mucosal penetration, preocclusal and postocclusal stages.
Erupting tooth penetrates mucosa and preeoclusal eruption stage begins. As the root grows and bone forms at the base of the crypt, tooth reaches func- tional occlusion plane. Most of the postemerged eruption proceeds during night . Once the occlu- sion is reached, tooth eruption speed drops dramatics- cally but continues at a slow rate during life thus compensating tooth wear. If the antagonist tooth is lost, eruption rate increas .Bone age Definition of skeletal maturity for medical and non-medical purpose. It is defined by the age expressed in years that corresponds to the level of maturation of bones.
Hand and wrist X-rays are the most used images. In fact, the images obtained by hand and wrist X-ray reflect the maturity of different types of bones of the skeletal segment evaluated chronological age is defined as the age in years between birth and the evaluation of a subject; bone age is defined by the age expressed in years that corresponds to the level of maturation of bones. This determination is based on the presence of particular centers of bone formation as well as the dimension and structure of the bones . Bone age may be affected by several factors, including gender, nutrition, as well as metabolic, genetic, and social factors and either acute or chronic diseases, including endocrine dysfunction the development of third molars and their interaction with the rest of the dentition has been of great concern to general dentist and dental specialists for a long time. Third molar is a tooth characterized by variability in the time of its formation and calcification, its crown and root morphology, its course of eruption and final position, presence or absence in the oral cavity. Third molars start appearing on radiographs as early as the age of 5 years and as late as the age of 16 years, usually erupting in the oral cavity between the ages of 18 and 24 and they present the highest rate of impaction. Third molar emergence spans between 18 and 25 years. Radiographicanalysis of third molar development expands age estimation to 9–23 years of age, as crown and root development can be studied independent of eruption. The impacted tooth is one that fails to erupt into the dental arch within the specific time . The time of third molar eruption is variable among different individuals. It could start at age of 16 or impede until 18 to 20. Third molar are the most frequently impacted teeth . The reason is probably that they are the last teeth erupting into the dental arch therefore the chance of space deficiency for thier eruption is high .The association of lower incisor crowding with third molar eruption has been a contentious and mythical concept in orthodontics. As the crowding of the lower incisors occurs coincidentally at the same chronological age that third molars erupt, a causal relationship seems intuitive, and prophylactic third molar extraction should be a logical preventive measure.

A longitudinal study by Bjork et al. reported late mandibular growth with uprighting of the mandibular incisors, resulting in crowding. Nevertheless, researchers continue to blame the eruption of the third molars or lack of the patient retainer wearing for the appearance of lower incisor crowding.There is a need for more conclusive evidence based on rigorous scientific research and its integration in clinical practice to prove whether there is association between lower incisor crowding and third molar eruption, and the present chapter is intended to address that need.

Although, in the majority of cases, third molars are not directly involved in orthodontic treatment, the fact that, in some cases, they can influence the latter or be influenced it, dictates their direct involvement in treatment planning.The main issues in third molars that cause malocclusion will be presented and discussed

Ricketts et al, used longitudinal records in an attempt to predict the amount of mandibular growth and to estimate the amount of space for forward and upward development of the molars. He concluded in that, in order the third molar to have a 50% chance of erupting, 50% of the crown must lie ahead of the external ridge. In a previous study, he had also claimed that the direction of tooth eruption plays a critical role in the impaction of third molars.

Kaplan also agreed that cases with impacted third molars exhibit a larger angle of mandibular growth compared with cases with erupted third molars. The distance from Xi cephalometric point to the distal surface of the second permanent molar, was used by Schulhof, in an attempt for a computerized prediction of third molar impaction. When this length decreased below 25 mm impaction became more likely and, conversely, less likely as the length increased towards 30 mm. However, this method of prediction presupposes impaction being solely related to available spac Richardson, in a longitudinal study of a group of 95 subjects observed that skeletal Class II cases, with a shorter in length, narrower in width and more acute angled mandible, were more prone in third molar impaction.

FACTORS INFLUENCING THE ERUPTION OR IMPACTION OF THIRD MOLARS

The possibility of eruption of third molars is of important consideration in treatment planning and in the long-term maintenance of the dentition and, therefore, of particular interest to dentists and orthodontists.

The presence or absence of third molars from the oral cavity has been related to genetically predetermined skeletal and/or dental factors. As early as 1936, Bowdler et al suggested that the individual growth pattern is an important factor for the eruption of the third molar. Broadbent believed that the inability of the mandible to achieve its full growth potential may be contributing to the impaction of third molar, whereas, according to Begg, the impaction of third molars is attributed to insufficient forward movement of the teeth of modern man due to the lack of interproximal attrition that was observed in ancient skulls.

Björk et al, in an early study, reported that in 90% of third molar

impaction cases the retromolar area space was limited. A few years later, in a longitudinal cephalometric studof 243 cases with the use of implants, he identified two skeletal and two dental factors that were linked with the impaction of mandibular third molars. These factors were: a vertical direction of condylar growth, a reduced mandibular length, a backward-directed eruption of the mandibular dentition and a retarded maturation of the third molars. However, in the same study, it is also stated that, depending on the case, these three factors "may either amplify or neutralize each other".

The four types of wisdom tooth impaction are: vertical, horizontal, mesial, and distal. We will discuss them in detail below.

Mesial Impaction

Mesial impactions are the most common type of wisdom tooth impaction. In this case, the tooth is partially erupted and angled forward, towards the front of the oral cavity, rather than towards the back. This positioning can cause issues with adjacent teeth, as the impacted tooth may .press against them and damage them

The decision to extract a mesial impacted tooth depends on several factors, such as the angle of the tooth and the extent to which it's impacted. Dentists usually prefer to carefully observe mesial impactions before determining whether extraction is necessary. This allows them to monitor any changes in the tooth's position and assess the potential risk to surrounding teeth before taking action.

Vertical Impaction

Vertical impactions occur when the wisdom tooth is in the correct position but remains below the gums. In many cases, these impactions don't require extraction, as they may not cause significant issues.

However, there are instances where a vertically impacted wisdom tooth can exert pressure In .against the bone or displace a neighboring molar, leading to oral health complications these cases, our dentist may suggest surgical removal of the vertically impacted tooth to prevent further damage and alleviate any discomfort

Horizontal Impactions

Horizontal impactions, whether partially or fully impacted, happen when the tooth lies entirely sideways beneath the gums, pressing against neighboring teeth. This can result in significant pain and damage to the adjacent teeth, making it essential to address

horizontal impactions promptly.

Surgical extraction is the recommended course of action for horizontally impacted wisdom teeth. In some cases, it may also be necessary to remove some of the jawbone to extract the impacted tooth successfully. By removing the horizontally impacted tooth, you can prevent further damage to surrounding teeth and alleviate any pain or discomfort associated with the impaction.

Distal Impaction

istal impactions are relatively rare and occur when the wisdom tooth is angled towards the back of the mouth. The decision to extract a distal impacted tooth depends on the angle of the tooth and the extent of impaction

Pell & Gregory's classification

This is based on the relationship between the impacted lower wisdom tooth (3rd molar) to the ramus of the mandible (lower jaw) and the 2nd molar (based on the space available distal to the 2nd molar).

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

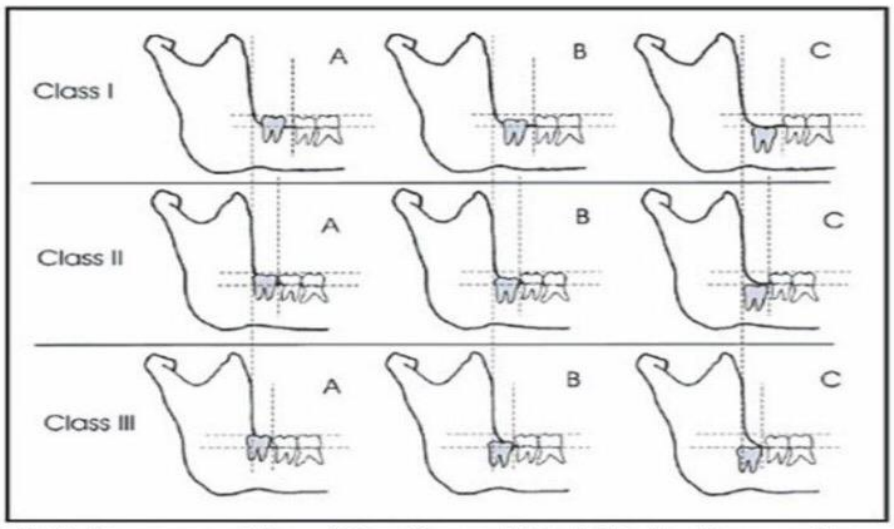
Class B. The occlusal plane of the impacted tooth is between the occlusal plane & the cervical margin of the 2nd molar. (The highest portion of impacted 3rd molar is below the occlusal plane but above the cervical line of the of 2nd molar).

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 sufficient 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 space 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 absolute 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).



Pell & Gregory Classification of 3rd Molar Impactions

Eitology of lmpaction

Generally, the third molars or the wisdom teeth are the last teeth to erupt and they erupt between 18 and 25 years of age. Since they erupt at about the time when the youth goes off into the world to become “wise,” the name “wisdom teeth” was used.

A number of theories have been put forth to explain the phenomenon of impaction. The following are the most commonly accepted ones:-

1.Discrepancy between the tooth size and the arch length.

2.Differential growth pattern of the mesial and distal roots.

3.Delayed maturation of the third molar—dental development of the tooth lags behind the skeletal growth and maturation.

4.Incidence of extraction of permanent molars is decreased in the mixed dentition period, providing less room for eruption of third molars. This is very pertinent in the present day due to better awareness of the population and dental treatments are started early in childhood.

5.Inadequate development of jawbones due to consumption of more refined food which causes reduced functional stimulation for the growth of jaw bone.

6. Evolvtion theory

Radiologic examination

The location and configuration of impacted third molar, surrounding bone, mandibular canal and adjacent tooth are important in imaging diagnosis for the proper surgical operation planning. Periapical radiographs have been used for many years to assess the jaws during impacted teeth surgery. Long cone paralleling technique for taking periapical X- ray is the technique of choice for the following reasons: reduction of radiation dose; less magnification; a true relationship between the bone height and adjacent teeth is demonstrated. One of the shortcomings of the present method is the use of film. Since the film is highly flexible, literally and figuratively, its processing can be suboptimal and it often leads poor image. During the last decade, many dental practices replaced the film with digital imaging systems.

Nevertheless, the biggest concern of periapical radiographs is that mandibular canal could not be clearly identified in the third molar region. Furthermore, the angulation of the periapical film can affect the perceived location of the canal with respect to the bone crest.

When a specific region that is too large to be seen on a periapical view, panoramic radiograph can be the method of choice. The major advantages of panoramic images are the broad coverage of oral structures, low radiation exposure (about 10% of a full-mouth radiographs), and relatively inexpensive of the equipment. The major drawbacks of panoramic imaging are: lower image resolution, high distortion, and presence of phantom images. These can artificially produce apparent changes thus may hide some of important vital structures. For example, cervical spine images often overlap on the anterior mandible.

Furthermore, it depicts a two-dimensional view of an intricate three-dimensional anatomic relationship and also fails to accurately project the buccolingual relation between the tooth and the inferior alveolar canal.

Cone Beam Computed Tomography (CBCT) have been advocated as method of choice than there is need to have a three dimensional view of the mandibular third molar and adjacent anatomical structures. Ghaeminia et al. in prospective study evaluated the role of CBCT in the treatment of patients with impacted mandibular third molars (n = 53) at increased risk of inferior alveolar nerve injury. Authors concluded that CBCT contributes to optimal risk assessment and, as a consequence, to more adequate surgical planning, compared with panoramic radiography. where CBCT influenced the treatment plan for 12% of cases. Direct contact in combination with narrowing of the canal lumen and canal positioned in a bending or a groove in the root complex observed in CBCT images were significant factors for deciding to change treatment plan

Preoperative Planning

Presence of an impacted third molar must be diagnosed systematically using the patient's chief complaint and history, clinical examination, and appropriate investigations.

The impacted third molar must be evaluated both clinically and radiographically prior to surgery for successful and speedy removal. Ideally, a periapical radiograph must be taken and an OPG must be added if the intraoral radiograph does not provide enough information about the tooth or adjacent structures. Manuel et al. has developed a simple format for evaluation of third molar impactions.

This comprehensive format is ideal for residents in oral surgery during their learning years. Using this format, third molar impactions may be analyzed, and difficulty level may be assessed and anticipated. Residents can judge problems that they may encounter during the procedure and can evaluate the patient better postoperatively.

Clinical Examination

This includes taking the patient's history, clinical examination extraorally and intraorally. 1.History taking

Complaints of the patient—Impacted teeth are usually asymptomatic and patients are aware of their existence only when told by the dental practitioner. Symptoms, if any, are usually due to acute or chronic pericoronitis, or due to acute pulpitis secondary to dental caries.

2.Extraoral examination

The clinician must examine the face and neck for redness and swelling related to infection. The lower lip is tested for anesthesia or paresthesia. The regional lymph nodes must be assessed by palpation for any tenderness or enlargement.

3.Intraoral examination—The following points are noted:

(a)Mouth opening—The ability of the patient to open the mouth is analyzed, and any trismus, fibrosis, or hypermobility of the joint is noted. The size of the mouth (microsomia/macrosomia) is also checked. Third molar access may be restricted if the mandible is retrognathic, while a prognathic mandible offers good access.

(b)General examination of oral cavity- oral mucosa, teeth, and oral hygiene.

(c) Examination of the third molar area for signs of pericoronitis and state of eruption of the tooth.

(d)Condition of the impacted tooth- presence of caries, dental fillings, and internal resorption (which may resemble caries). The angle of the tooth and locking beneath second molar must be noted and confirmed with appropriate radiographs.

(e) Condition of first and second molars—presence of caries, fillings, or crowns; root canal treatment may put the second molar at risk of fracture and the patient must be warned of this. Distal periodontal pocketing, root resorption, and absence of the second molar must also be noted.

(f)Space present between the second molar distal surface and the ascending ramus: A small distance makes access difficult, and a large distance makes the tooth more accessible. For maxillary teeth, the distance between the second molar and tuberosity must be considered. Access can also be decreased by distal tilting of second molar.

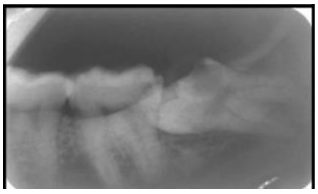
(g)Adjacent bone may develop infection, which can spread along the mesial surface of the tooth and affect the second molar, which would then require extraction. Infection/osteomyelitis can spread to the ramus in the case of distoangular impacted third molars, through recurrent submasseteric abscesses in this region.

(h) Systemic skeletal diseases may cause pathological complications which should be noted. For instance, conditions such as osteogenesis imperfecta and osteosclerosis may cause fractures during the procedure. In acromegaly, the mandibular bone is massive which makes the procedure difficult because the mandible consists of massive bone. In Paget's disease also tooth removal is difficult as the bone is affected by resorption and repair.
(i)Presence of cysts and tumors—The impacted tooth may be associated with eruption cysts or large odontogenic cysts can occur in relation to impacted tooth. By and large, they cause displacement of the tooth. Benign and malignant tumors such as ameloblastoma may also be found involving the tooth. Odontomes may also be present in relation to the third molar

Indications for Removal

Despite the fact not all unerupted/impacted teeth cause problems, all have that potential. .Based on extensive clinical studies, indications for removal have been identified
1.Pericoronitis and Pericoronal abscess (Fig. 14.1a, b, c)—This is the most common cause for extraction of mandibular third molars (25–30%). Pericoronitis is frequently found to be associated with distoangular and vertical impaction. If treated inadequately, the infection may extent posteriorly resulting in submasseteric abscess.

2.Dental Caries—Incidence of caries of the second molar or third molar is about 15%. The reason for this high incidence is attributed to difficulty to perform oral hygiene measures in the third molar area (Fig. 14.2).



3.Periodontal diseases—Repeated food impaction and collection of food debris between the impacted third molar and the erupted second molar can lead to periodontal disease and subsequent bone loss. This weakens the bone support for the second molar and can cause pulpo-periodontal disease in the second molar

4.Orthodontic reasons
(a) Crowding of incisors: Third molars has the potential to generate force in an anterior direction, which in turn can cause mandibular incisor crowding. Hence, removal of third molars has been recommended during or after orthodontic treatment. The hypothesis that the mesial pressure from the third molars is transferred through the contact points resulting in the narrow contacts of the

lower incisors is slipping. Contemporary studies have questioned this hypothesis. However, it is still believed by certain clinicians, and third .molars may be removed for these reasons

(b) To facilitate orthodontic treatment—Since the recent trends in orthodontics prefer non- extraction modalities of treatment, distalization of molars has become ever more popular, particularly with regard to Class II malocclusions. In such cases, in order to expedite the distal movement of maxillary molars, the impacted or erupted maxillary third molar tooth .may be extracted

5.To facilitate orthognathic surgery—Removal of third molars should be considered in the presurgical preparation for orthognathic surgery. Making bone cuts in Bilateral sagittal split osteotomies (BSSO) is easier after third molars are removed. To ensure that adequate bone exists in this region, these must be extracted at least one year before the planned osteotomy.

6.Odontogenic cysts and tumors—Cysts and tumors may develop from the retained follicle around the impacted tooth To prevent this, extraction of asymptomatic third molars is recommended.

7.Unexplained pain—Sometimes, unexplained pain may be alleviated simply by removing impacted teeth, although the mechanism is still unclear. However, the pros and cons must be discussed with the patient.

8.Resorption of the adjacent tooth root—Pressure from the impacted tooth can cause the root of the second molar to resorb. When this is identified, the third molar must be removed as early as possible to avoid further damage.

9.For placement of dental prosthesis—The removal of impacted teeth under dental prosthesis must be assessed carefully, with the evaluation of risk versus benefits. Removal may be done for teeth that are superficial. However, sometimes the impacted tooth may lie deep within the mandible and in such cases, the tooth is better off left in situ.

10.Prevention of jaw fracture—For those engaged in contact games, it may be better to prophylactically remove the impacted third molars, as this area may be prone to fracture .)due to lowered bone resistance

11.Infection of deep fascial spaces—When pericoronitis is associated with impacted tooth, infection can track into deep fascial spaces.

12.To remove a potential infection source (e.g. prior to administration of radiotherapy)— Teeth which are at risk of infection like partially erupted third molar tooth may lead to local complications like osteoradionecrosis or systemic complications like endocarditis. Removal must be considered for these cases as well as other procedures such as chemotherapy, organ transplantation, or insertion of alloplastic implants.

13.Removal for autogenous transplantation—Even though this was a very popular procedure in the past, it fell into disrepute due to unpredictable results. However, it is worth considering when indicated for first molar replacements.

Relative Contraindications for Removal of Impacted Tooth

1.Compromised systemic status—It may not be advisable to undertake surgical removal of impacted third molars in patients with uncontrolled or poorly controlled systemic disease, as they can develop complications during or after

the procedure. Hence, a proper history, physical examination, and, if needed, appropriate laboratory investigations must be performed.
2.Advanced age—Bone sclerosis increases with advancing age. This leads to poor healing, a larger defect size, and increased difficulty of the procedure. Risk of mandibular fracture is also high in these cases.
3.Damage to any adjacent structures—If the inferior alveolar canal is in close contact with the impacted tooth, inadvertent damage can result in paresthesia.
4.Questionable status of the second molar—If the second molar is badly decayed and unrestorable, removing it may allow the third molar to come into a functional position. The third molar may also serve as a bridge abutment. Such cases require multidisciplinary evaluation with the prosthodontist and endodontist.
5 .Deeply impacted third molars which do not appear to be associated with local or systemic pathology must not be removed.

Surgery
Under all aseptic precuations surgical extraction of upper third molar were done debries, fragments of tooth, sharp bones pieces checked and removed, surgical site was inspected, irrigated with sterile saline and surgical site sutured with 3-0 silk suture. All patients were prescribed oral antibiotics (amoxicillin 1.5 g per day) and nonsteroidal anti-inflammatory drug twice aday for 5 day.

Patient positioning
Generally, for operative procedures in mandible the occlusal plane of lower teeth should be parallel to the floor and for the maxillary teeth the occlusal plane of the upper teeth at 45° angles to the floor. The instruments are arranged in a rational order of their intended use the instrument tray of the dental chair or more preferably on a separate instrument over trolley.

Incision and Designing the Flap
~As general rule the deeper the third molar more expensive the bone removal required
and the necessity for tooth sectioning.
--The most commonly used flap is the envelope flap, which extends from just posterior to the position of the impacted tooth anteriorly to the level of the first molar. The posterior
end of the incision is directed buccally along the external oblique ridge.
--If greater access is required, a release incision is given on the anterior aspect of incision, creating a triangular flap (started from a point approximately 6 mm down in the buccal sulcus and then extended obliquely upwards to the gingival margin to a point at the)junction of the posterior and middle thirds of the second molar).
--The blunt end of the periosteal elevator is passed beneath the mucoperiosteum to reflect the soft tissue.
--Reflection of lingual mucoperiosteum is kept to the minimum to avoid injury to lingual nerve.

Bone removal

The bone on the buccal and the distal aspect of the impacted tooth is removed down to the level of the cervical line (Further bone removal if required is done in a manner not detrimental to the strength of mandible) achieved by drilling a deep vertical gutter alongside the buccal aspect and if required on the distal aspect of the tooth.
2. Guttering method will ensure that the height of the buccal plate is maintained without weakening the mandible and adequate space is created for tooth delivery.
3. As the bur reaches the apex of the tooth, the inferior alveolar canal may be opened brisk haemorrhage from inferior alveolar vessels controlled with pressure pack or bone wax.
4. Drilling in the region of the mesial surface of impacted tooth should be kept to the minimum avoid damage to the distal aspect of second molar.
5. Removing bone on the distolingual aspect care protect the lingual. 6. Moderate force alone is sufficient to displace the tooth.
7. If the tooth is still resistant plan for further bone removal or tooth sectioning.

8. At the time of elevating the tooth, the index finger of the operator's left hand should rest on the occlusal surface of the wisdom tooth to judge its movement and the other fingers support the mandible.
9. In order to apply the elevator, a point of application (purchase point) is required either in the bone or a bur cut is made on the tooth deep enough and placed in substantial portion of tooth structure elevation of rather than fracture

Controvers on prophylactics removal of third molars

he benefits of prophylactic surgical removal of impacted third molars that are disease-free is quite controversial. There are opinions that retaining the teeth may be more cost- effective than prophylactic removal, at least in the short to medium term. Nevertheless, there may still be clinical situations that demand prophylactic surgery. Each clinical scenario needs an individualized evaluation and the consequences of all management techniques must be discussed with the patient. Thomas Dodson in brought out a classification based upon the presence/absence of symptoms and the presence/absence of disease. He proposed to use this method to decide on the removal vs retention of third molars.

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