

IMPACTION OF THE MAXILLARY THIRD MOLAR

Natural Development

The maxillary third molar usually starts its development at cervical neck of the second molar and with occlusal surface facing posteriorly. The initial start of mineralization can be identified radiographically at 8-10 years of age. The posteriorly tilted tooth gradually uprights during further crown and root formation and ends up with its axis almost vertical.

Being the last tooth to develop in maxilla it has to adapt to existing space which is limited by presence of second molars, the maxillary sinus and anatomy of pterygoid fossa. As the third molar has on certain amount of adaptability in its initial stages of development the anatomy of the region often dictates the morphology.

Thus restricted A-P space or as initial ectopic position of tooth may result in severely mesio-distal compressed crown anatomy, divergent roots as the tooth adapts to sinus morphology. Usually erupts at 20yrs of age, 6 months later in females.

Etiology

No systemic disease have been implicated

From clinical experiences it appears that in frequent cases is space deficiency as in cleft lip palate.

Classification

1. Bony
Soft tissue
2. Depending on the angulations
 - Horizontal 1%
 - Mesioangular 12%
 - Distoangular 25%
 - Vertical 63%
 - Inverted 1%
 - Transverse 1%

3. Pell and Gregory ABC classification to diagnose the depth of Impaction
 - A ~ occlusal surface at the same level as that of II molar.
 - B ~ Between occlusal and CEJ of II molar
 - C ~ Deeper to CEJ of II molar
4. Types of Roots
 - Straight separate/fused
 - Distal
 - Mesial
 - Erratic Curvature
5. Number of Roots
 - Fused roots
 - Two roots
 - Multiple roots

**Factors contributing in the difficulty of extraction
of the III Molar**

1. Root Morphology
 - Common factor thin non- fused roots with erratic curvature
 - Divergent roots
2. Periodontal Ligament Space (PDL)
 - Wide –easier
 - Small –difficult
3. Follicle Surrounding
 - Big Space –Easy
 - Small – Difficult
 - Absence –Ankylosis
4. Bone Density
 - Younger Patient- Less dense- easy – as the bone is elastic and easily expands

- Older – The density increases the elasticity decreases
5. Relationship to II Molar
 - If it is underneath the II molar more bone removal is required.
 - Large restoration caries on the II molar cause fracture of the III Molar.
 6. Angulations
 - Disto-angular –easier
 - Mesio-angular – difficult
 7. Sinus
 - Structure
 - Position of sinus $\leq 2\text{mm}$ – more difficult
 - Intimate contact with roots of teeth and frequently forms the posterior wall of maxillary sinus
 - Sinusitis or Oro Antral Fistula
 8. Maxillary Tuberosity
 - Bone that is denser is less elastic
 - Larger maxillary sinus makes it thin
 9. Complete Bony Impactions
 - Class B /C

SURGICAL ANATOMY

- Located in Tuberosity
- Surrounded by spongiosa and thin cortical bone plate.
- More bone on palatal aspect.
- Buccal and Distal side of the Tuberosity is covered by a thin mucoperiosteum in which branches of PSA vessels and nerves
.....
- Palatal mucoperiosteum – thick carries branches of greater palatine arteries an nerves.

- Maxillary Sinus
 - May present varying extensions into Tuberosity ,
 - Older people's sinus may extend to III molar and expand around mesial aspect sometimes.
 - In most cases tooth and sinus will be separated by bone.

- Musculature
 - Buccinator , buccally inserts on lateral aspect of Tuberosity above the teeth.
 - Surgical implications of insertion is mesio-occlusal to position of impacted tooth, infection can be confined to vestibule / prevented from entering the adjacent space and it may enter the buccal space.

- Lateral Pterygoid
 - Larger inferior head originated from outer surface of lateral pterygoid located 1mm distal to the Tuberosity.
 - Surgical damage – Trismus

- Buccal Pad
 - Between buccinator / Masseter
 - Accidental perforation into pad

- Pterygo Palatine Nerve
 - Narrow tunnel shape fovea into which displace of tooth or root on follow....

- Infra temporal Space
 - Displacement / Edema/ Infection

Radio Graphic Diagnosis

- OPG
- IOPA
- Oblique Occulusal View

TREATMENT PLAN

1. No Treatment

Deeply impacted that progression of Periodontia/ periapical inflammation is not likely to occur
No radiographic signs such as cysts/ tumors.

2. Surgical Exposure

When functional needs of the III molar exists , surgical exposure is advocated.

3. Guidance into Mesial eruption

When preservation of maxillary II molar is doubtful due to caries or peri-apical
III molar can be guided by extraction of II molar and achieve proximal contact with maxillary I molar.

4. Auto-transplantation

Considered as possible graft replacement for the I molar

Very much indicated if I molar is destroyed due to decay /periodontitis

It can also be ___ sometimes to mandibular premolar area.

However in case of Premolar the limited Buccal, Lingual dimensions of alveolar process had to be considered because 90° rotation is necessary.

5. Surgical removal

Indications

- Pericoronitis
- Periodontitis
- Caries
- Pathological resorption
- Cysts and Neoplasm
- Idiopathic pain

- Maintaining Tuberosity in edentulous patients

Sufficient radiographic examinations should be performed in which position of tooth as well as information on number and position of root.

A part of Clinical analysis of topography of III molar . Analysis facilitated is asking not to open ≥ 3 cm with deviation of mandible towards the surgical side. This will create extra room between the ramus and Tuberosity.

SURGICAL PROCEDURE

The principles and steps for removing impacted teeth are the same as for other surgical extractions. Five basic steps make up the technique. The first step is to have adequate exposure of the area of the impacted tooth. This means that the reflected soft tissue flap must be of an adequate dimension to allow the surgeon to react the soft tissue and perform the necessary surgery. The second step is to assess the need for bone removal and to remove a sufficient amount of bone to expose the tooth or sectioning and delivery. The third step is to divide the tooth with a bur or chisel to allow the tooth to be extracted without removing excessive amounts of bone. In the fourth step the sectioned tooth is delivered from the alveolar process with the appropriate elevators. Finally, the wound is thoroughly cleansed with irrigation and mechanical debridement with a curette and is closed with simple interrupted sutures. The following discussions elaborate on these steps for the removal of impacted third molars.

While the surgical approach to the removal of impacted teeth is similar to other surgical tooth extractions, it is important to keep in mind several distinct differences. For instance, the typical surgical extraction of a tooth or both root requires the removal of a relatively small amount of bone. However, when an impacted tooth (especially a mandibular third molar) is extracted, the amount of bone that must be removed to deliver the tooth is substantially greater. This bone also is much denser than it is for typical surgical extractions, and its removal requires better instrumentation and a higher degree of surgical skills.

Impacted teeth also frequently require sectioning, whereas other types of tooth extractions do not. Although erupted maxillary and mandibular molars occasionally are divided for removal. It is not a routine step in the extraction of these teeth. However, with impacted mandibular third molars, the surgeon is required to divide the tooth in a substantial majority of patients. The surgeon must therefore have the necessary equipment for such sectioning as well as the necessary skills and experience for dividing the tooth along the proper planes.

Unlike most other types of surgical tooth extractions, for an impacted tooth removal the surgeon must be able to balance the degree of bone removal and sanctioning. Essential all impacted teeth can be removed without section large amount of bone is removed. But the removal excessive amounts of bone unnecessarily prolong the healing period and may result in a weakened jaw. Therefore, the surgeon should remove most mandibular third molars only after sectioning them. On the other hand, removal of a small amount of bone with multiple divisions of the tooth may cause the tooth sectioning process to take an excessively long time and thus prolong the operation unnecessarily. The surgeon must remove an adequate amount of bone and section the tooth into a reasonable number of pieces both to hasten healing and to minimize the time of the surgical procedure.

Reflecting adequate flaps for accessibility. The difficulty of removing an impacted tooth depends on its accessibility. To gain access to the area and to visualize the overlying bone that must be removed, the surgeon must reflect an adequate mucoperiosteal flap. The reflection must be of a dimension adequate enough to allow the placement and stabilization of retractors and instruments for the removal of bone.

In most situations the envelope flap is the preferred technique. The envelope flap is easier to close and heals better than the three-cornered flap. However, if the surgeon requires greater access to the more apical areas of the tooth, which might stretch and tear the envelope flap, the surgeon should consider using a three-corned flap.

The recommended incision for the maxillary third molar is also an envelope incision. It extends posteriorly from the distobuccal line angle of the second molar and interiorly to the mesial aspect of the first molar. In situations in which much access is required (for

instance, in a deeply embedded impaction), a release incision extending from the mesial aspect of the second molar can be used.

In the removal of third molars it is vital that the flap be large enough for adequate access and visibility of the surgical site. The flap must have a broad base if the release incision is used. The incision must be made with a smooth stroke of the scalpel, which is kept in contact with bone throughout the entire incision so that the mucosa and periosteum are completely incised. This allows a full-thickness mucoperiosteal flap to be reflected. The incision should be designed so that it can be closed over solid bone (rather than over a bony defect). This is achieved by extending the incision at least one tooth anterior to the surgical site when a vertical releasing incision is used. The incision should avoid vital anatomic structures. Only a single releasing incision should be used.

For maxillary teeth, bone is removed primarily on the buccal aspect of the tooth down to the cervical line to expose the entire clinical crown. additional bone must be removed on the mesial aspect of the tooth to allow an elevator an adequate purchase point to deliver the tooth. Since the bone overlying maxillary teeth is usually thin, it can be removed easily with unibeam chisel with only and pressure

Sectioning the tooth, the surgeon should assess the need to section the tooth. Sectioning allows portions of the tooth to be removed separately with elevators through the opening provided by bone removal

The direction in which the impacted tooth should be divided is primarily dependent on the angulation of the impacted tooth. Although minor modifications are necessary for teeth with divergent roots or for teeth that are more deeply or less deeply impacted, the most important determinant is the tooth's angulation.

Tooth sectioning can be performed with either a bur or chisel; however, the bur is used by most surgeons. If a chisel is used, it must be extremely sharp, and the blow delivered to it by the mallet must be sharp and forceful enough to split the tooth. For the conscious patient the sound of the chisel striking the tooth may be bothersome.

Impacted maxillary teeth rarely are sanctioned, because the overlying bone is usually thin and relatively elastic. In situations in which the bone is thicker or the patient is older (and therefore the

bone not so elastic), tooth extraction is usually accomplished by bone removal rather than tooth sectioning. Under no circumstances should a chisel be used section maxillary teeth, because displacement of the tooth into the maxillary sinus is highly likely. In general, impacted teeth elsewhere in the mouth are usually sectioned only at the cervical line. This permits removal of the crown portion of the tooth, displacement of the root portion in to the space previously occupied by the crown, and removal of the root portion

Delivery of maxillary third molars is accomplished with small straight elevators such as the No. 301 elevator, which luxates the tooth distobuccally. Some surgeons prefer angled elevators, such as the Potts or Miller elevators, which aid in gaining access to the impacted tooth. The elevator tip is inserted into the area at the mesial cervical line, and force applied to displace the tooth in the distobuccal direction. The surgeon should be cautious about applying excessive pressure anteriorly to avoid damage to the root of the maxillary second molar. In addition, as pressure is applied to displace the tooth posteriorly, the surgeon should have a finger on the tuberosity of the maxilla (especially if the impaction is mesioangular) so that if a fracture does occur, steps can be taken to salvage the tuberosity of the maxilla.

Debridement of wound and wound closure. Once the impacted tooth is removed from the alveolar process, the surgeon must direct his attention to debriding the wound of all particulate bone chips and debris. The surgeon should irrigate the wound with sterile saline and take special care to irrigate thoroughly under the reflected soft tissue flap. The periapical curette should be used to mechanically debride both the superior aspect of the socket and the inferior edge of the reflected soft tissue to remove any particulate material that might have accumulated during surgery. The bone file should be used to smooth any sharp, rough edges of bone. A mosquito hemostat can be employed to remove any remnants of the dental follicle. Once the follicle is grasped, it is lifted with a slow, steady pressure and will pull free from the surrounding hard and soft tissue. A final irrigation and a thorough inspection should be performed before the wound is closed.

The closure of the incision usually should be a primary closure. If the flap was well designed and not traumatized during surgical procedure, it will fit closely back into its original position. The initial suture should be made through the attached tissue on the posterior

aspect of the second molar. Additional sutures are placed posteriorly from that position and anteriorly through the papilla on the mesial side of the second molar. usually three or four sutures are necessary to close an envelope incision. If a release incision was used, attention must be directed to closing that portion of the incision as well.

PERIOPERATIVE PATIENT MANAGEMENT

The removal of impacted third molars is a surgical procedure that is associated with a large amount of patient anxiety. In addition, this surgical procedure can involve a number of unpleasant noises and sensations. As a result, surgeons who routinely perform surgical removal of impacted third molars commonly recommend to their patients some type of profound anxiety control such as a general anesthetic or deep IV sedation.

IMPACTIONS OF MAXILLARY CANINE

Natural Development

The permanent maxillary canines are developed deep within the maxillae, complete their development late and emerge into the oral cavity after the all the teeth are erupted.

Therefore ectopic eruption, an orthodontic/surgical problem often leads to impaction, resorption of adjacent teeth or other complications.

Mineralisation starts 6-12 months and completes at 6-7 years of age. During eruption , canines moves along the aspect of lateral incisors roots in very close continuity with it.

Retention and Impaction

Increased in females when compared to males

Unilateral impactions

Usually found palatal to Lateral Incisors and

bucal only in the later 15%

Cause for Canine eruption

- space loss
- ectopic position of tooth germ
- retention of primary canine
- Deflection in eruption path.
- Lack of guidance from the Gubernacular canal. Changes in the width of the Gubernacular canal during tooth development have been suggested.
- Root tip deflection-Deflection of the root tip is often seen with impacted canines
- hereditary canines-A familial tendency for canine impaction has been reported by several authors.
- Congenitally missing Lateral Incisors
- Retardation of canine developments- late canine maturation has been suggested
- obstruction due to odontomas/supernumery tooth
- cleft lip and palate deformities
- trauma -due to partial injuries.

Classification

Field and Ackerman 1935

Maxillary Canines

- > labial position - crown in intimate relationship with incisors.
 - crown well above the apices of the incisors

Palatal position – Crown near the surface on close relationship with roots of incisors

- Crown deeply embedded in close relationship to the apices of incisors

Intermediate Position

- Crown between lateral Incisors and 1st Pre molars root
- -Crown above the teeth with crown labially placed and roots palatally placed

Unusual Position

In nasal or antral walls

In infra orbital region migrated to opposite side.

Indications

- Changed position of adjacent tooth
 - Labioversion
 - Lingoversion
- Rotation
- Resorption of roots of adjacent teeth
- Resorption with or without displacement
- Cyst formation – When a follicle space surrounding tooth germ occupies a larger space unusually the evidence of cyst formation.
- Cleft palate – Following surgery which do not erupt due to either narrowed arch, the surgical scar, lack of alveolar bone.
- Presence in edentulous patients
- Neurological symptoms- Pain referred to ear, eye, side of head and headache.

Radiographical Analysis

- IOPA – SLOB rule
- Occclusal
- Vertical axis
- OPG

Armamentarium

- B P
- Blade
- Periosteal elevator
- Micromotor hand piece
- Burs
- Elevators
- Sutures
- Gauze pack
- Needle holder
- Scissors

Anaesthesia for surgical removal

LA – naso palatine block

-Greater palatine

-Intra orbital block

Operative Procedures

- Surgical repositioning

- Auto transplantation
- Prophylactic space augmentation
- Primary canine extraction
- Removal

Prophylactic space augmentation

Elimination of severe crowding in dental arch sometimes make room for an impacted canine or possible stimulate eruption into correct position.

Extraction of primary canine

In young individuals 10-13 year old it has been shown extraction can correct a palatally erupting canine is not favorable with ectopic canines in a more horizontal position high up in the alveolar process when there is space loss in lateral segments.

Exposure and orthodontic repositioning

Usually treatment of choice in cases of ectopic canine is repositioning but associated with minor complications such as loss of pulpal sensitivities root surface resorption , loss of marginal bone support gingival recession. Depends on patients age, space condition , sagittal and transverse position of canine crown and root , more vertical the orientation THE BETES

An axial inclination -45° – the crown's colour the crown is to the midline and root to mid palatal suture poorer the prognosis tooth should not be ankylosed.

Labial position

- use of radial excision
- use of pedicle flap

Palatal position

- Semi lunar incision
- cruciform
- marginal incision

Surgical repositioning

Maxillary canine impaction is often not detected before root development is complete therefore if transplantation is carried out

early i.e. before the completion of root development the prognosis is very favorable.

Auto transplantation could be considered in the following cases

- ectopic location where canines path of eruption has resulted in marked resorption of lateral and central incisors
 - ectopic placement of canines , where surgical exposure and subsequent orthodontic realignment are difficult
 - when these procedures have failed
 - preferable age 11-12
- but detail space analysis of recipient have to be made

Surgical Treatment

Labially Position

Position with their horns perforating the labial bone. A semi lunar flap is raised and bone is exposed

Primary bone is removed and the sockets enlarged

Then the tooth is positioned in the socket and splinted

Palatal Position

The palatal flap is raised extending the first premolar to the opposite premolar. Bone covering the crown and middle 3rd of the root is removed.

Removal of Ectopic Canines

If exposure and subsequent orthodontic treatment is not indicated possibility of removal of impacted canine is considered

Is designed according to position

- labial
- palatal

Another surgical principle is that exposure of impacted canine should minimize the risk of damage to adjacent teeth

Labial Position

A marginal or semi lunar flap is raised according to the position of crown .

A bulge on labial bone or appearance of follicle indicates position of crown.

Pericoronal bone is removed with burs/ chisel until widest part of crown has been removed then the tooth is elevated.

Palatal position

A palatal flap is raised , extending for the first premolar to opposite first premolar region

To avoid gingival problems papillae should not be included..At the point of bulge access to hold the crown area is made with a bur and entrance is then enlarged so that entire crown is exposed .

Then luxation is tried

If the tooth does not get luxated indicated the palatal bone covering the root is resisting.

Section of crowns.

Removal of extra bone.

Then the tooth is elevated.