Exodontia

• Definition: It is the painless removal of the whole tooth, or tooth root, with minimal trauma to the investing tissues, so that the wound heals uneventfully and no postoperative prosthetic problem is created.
Methods of tooth extraction

1. CLOSED METHOD/FORCEPS EXTRACTION/INTRA-ALVEOLAR EXTRACTION:
   Consists of removing the tooth or root by use of forceps or elevators or both.

2. OPEN METHOD/SURGICAL/TRANS-ALVEOLAR EXTRACTION:
   Consists of dissecting the tooth or root from bony attachments by removal of some bone investing the tooth/roots, which are then delivered by use of elevators and/or forceps.

Indications of tooth extraction

1. Severe Caries:
   • Teeth with severe caries or severe abrasion, which can not be treated by conservative methods such as fillings and crowning.
   (non-restorable teeth)
   • the most common and widely accepted reason.
Indications of tooth extraction

2- Pulpal Necrosis:
• Teeth with non-vital pulps, or with acute or chronic pulpitis when root canal treatment is not possible.
• Also in endodontic failure.

3. Severe Periodontal Disease:
• A common reason for tooth removal is severe and extensive periodontal disease. If severe adult periodontitis has existed for some time, excessive bone loss and irreversible tooth mobility will be found.
**Indications of tooth extraction**

**4. Orthodontic Reasons**
- Correction of crowded dentition frequently require the extraction of teeth to provide space for tooth alignment.
- The most commonly extracted teeth are the maxillary and mandibular first premolars.

**5. Malposed teeth:**
- If they traumatize soft tissue and cannot be repositioned by orthodontic treatment, they should be extracted.
- A common example is an upper third molar which erupt in severe buccal position causing ulceration and trauma to the cheek.
Indications of tooth extraction

6. Pre prosthetic Extractions:
   • Teeth interfere with the design and proper placement of prosthetic appliances, that is, full dentures, partial dentures, or fixed partial dentures.
   • Like over-erupted tooth due to loss of tooth in the apposing arch, this will interfere with the construction of adequate prosthesis.

7. Cracked Teeth
   • Tooth that has cracked crown with root fracture that is unmanageable by restorative procedure should be considered for extraction.
8. Impacted Teeth

- Fully impacted or partially erupted teeth should be considered for removal.
Indications of tooth extraction

10. Teeth Associated with Pathologic Lesions:
• Such as abscess, granuloma, tumors, or cyst; in cases where apicoectomy is contraindicated.

11- Preradiation Therapy
• Teeth in the line of radiation therapy should be extracted at least 3 weeks before radiotherapy for head and neck malignancy started.

12- Tooth involved with jaw fractures:
• In some situations the tooth involved in the line of fracture can be maintained, but if the tooth is injured, infected, or severely luxated from the surrounding bony tissue or interferes with proper reduction and fixation of the fracture, its removal may be necessary.
13. Retained deciduous teeth: to facilitate eruption of normally positioned permanent teeth.

14. Remaining roots and fragments

15. Financial Issues:
   • A final indication for removal of teeth is related to the financial status of the patient. All of the indications for extraction already mentioned may become stronger if the patient is unwilling or unable financially to support the decision to maintain the tooth.
Contraindications of tooth extraction

• Even if a given tooth meets one of the requirements for removal, in some situations the tooth should not be removed because of other factors or contraindications to extraction, which are divided to:

A. Systemic contraindications.

B. Local contraindications.

A. Systemic contraindications

1. Severe uncontrolled metabolic diseases:
   – Uncontrolled Diabetes; cause infection and delayed healing.
   – End stage renal disease with severe uremia.

2. Uncontrolled leukemias and lymphomas:
   – Potential complications: Infection and bleeding

3. Severe uncontrolled cardiac diseases:
   e.g. Unstable angina pectoris
   Recent myocardial infarction
   Uncontrolled cardiac dysrhythmias
A. Systemic contraindications

4. Severe uncontrolled hypertension:
   Potential complications:
   – Persistent bleeding.
   – Acute myocardial insufficiency.
   – Cerebrovascular accidents as a result of stress caused by the extraction.

5. Severe bleeding diathesis:
   – Such as hemophilia or severe platelet disorders.

6. Pregnancy: (relative contraindication).
   – first or third trimester; extractions deferred if possible.
   – middle trimester is safe for routine uncomplicated extraction.

7. Medications:
   – Corticosteroid
   – Immunosuppressive agents
   – Anticoagulants.
   – Cancer chemotherapeutic agents.
   – Bisphosphonates

8. Toxic Goiter:
B. Local contraindications of tooth extraction

1- **History of radiotherapy for head & neck cancer:**
   - potential complication: Osteoradionecrosis

2- **Teeth that are located within an area of tumor:**
   - (especially a malignant tumor)
   - complication: Disseminate malignant cells (metastasis)

3- **Acute pericoronitis around partially erupted third molar:**
   - More postoperative complications

   ![Pericoronitis; swelling of the operculum due to constant biting from the antagonist](image)

4- **Extraction of maxillary teeth during acute maxillary sinusitis.**

5- **Acute dentoalveolar abscess**
   - Patient may be unable to open widely
   - Difficult to get profound anesthesia

   **Clinical Note:**
   - The most rapid way for resolution of infection secondary to pulpal necrosis is obtained when the tooth is removed as early as possible, therefore **acute infection is not a contraindication to extraction once the access and anesthesia can be ensured.**

6- **Absolute contraindication:** Presence of haemangioma in the extraction site.
Pre-operative assessment for Extraction

(A) Clinical Assessment of the Tooth to be extracted

(B) Radiographic Evaluation

Estimation of the difficulty to Extraction

A- Clinical assessment for Extraction

1- Access to the tooth (mouth opening)
   • Limitation of mouth opening (trismus) may compromise the extraction. Trismus may be due to:
     (1) Infection around or in the muscles of mastication.
     (2) TMJ dysfunction or ankylosis.
     (3) Muscle fibrosis.
A- Clinical assessment for Extraction

2- Location & position of the tooth to be extracted.

• Anteriorly located tooth has better access than posteriorly located.
• Well aligned tooth in the dental arch has better access for instrument placement than crowded or malposed teeth.

3- Mobility of the tooth

• If the teeth are excessively mobile due to severe periodontal diseases; an uncomplicated tooth removal should be expected.
• Teeth that have less than normal mobility should be carefully assessed for the presence of hypercementosis or ankylosis of the roots.
A- Clinical assessment for Extraction

4- Condition of the crown
   a- Presence of large carious lesion or large restoration cause weakening of the crown and the possibility of crown or filling fracture during extraction is high.
   b- Endodontically treated teeth become dry and brittle so possibility of the fracture is high.
   c- Accumulation of large calculus around a tooth interferes with the proper placement of the forceps, and may contaminate the empty tooth socket after extraction so it should be removed before the extraction.

5- Condition of the adjacent teeth
   • If the adjacent teeth have a crown or large restoration or endodontically treated, great care should be given during the extraction to avoid fracture or displacement of this restoration.
B- Radiographic Evaluation for Extraction

- Requirement of a pre extraction radiographs:
  1. Should show the whole crown and root structure.
  2. Should show the bone investing the tooth.
  3. Should show the relation to any important anatomical structures.

Note:
- Periapical radiographs provide the most accurate and detailed information concerning the tooth, its roots, and the surrounding tissue.
- Panoramic radiographs are used frequently, but their greatest usefulness is for impacted teeth as opposed to erupted teeth.
- Occlusal radiograph to localize the position of impacted teeth in a bucco-lingual direction, especially impacted maxillary canine.

Indications for Pre-Operative Radiographs

1. A history of difficult extraction.
2. A tooth which is abnormally resistant to forceps extraction.
3. Any teeth or roots in close relationship to either the maxillary antrum, inferior dental and mental nerves.
4. All mandibular and maxillary third molars
5. Any tooth which has been subjected to trauma.
6. Any partially erupted or impacted teeth.
Indications for Pre-Operative Radiographs

7. Retained roots.
8. Any tooth with abnormal crown form.
9. Any tooth that has been decided to be removed surgically.
11. Any isolated upper molar for long time.
12. Any condition which predisposes to dental or alveolar abnormality, e.g.
   a) Osteitis deformans “Paget disease” - (hypercementosis).
   b) Cleido-cranial dysostosis - (hooked roots).
   c) Osteopetrosis - (difficult extraction).
   d) Irradiated bone - (osteoradionecrosis).

Values of Pre-Extraction Radiograph

1- Relationship to vital structure
   a- Maxillary sinus:
   • The roots of the maxillary premolars and molars are closely related to the floor of the maxillary sinus, if thin layer of bone exists between the roots and sinus or there is periapical pathology, the potential for sinus perforation during extraction increases.

   b- Inferior dental canal:
   • This point is more important when dealing with impacted mandibular third molars than other erupted teeth.
Values of Pre-Extraction Radiograph

C- Mental foramen:
• This foramen is closely related to the apices of the lower premolars, and if a surgical flap is required to extract a premolar root, it is essential that the surgeon know where the mental foramen is to avoid injuring the mental nerve during flap development.

Values of Pre-Extraction Radiograph

2- Configuration of Roots:
   a- Number of roots:
   • Majority of teeth have typical number of roots, but sometimes extra root present, in such case modification of the treatment plan can be made to prevent fracture of the additional root.
   b- Root curvature & divergence:
   • More curvature –more possibility of the fracture
   • More divergence makes the total root width so wide that makes the extraction more difficult.
Values of Pre-Extraction Radiograph

c- Size and shape of the root:
- Short: simple extraction
- Long: difficult extraction
- Conical shape: simple extraction
- Bulbous (hypercementosis): difficult extraction.

Note:
- The periapical radiographs of older patients should be examined carefully for evidence of hypercementosis, because this process seems to be a result of aging.

d- Root caries or resorption:
- Caries extension into the root or if there is internal or external root resorption will weakens the root and makes it more liable to fracture.

e- Previous RCT:
- Presence of RCT for many years makes the tooth more brittle or ankylosed and this makes the extraction more difficult.

f- PDL space:
- The more the space, the simple the extraction will be.
Values of Pre-Extraction Radiograph

3- Condition of the surrounding bone:

a- Bone density:
   • Bone that is more radiolucent is likely to be less dense which make the extraction more easy.
   • Bone that is more opaque is likely to be more dense which makes the extraction more difficult.

b- Presence of apical pathology:
   • Apical pathology like cyst or granuloma should not be left after extraction, but should be removed at the same time of teeth removal.

Summery

• evaluation of the clinical presentation of the tooth to be removed, and radiographic evaluation of the tooth root and bone must be weighed when estimating the difficulty of the extraction.
Principles of exodontia

- Surgeon and patient preparation.
- Pain and anxiety control
- Position of the patient
- Position of the operator
- Clear vision and access to the surgical field
- Use of controlled force- elevators & forceps
- Unimpeded path of removal
- Post-extraction wound care and instructions.

Surgeon preparation

- Surgical team should wear surgical gloves, surgical mask, head caps and eyewear with side shields. Additionally they should wear long-sleeved gowns that can be changed when they become visibly soiled.
- If the surgeon has long hair, it is essential that the hair be held in position or to be covered with a surgical cap.
- Operator must remove rings & watch and should scrub his hands and arms.
Patient preparation

- A sterile drape should be put across the patient's chest to decrease the risk of contamination.
- Before the extraction, patients should rinse their mouths with an antiseptic mouth rinse, such as chlorhexidine.

Position of the patient

- Chair Angulation
- Chair Height
Position of the patient

A. For extraction of maxillary teeth:
   • The height of the chair should be such that the height of the patient's mouth is at or slightly below the operator's elbow level.
   • The occlusal surface of the maxillary teeth must be at a 60° angle compared to horizontal when the mouth is open.
   • The patient's head should be turned substantially toward the operator, so that adequate access and visualization can be achieved except the extraction anterior portion of the arch, the patient should be looking straight ahead.
Position of the patient

B. For extraction of mandibular teeth:
   1. The chair is positioned lower than the upper extraction.
   2. The level of the mandible about the level of the elbow.
   3. The occlusal surface of the mandibular teeth must be parallel to the horizontal when the patient’s mouth is open.
   4. A bite block should be used to stabilize the mandible when the extraction forceps is used.
Position of the surgeon

A. For extraction of maxillary teeth:
   – Dentist should stand as nearly erect as possible with his weight equally distributed to each foot.
     - Right-handed dentists during extraction using forceps is in front of and to the right of the patient (8 o'clock)
     - Left-handed dentists should be in front of and to the left of the patient.

B. For extraction of mandibular teeth:
   - Right-handed dentists during extraction of anterior and left side teeth using forceps, is in front of and to the right of the patient (8 o'clock).
   - Right-handed dentists during extraction of right side teeth using forceps, is in behind to and to the right of the patient (11 o'clock).
Role of Opposite Hand

- **For upper teeth:**
  - The left index finger of the surgeon should reflect the lip and cheek tissue; the thumb should rest on the palatal alveolar process.

- **For lower teeth:**
  - The left index finger should reflect the cheek, the middle finger retracts the tongue, while the thumb finger supports the mandible.

- **In this way the left hand is able to:**
  1. Reflect the soft tissue of the cheek.
  2. Stabilize the patient's head.
  3. Support the alveolar process.
  4. Provide tactile information to the surgeon.
  5. Stabilize the lower jaw to avoid injury to the TMJ.
Role of assistant during the extraction procedure

1. Helps the surgeon to get an unobstructed view and access to the surgical field.
2. Suction away blood, saliva, irrigating solutions used.
3. Support the mandible when required.
4. Provide psychologic and emotional support for the patient.
   • However, the assistant must not make casual and offhand comments that may increase patient's anxiety.

Mechanical principles of extraction

• The removal of teeth from the alveolar process requires the use of the following mechanical principles:
  1. Expansion of the bony socket.
  2. The use of lever.
  3. Insertion of wedge or wedges.
  4. Wheel and axle.
Mechanical principles of extraction

1- **Forceps are used to expand the bony socket** by using the root of the tooth as a dilating instrument and lift the tooth out.

2- **The lever principles** is the most frequently used, the elevator is a lever of 1st. Class.
   - The first class lever transforms small force & large movement to small movement & large force.
   - The position of the fulcrum is between the effort & the resistance.

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The lever principles
3- The wedge principle:
• First the beaks of the extraction forceps are usually narrow at their tips; they broaden as they go superiorly. When the forceps is used, force the tips of the forceps into the periodontal ligament space to expand the bone and force the tooth out of the socket.
• It is also useful when a straight elevator is used to luxate a tooth from its socket. A small elevator is forced into the periodontal ligament space, which displaces the root toward the occlusion and therefore out of the socket.

4- Wheel and axle, which is most closely identified with the triangular elevator. When one root of a multiple-rooted tooth is left in the alveolar process, the triangular elevator is positioned into the socket and turned. The handle then serves as the axle, and the tip of the triangular elevator acts as a wheel which engages and elevates the tooth root from the socket.
Dental elevators

- The elevator is the second most important instrument (after the extraction forceps) with which tooth extraction is achieved or aided.
- It is composed of three parts: the handle, the shank, and the blade. The shape of blade differs for each elevator type, and each is used as the need dictates.

![Image of a dental elevator](image)

Classification of Dental elevators

**A. According to use:**
1. To remove the entire tooth.
2. To remove roots.
3. To reflect the mucoperiosteum.

**B. According to form:**
1. Straight elevators all types (coupland elevator).
2. Curved elevators right and left (e.g. Cryer’s elevator).
3. Angulated elevators right and left (apexo elevator).
4. Pick type elevators.
5. Cross bar design elevators.
1- **Straight elevators:**

- The shank is narrow and long and connects the handle to the blade. The blade has two surfaces: a convex and a concave one. The concave surface is placed buccally, either perpendicular to the tooth or at an angle, and always in contact with the tooth to be luxated.
- Examples of straight elevators (**Coupland, Straight Warwick James, Lindo Levien**)

![Straight elevators](image)

2- **Triangular (curved) elevators:**

- These elevators are provided in pairs: a left and a right.
- **Triangular elevator (Cryer)** is most useful when a broken root remains in the tooth socket and the adjacent socket is empty.
- A typical example would be when a mandibular first molar is fractured, leaving the distal root in the socket but the mesial root removed with the crown. The tip of the triangle-shaped elevator is placed into the socket, it is then turned with the sharp tip of the elevator engaging the cementum of the remaining distal root; the elevator is then turned and the root delivered.

![Triangular elevators](image)
• **Warwick James elevator:**
  • It is a paired instrument (Rt, Lt), most useful in luxation of upper third molars.

![](image1.png)

3. **Angulated elevators:**
   • **Apexo elevator (Rt and Lt):**
   • Apexo Elevators are straight one and have a biangulated and sharp, straight working tip.
   • They are paired elevator for mesial and distal roots. They can be used to remove root stumps.

![](image2.png)
4- Pick type elevators:

- The heavy version of the pick is the **Crane pick**.
- This instrument is used as a lever to elevate a broken root from the tooth socket.

- The **root tip pick** is a delicate instrument that is used to tease small root tips from their sockets.

5. Cross bar elevators:

- **Winter’s Elevator:**
  - It is a crossbar elevator as the shank is at right angles to the handle.
  - This type of handle can generate large amounts of force that may fracture the mandible and therefore must be used with caution.
  - Used like Cryer elevator.
Periotomes

- Periotomes are instruments used to extract teeth while preserving the anatomy of the tooth’s socket.
- The general principle behind their use is to sever some of the periodontal ligaments of the tooth to facilitate its removal.
- The tip of the periotome blade is inserted into the periodontal ligament space and advanced using pressure in the apical direction along the long axis of the tooth.
- Once sufficient severance of periodontal ligaments has been accomplished, the tooth is removed by using a dental elevator, extraction forceps, or both.
Rules of elevator use

1. Never use adjacent tooth as fulcrum unless it needs extraction.
2. Never use buccal plate as fulcrum except in lower third molars.
3. Never use lingual plate as fulcrum.
4. Always use finger guards to protect the patient in case elevator slips.
5. Forces applied should be under control & in the right direction.

Mechanical principles of forceps use

• Forceps is the primary instrument used to remove a tooth from the alveolar process:
  1. Expansion of bony socket, i.e. the forceps creates micro fracture in the alveolar process by the use of the tooth as dilating object.
  2. Lever principle —this works same as that for elevator.
  3. Wedge principle —the tip of the forceps beak is narrower anteriorly and broadens posteriorly. When the tip is forced between the mucoperiosteum and tooth it causes expansion of bony socket so that the tooth displaced out of socket.
Extraction technique

• Procedure for closed extraction:
  – Step 1: Loosening of soft tissue attachments from the tooth.
  – Step 2: Luxation of the tooth with a dental elevator.
  – Step 3: Adaptation of the forceps to the tooth.
  – Step 4: Luxation of the tooth with the forceps
  – Step 5: Removal of the tooth from the socket.

1- Loosening of soft tissue attachments from the cervical portion of the tooth

• With a sharp instrument, such as the sharp end of periosteal elevator.
  1. It allows the surgeon to ensure that profound anesthesia has been achieved..
  2. To allow the tooth-extraction forceps to be positioned more apically, without interference from the soft tissue of the gingiva.
  3. To avoid soft tissue laceration during removal of the tooth.
2- Luxation of the tooth with a dental elevator

- The straight elevator is inserted perpendicular to the tooth into the interdental space, after reflection of the interdental papilla.
- The elevator is then turned in such a way that the inferior portion of the blade rests on the alveolar bone and the superior, or occlusal, portion of the blade is turned toward the tooth being extracted.
3- Adaptation of the forceps to the tooth

- The lingual beak is usually seated first and then the buccal beak.
- The beaks of the forceps must be held parallel to the long axis of the tooth.
- The forceps are then forced apically as far as possible to grasp the root of the tooth as apically as possible.
- The surgeon should be prepared to apply force with the shoulder and upper arm without any wrist pressure. The surgeon should be standing straight, with the feet comfortably apart.

4- Luxation of the tooth with the forceps

- The forceps must be apically seated as far as possible and reseated periodically during the extraction.
- The forces applied in the buccal and lingual directions should be slow, deliberate pressures and not jerky wiggles,
- The force should be held for several seconds to allow the bone time to expand. One must remember that teeth are not pulled; rather, they are gently lifted from the socket once the alveolar process has been sufficiently expanded.
5- Removal of the tooth from the socket

- Once the alveolar bone has expanded sufficiently and the tooth has been luxated, a slight tractional force, usually directed buccally, can be used.
- Tractional forces should be minimized, because this is the last motion that is used once the alveolar process is sufficiently expanded and the periodontal ligament completely severed.

Rules of application of forceps

- Selection of an appropriate forceps.
- Grasp forceps at far ends of handles with firm grip of the palm.
- Long axis of forceps beaks must be parallel to long axis of the tooth.
- Forceps beaks must grasp firmly the sound root structure and not enamel of the crown.
- Beaks must not impinge on adjacent teeth during the luxation.
Rules of application of forceps

• The forceps grip:
  • The thumb is positioned just below the joint of the forceps & forceps handles in the palm with a firm grip.
  • The little finger is placed inside the handle & used to control the opening of forceps blades during application.
  • When the tooth gripped the little finger is placed outside the handle.

Rules of application of forceps

• The forceps can apply five major motions to luxate the teeth and expand the bony socket:
  1. Apical pressure (*first movement for all teeth*).
  2. Buccal pressure.
  3. Lingual pressure.
  4. Rotational pressure.
  5. Tractional pressure.
Rules of application of forceps

• A strong apical force is always useful and should be applied whenever the forceps are adapted to the tooth.
• Most teeth are removed by a combination of buccal and lingual (palatal) forces.
• Because the maxillary buccal bone is usually thinner and the palatal bone is a thicker cortical bone, maxillary teeth are usually removed by strong buccal forces and less vigorous palatal forces.
• The mandibular molar teeth have thicker buccal bone and usually require a stronger lingual pressure.
• Rotational forces are useful for single-rooted teeth that have conical roots and no severe curvatures at the root end. The maxillary incisors, particularly the upper central incisor and mandibular premolars (especially the second premolar) are most amenable to rotational forces.

Specific techniques for removal of each tooth

1. Maxillary incisor teeth:
   • The left hand grasps alveolar process.
   • Forceps are seated as far apically as possible.
   • Luxation is begun with labial force then slight lingual force is used.
   • The tooth is delivered to labial side with rotational, tracial movement.
Specific techniques for removal of each tooth

2. Maxillary canine:
   • The initial movement is apical and then to the buccal aspect, with return pressure to the palatal.
   • As the bone is expanded and the tooth mobilized small amount of rotational force may be useful in expanding the tooth socket.
   • After the tooth has been well luxated, it is delivered from the socket in a labial-incisal direction with labial tractional forces.

Specific techniques for removal of each tooth

3. Maxillary premolars and molars:
   • Buccal pressures should be greater than palatal pressures.
   • Any rotational force should be avoided.
   • Final delivery of the tooth from the tooth socket is with tractional force in the occlusal direction and slightly buccal.
Specific techniques for removal of each tooth

5. Mandibular anterior teeth:
   • The forceps beaks are positioned on the teeth and seated apically with strong force.
   • The extraction movements are generally in the labial and lingual directions.
   • The tooth is removed from the socket with tractional forces in a labial-incisal direction.

Specific techniques for removal of each tooth

6. Mandibular premolars:
   • The roots tend to be straight and conical.
   • The forceps are apically forced as far as possible.
   • The basic movements being toward the buccal aspect, returning to the lingual aspect, and, finally, rotating.
   • The tooth is then delivered in the occluso-buccal direction.
Specific techniques for removal of each tooth

7. Mandibular molars:

- The forceps are seated as far apically as possible.
- Luxation of molar is begun with strong buccal and lingual pressure.
- The tooth is delivered in buccoocclusal direction.
- The lingual alveolar bone around the second molar is thinner than the buccal plate, so the second molar can be removed more easily with stronger lingual than buccal pressures.
- The third molar is delivered in the linguoocclusal direction.
- The dentist should give serious consideration to using the straight elevator to achieve a moderate degree of luxation before applying the forceps.

Order of extraction

- First is usually maxillary teeth as they get anesthetized earlier and prevents fall of enamel or amalgam/debris into mandibular socket
- Most posterior teeth is extracted first
- the following order is recommended:
  (1) Maxillary posterior teeth, leaving the first molar.
  (2) Maxillary anterior teeth, leaving the canine.
  (3) Maxillary first molar.
  (4) Maxillary canine.
  (5) Mandibular posterior teeth, leaving the first molar.
  (6) Mandibular anterior teeth, leaving the canine.
  (7) Mandibular first molar.
  (8) Mandibular canine.
**Post-extraction tooth socket care**

1. The socket should be debrided only if:
   a) A periapical lesion is visible on the preoperative radiograph and there was no granuloma attached to the tooth when it was removed, the periapical region should be carefully curetted with a periapical curette to remove the granuloma or cyst.
   b) Any debris is obvious, such as calculus, amalgam, or tooth fragment remaining in the socket, it should be gently removed with a curette or suction tip.
2. The expanded buccolingual plates should be compressed by finger pressure back to their original configuration.
3. The bone should be palpated through the overlying mucosa to check for any sharp, bony projections. If any exist, the mucosa should be reflected and the sharp edges smoothed judiciously with a bone file or trimmed with a rongeur forceps.

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**Post-extraction instructions**

1. **Bleeding**:
   - Bite firmly on gauze pack for 30-45 minutes.
   - In case bleeding continues, another gauze is placed over the wound for a further hour.
   - Do not spit or suck through a straw.
   - Do not smoke for 12hrs because this will promote bleeding & interfere with healing.
2. **Discomfort and Pain**:  
   - Some discomfort is normal after surgery. It can be controlled but not eliminated by taking the painkiller (but not salicylates, aspirin), every 4 h, for as long as the pain persists. e.g. Paracetamol 500mg tab.
3. **Diet**:
   - The patient’s diet on the day of the surgical procedure must consist of cold, liquid foods (pudding, yogourt, milk, cold soupe, orange juice, etc.).
Post-extraction instructions

4. **Oral hygiene:**
   - Do not rinse your mouth for the first 24hr after surgery.
   - After that rinse gently with warm salt water 3 times a day for 3-4 days.
   - Brush your teeth gently but avoid the area of surgery.

5. **Swelling:**
   - Swelling after surgery is a normal body reaction reaches its maximum about 48 hr after surgery & usually lasts for 4-6 days.
   - Applying ice packs wrapped in towel over the area of surgery for the 10-15 min at a time, and repeated every half hour, for at least 4-6h

6. **Rest:**
   - Avoid strenuous activity for 12hr after your surgery.

7. **Medication:**
   - Take regular medication prescribed.

8. **Stiffness:**
   - After surgery you may experience jaw muscle stiffness & limited opening of your mouth. This is normal & will improve in 5-10 days.

9. **Call office if emergency.**
Extraction of Single-Rooted Teeth with Destroyed Crown

• This is accomplished with the help of the straight elevator.
• The blade of the elevator is seated between the root and alveolar bone (perpendicular or at an angle), with the concave surface of the blade in contact with the mesial or distal surface of the root.
• Using the alveolar bone as a fulcrum, rotational forces are applied around the axis of the elevator, in the mesial and distal area, resulting in displacement of the root and elevation from the socket.

Extraction of Root Tips

Diagrammatic illustrations showing luxation of the root tip of the mandibular second premolar, using apico elevators

Removal of the root tip using an endodontic file. After the endodontic file enters the root canal, the root tip is drawn upwards by hand (a), or with a needle holder (b)
Extraction of Multi-Rooted Teeth with Destroyed Crown

• If the roots are above the alveolar bone, the roots are sectioned and separated after creating a deep perpendicular buccolingual groove using a fissure bur, which reaches the intraradicular bone.
• The roots are then removed separately one at a time, using either root tip forceps or an elevator.

Policy for leaving root fragments

These conditions must exist for a tooth root to be left in the alveolar process:
1. Root fragment must be small, not more than 4-5 mm in length.
2. It must be deeply embedded in bone, to prevent subsequent bone resorption from exposing tooth root & interfering with prosthesis.
3. The tooth involved must not be infected, and there must be no radiolucency around the root apex.
4. When the risk of surgery is greater than the benefits such as:
   – Removal causes excessive destruction of surrounding tissue.
   – Endangers vital structures like inferior alveolar nerve.
   – There are chances of displacing root into tissue spaces or into maxillary sinus.

Patient must be informed about the judgment and consent must be obtained.
Trans-alveolar extraction

Indications:
1. Any tooth which resists attempt at closed extraction.
2. Heavy/dense bone, short clinical crown due to attrition.
3. Hypercementosed, ankylosed & dilacerated roots.
4. Impacted tooth.
5. Retained fractured tooth/roots which cannot be grasped with forceps or removed by elevators.
6. Roots in close proximity with vital structures like nerve or sinus.
7. Grossly destructed, heavily restored, Root canal treated teeth
8. Prosthetic considerations.

Procedure

1. Anesthesia-LA or GA.
2. Flap design and incision.
3. Elevation of mucoperiosteal flap.
5. Division of tooth if required.
7. Control of bleeding.
8. Alveoloplasty if required.
9. Irrigation of the alveolar socket.
10. Suturing of the flap.
Mucoperiosteal Flap  
(Principles of flap design)

The term local flap indicates a section of soft tissue that

1. Is outlined by a surgical incision
2. Carries its own blood supply
3. Allows surgical access to underlying tissues
4. Can be replaced in the original position
5. Can be maintained with sutures and is expected to heal

• The base of the flap (away from the teeth) should be wider than the apex (tip, teeth region), and the sides of the flap should converge moving from base to the apex.

• The length of the flap preferably to be not more than twice the width.

• Must be of adequate size to provide access & visibility.

• Long, straight incision over intact bone full thickness flap 6-8mm away from bony defect to prevent collapsing of flap into it.

• Preserve vital structures (e.g. lingual n., mental n., buccal a., greater palatine a.).

• Releasing incisions are used only when necessary and not routinely. Envelope incisions usually provide the adequate visualization required for tooth extraction in most areas.

• Vertical releasing incision is oblique incision which cross free gingival margin at line angle of tooth and not on facial aspect or papilla.
Mucoperiosteal Flap
(Principles of flap design)

- **A,** Flap must have base that is broader than free gingival margin. **B,** If flap is too narrow at its base, the blood supply may be inadequate, which can lead to flap necrosis.

- **A,** To have sufficient access to root of second premolar, envelope flap should extend anteriorly, mesial to canine, and posteriorly, distal to first molar. **B,** If releasing incision (i.e., three cornered flap) is used, flap extends mesial to first premolar.

Mucoperiosteal Flap
(Principles of flap design)

- **A,** When designing flap, it is necessary to anticipate how much bone will be removed so that after surgery is complete, the incision rests over sound bone.

- **A,** Correct position for end of vertical releasing incision is at line angle (mesiobuccal angle in this figure) of tooth. **B,** These two incisions are made incorrectly: (1) incision crosses prominence over canine tooth, which increases risk of delayed healing; incision through papilla results in unnecessary damage; (2) incision crosses attached gingiva directly over facial aspect of tooth, which is likely to result in soft tissue defect and periodontal and aesthetic deformities.
Types of mucoperiosteal flaps

1. **Envelope flap**: In this type of flap, only sulcular incisions are given and mucoperiosteal flap is raised.

2. **Three cornered/triangular flap/2 sided flap**: In this type of flap, in addition to the sulcular incisions, one release incision usually anteriorly is given, such that the flap has two sides and three angles.

3. **Four cornered/3 sided Trapezoidal flap**: In this flap there are two releasing incisions in addition to the sulcular incisions. Thus this flap has four angles and 3 sides.

4. **Semilunar flap**: To approach root apex and avoids trauma to papilla & gingival margin but provides limited access because the entire root of the tooth is not visible. This incision is most useful for periapical surgery of a limited extent.

5. **Y-Incision**: is useful on palate for adequate access to remove a palatal torus. Two anterior limbs serve as releasing incisions to provide greater access.
Developing a mucoperiosteal flap

- No.15 blade is used on a no.3 scalpel handle and held in a pen grasp.
- When making an incision, the operator should start posteriorly, working towards the front of the flap. For sulcular incisions, the blade is placed vertically into the gingival sulcus, following the shape of the tooth, keeping the sharp edge of the blade against the tooth surface to prevent unnecessary damage to gingiva.
- The interdental papilla should be preserved, this allows the flap to be easily repositioned to its original position and therefore provides good aesthetics.

Developing a mucoperiosteal flap

- When making the releasing incision, the operator’s supporting hand should retract the cheek to exert tension on the mucosa to ensure the blade runs cleanly through the tissues. Once the tissue has been tensed, the incision is made in a single smooth stroke.
- Incisions should be made at right angles to the tissue and must be straight down to bone.
- Start reflecting from papilla using sharp end of no.9 molt periosteal elevator carried out in pushing stroke, posteriorly and apically.
- Once the flap is reflected, the flap is held with a retractor resting firmly on sound bone (e.g. Austin retractor).
Bone removal

- Bone removal must be limited and carried out with dental burs or chisel with hand or mallet pressure

**CHISEL & MALLET:**
- Performed mainly under G.A (due to patient’s fear)
- Quicker and cleaner
- Maxillary buccal and lingual plates can be removed
- Limiting cuts are placed vertically and then joined by horizontal cut
- If force is not controlled it might lead to fracture of basal bone or adjacent teeth

**DENTAL BURS:**
- Round burs are preferred over straight fissure for bone removal because they are faster and cooling is easier.

Techniques of bone removal

- Flap must be held away from the site with a retractor
- Bur must not be allowed to overheat during bone removal, frequent irrigations with sterile normal saline should be used to prevent this and also removes debris and prevent bur from clogging.
- Bone might be removed by:
  1. **Guttering of buccal bone:** A trough created between bone and tooth on buccal and/or mesial or distal aspect and height of alveolus is maintained.
  2. **Postage stamp method:** Buccal cortical bone is removed up to 1/3rd height of root.
Tooth sectioning
(Odontectomy)

• Fragments can be removed easily one by one, we can section crown from root, separate cusps, separate roots or perform a combination.

• Splitting of roots better with burs because of definite control over splitting, although it is more time consuming.

• Creation of space by bur: If space is not created between divergent roots they will still impact against each other on elevation.
Tooth sectioning
(Odontectomy)

Indications of odontectomy

1. Hypercementosis
2. Divergent and dilacerated roots
3. Teeth with post crowns
4. Extensively decayed teeth
5. Root canal treated teeth
6. Thick dense buccal/labial cortex
7. Thin mandible
8. Hollow maxillary tuberosity
9. Malposed, impacted & supernumerary teeth
10. Ankylosed roots
11. When customary force fail to produce luxation.
Flap reposition and suturing

- **A.** To make the suturing of the three-cornered flap easier, a periosteal elevator is used to elevate a small amount of fixed tissue so that suture can be passed through the entire thickness of the mucoperiosteum.

- **B.** When the three-cornered flap is repositioned, the first suture is placed at the occlusal end of the vertical-releasing incision (1).

- The papillae are then sutured sequentially (2, 3), and finally, if necessary, the superior aspect of the releasing incision is sutured (4).
Complications of exodontia

A- Immediate or operative complications.
B- Delayed or postoperative complications.

A- Immediate or operative complications

1. Failure secure local anesthesia
2. Failure to move the tooth with either forceps or elevator.
3. Fracture of the crown of tooth being extracted
4. Fracture of the roots of tooth being extracted
5. Fracture of the alveolar bone.
6. Fracture of the maxillary tuberosity.
7. Fracture of the adjacent/opposing tooth.
8. Fracture of the mandible.
9. Fracture or dislodgment of an adjacent restoration
10. Dislocation of the mandible.
A- Immediate or operative complications

11. Loosening or extraction of an adjacent tooth.
12. Extraction of or injury to an unerupted tooth.
13. Displacement of a root into soft tissue.
14. Displacement of a tooth or root into the maxillary sinus or opening of maxillary sinus.
15. Primary hemorrhage.
16. Damage to gingiva, tongue, lips, cheek, palate and floor of the mouth.
17. Damage to inferior alveolar nerve or its branches
18. Damage to lingual nerve.
20. Extraction of the wrong tooth

B-Delayed complications

“postoperative complications”

1. Hemorrhage.
2. Dry socket.
3. Postoperative swelling due to:
   a. Oedema
   b. Hematoma formation
   c. Infection
4. Trismus.
5. Acute osteomyelitis.
6. Traumatic arthritis of the TMJ
Fracture of the teeth

• Causes:
  1. Excessive force applied to the tooth
  2. A tooth weakened by caries or large restorations.
  3. Endodontically treated teeth.
  4. Inappropriate application of force resulting from failure to grasp enough of the root mass or using forceps with blades too wide to make two point contacts on the root
  5. Haste due to impatience or frustration
  6. Unfavourable root anatomy.

• Management:
  • If the tooth is fractured near the neck, it may be removed with forceps.
  • In multi-rooted teeth it may be removed with forceps-elevator-or by open method.

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Dr. Rafik Alkowafi
Fracture of the alveolar process

- This occurs when the extraction is difficult. The fractured bone can be removed with the tooth or remain attached to the periosteum.
- If the bone is attached to the periosteum, it should be replaced in its position by one or two sutures through the gingival margins.

Fracture of maxillary tuberosity

- Occurs usually during extraction of the upper second and third molars.
- Causes:
  1. Ankylosed tooth.
  2. Malposed tooth.
  3. Prominent tuberosity.
  4. Isolated tooth.
  5. Divergent or hypercementosed roots.
Fracture of the tuberosity of the maxilla

- If this occurs, the operator finds himself grasping a large segment of detached bone. Extraction should not be continued as it may cause fracture of the tuberosity, lacerated soft tissues, opening of the antrum and profuse bleeding.

Management

- Small fragments: Removed by raising a buccal flap & then dissecting the bone free from any remaining soft tissue, tooth & bone fragment are then removed together.
- Large segment: abandon the Ext., splint the tooth being extracted to adjacent teeth and defer the extraction for 6 to 8 weeks, allowing time for the bone to heal. The tooth is then extracted with an open surgical technique.

Fracture of the tuberosity of the maxilla

- Tuberosity removed with maxillary third molar, which eliminates important prosthetic retention area and exposes maxillary sinus. A, Buccal view of bone removed with tooth. B, Superior view, looking onto sinus floor, which was removed with tooth.
Dislocation of the mandible

• It is the dislodgement of condyle from the glenoid fossa. One or both joints may be dislocated as a result of using too much pressure.

• The symptoms:
  • The patient can not close his mouth.
  • A depression is visible anterior to the ear.
  • If the dislocation is unilateral the jaw is deviated towards the normal side.

Dislocation of the mandible

Treatment

• Dislocations should be reduced as soon as possible. This reduction is accomplished by applying downward pressure on the posterior teeth and upward pressure on the chin, accompanied by posterior displacement of the mandible.

• After reduction the patient should be instructed to restrict mandibular opening for 2 to 4 weeks.

• Moist heat and nonsteroidal antiinflammatory drugs (NSAIDs) are also helpful in controlling pain and inflammation.
Dislocation of the mandible

Fracture of the mandible

- A fracture is a break in the continuity of the bone. It is uncommon complication but it has occurred. The common sites are in the premolar region and the angle of the jaw.

Causes:
- Excessive force.
- Senile osteoporosis.
- Atrophic mandible.
- Irradiated mandible.
- Osteomyelitis.
- Fibrous dysplasia.
- Unerupted teeth, cyst or tumors.

Management
- Stop extraction and bandage should be applied.
- Referred the case to specialist in oral surgery center.
Loosening or extraction of an adjacent tooth

- **Causes**
  - Hasty or ill directed extraction movements.
  - Using the tooth as a fulcrum during application of elevator.
  - Lack of vision if an excess of blood is allowed to accumulate.
  - In cases of fusion of two teeth.

- **Management**
  - The luxated tooth should be forced back into normal position by heavy thumb pressure and splinted for 1-2 weeks.
  - If completely extracted: Immediate repositioning of the extracted tooth and splinting to the adjacent teeth. Relief the replant tooth from the bite by selective grinding of The opposing teeth. Proper postoperative instructions and follow up.

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Extraction of or injury to an unerupted tooth

- This complication may occur as a result of pushing the beaks of the forceps very deep when extracting a deciduous tooth thus holding it with its permanent successor.

- **Management:**
  - The permanent tooth bud should be repositioned in its place and the mucosa should be sutured over it.
Damage to the soft tissues
(Gingiva, lips, cheek, floor of the mouth)

• As a result of slipping or misapplication of the instruments. Also in some cases the gingiva may adhere to the tooth.

• Management:
  • The tooth should be carefully dissected from the gingiva by periosteal elevator, scalpel or scissor.
  • The lacerated tissue should be sutured back in its place.

Injury to the inferior dental canal

Causes
• Proximity of the root to the inferior dental nerve.
• Careless curettage and blind use of elevators to remove root apices.

Signs and symptoms
• Usually the injury to the inferior dental nerve accompanied by injury to the neurovascular bundle & causes sudden severe bleeding.
• Numbness and parasthesia of half of lower lip and chin.

Management
• Control bleeding.
• The nerve usually regenerates within six weeks to six months.
Displacement of a tooth or root into the surrounding soft tissues

- This is a rare but potentially serious complication. The tooth or part of it may be lost under a mucoperiosteal flap into the lingual pouch through the thin lingual cortex of bone or into the submandibular space during extraction of lower third molars, or into the infratemporal fossa around the back of the maxillary tuberosity from the upper molar region.
- It is usually can not be reached easily by intra oral approach and should be removed through an extra-oral approach under G.A. by the oral surgeon.

Oroantral communication

- **Causes**
  1. During extraction of maxillary teeth 5,6,7,8 and occasionally during exo. of 3,4
  2. removal of fractured roots of upper posterior teeth.
  3. Apical infection and other pathological processes favor perforation because the bone completely destroyed e.g. Osteomyritis, tumor, cyst, granuloma.
  4. Sinus approximation.
- **Signs and Symptoms**
  1. The patient will fail to blow air into the nose while holding the nostrils together, as air will escape through the extraction wound.
  2. Bleeding comes from the site of perforation and from the nose (epistaxis).
  3. Alteration of voice.
  4. Inability to blow-out the cheek.
  5. Regurgitation of liquids from the mouth into the nose.
Oroantral communication

• If the root or tooth has been forced into the antrum, there are several tricks to remove the roots from the sinus.
  1. Ask the patient to blow with the nostrils closed while the perforation is carefully washed for the appearance of the root.
  2. The use of suction tip in the socket may aid in the removal.

3. Mucoperiosteal flap is prepared on the buccal surfaces after enlarging the perforation to give sufficient access and the root can be seen & removed by instrument.

4. In other cases a caldwell-luc operation is necessary.
• After removal of the root or tooth from the sinus, the perforation of the sinus (oroantral communication OAC) should be closed by:
  • Buccal advanced Mucoperiosteal Flap.
  • Palatal flap.
  • Combination of buccal & palatal flap.
  • Buccal pad of fat.
Oroantral communication

Post operative instructions
1. Maintenance of a pressure pack on the wound for at least six hours.
2. Any suction, such as occurs when drinking from a straw, blowing the nose must be through the mouth.
3. Ephedrine nasal drops should be prescribed to insure proper drainage.
4. Antibiotic therapy as a prophylactic measure against infection.
5. The patient should be instructed to return in 48 hours for follow up.
Hemorrhage

- Is the escape of blood outside the vascular system.

- **Types**
  
  A. **External**: If blood escaped outside the body.
  
  B. **Internal**: If blood escaped inside the body cavities.
     
     - e.g. Peritoneal or pleural cavities.
     
     - e.g. Submandibular or sublingual spaces
Hemorrhage

- The common type of hemorrhage in oral cavity is the external one. Also the hemorrhage may be:
  a. Arterial.
  b. Venous.
  c. Capillary.
- Also the hemorrhage may be
  a. Primary: Occurs at the time of operation.
  b. Intermediate or reactionary: Occurs within 24 h after operation.
  c. Secondary: Occurs at any time after 24 h up to 14 days.
- Intermediate hemorrhage may be due to loose tie. The secondary hemorrhage may be due to disintegration of the blood clot by infection.

Normal Mechanism of Hemostasis

1. VASCULAR PHASE
   Vasoconstriction When a blood vessel is damaged
2. PLATELET PHASE
   Platelets adhere to the damaged surface and form a temporary plug.
3. COAGULATION PHASE
   Through two separate pathways, the Intrinsic and Extrinsic, the conversion of fibrinogen to fibrin is complete. Fibrin tightly binds the platelets to form a clot
4. FIBRINOLYTIC PHASE
THE CLOTTING MECHANISM

INTRINSIC
- Collagen
- XII
- XI
- IX
- VIII

EXTRINSIC
- Tissue Thromboplastin
- VII

PROTHROMBIN (II) → THROMBIN (III) → FIBRINOGEN → FIBRIN

Clot
Hemorrhage in Oral Surgery

- Hemorrhage following Oral Surgical procedures can occur due to local or systemic causes.
- In healthy patients the postoperative bleeding is mainly due to local causes.
- Local causes of hemorrhage originate in either soft tissue or bone.

Local Causes-Soft Tissue

- Soft tissue bleeding is either arterial, venous, or capillary in nature.
- Arterial bleeding is bright red and spurring in nature. (greater palatine artery, buccal artery, facial artery)
- Venous blood is dark red in color and flows steadily and heavily especially if the vein is large.
- Capillary bleeding is bright red in color and is more of a minimal ooze.
- Bleeding from soft tissues may results from:
  1. Laceration.
  2. Failure of the blood clot to form on the top of severed vessels. E.g. Root in the socket.
  3. Presence of acute infection.
Local Causes - Osseous (Bony)

• Troublesome bone bleeding originates either from nutrient canals in the alveolar region, central vessels, such as the inferior alveolar artery, or from central vascular lesions (Hemangioma or Vascular malformation)

Systemic Causes

1. Vascular disorders, which are due to alterations of the vascular wall, especially of the capillaries. These include hereditary hemorrhagic telangiectasia and von Willebrand disease.
Systemic Causes

2. Thrombocytic disorders: Patient with thrombocytopenia (decreased platelet count), Leukemia e.t.c., or patients taking Antiplatelet Drugs are also at risk of prolonged bleeding after surgery.

Systemic Causes

3. Disorders of coagulation, either due to deficiency of certain coagulation factors (Hemophilias, Liver Diseases) or taking oral anticoagulants.
Anticoagulants

• heparin and Low molecular weight Heparin (LMWH)
  Dalteparin (Fragmin), enoxaparin (Lovenox, Clexane), Nadroparin Fraxiparin.
• Coumarin (Warfarin). Oral, 5-7 mg/day for 3-6 months. Rx for PE, DVT, Prevention of recurrent MI
Antiplatelet Drugs

- Antiplatelet treatment has been reported to reduce overall mortality from vascular disease by 15% and to reduce nonfatal vascular complications by 30%.
- Aspirin: Oral, 75 to 325 mg once per day
- Aspirin plus dipyridamole (Persantin, Aggrenox) 50 + 200 mg bds
- Clopidogrel (Plavix) 75mg once daily.

Laboratory Evaluation

* PLATELET COUNT (CBC)
  140,000-400,000/mm
* BLEEDING TIME (BT) 2-8 min
* PROTHROMBIN TIME (PT) and INR
  11-15 seconds (INR = 1)
* PARTIAL THROMBOPLASTIN TIME (PTT)
  25-35 seconds
* THROMBIN TIME (TT)
  9-13 seconds
* PFA-100 (< 175 seconds)
Detection of the Patient (Who is Bleeder)

1. History
   a. Bleeding problems in relatives
   b. Bleeding problems after operations and tooth extractions
   c. Bleeding problems after trauma (cuts, etc.)
   d. Medications that may cause bleeding problems
      (1) Aspirin
      (2) Anticoagulants
      (3) Long-term antibiotic therapy
      (4) Certain herbal preparations
   e. Presence of illnesses that may have associated bleeding problems
      (1) Leukemia
      (2) Liver disease
      (3) Hemophilia
      (4) Congenital heart disease
      (5) Renal disease—uremia
   f. Spontaneous bleeding from nose, mouth, ears, etc.

Cont....

2. Examination findings
   a. Jaundice, pallor
   b. Spider anacomas
   c. Ecchymoses
   d. Petechiae
   e. Oral ulcers
   f. Hyperplastic gingival tissues
   g. Hemarthrosis

3. Screening laboratory tests
   a. PT
   b. aPTT
   c. TT
   d. PFA-100
   e. Platelet count

4. Surgical procedure—excessive bleeding after surgery may be first due to underlying bleeding problem
Management of Primary Hemorrhage

The management of bleeding during surgery (Primary bleeding) can be achieved by the following means,

(i) Use of pressure pack to achieve hemostasis.
(ii) Securing / ligation of blood vessels with sutures.
(iii) Use of electrocautery to achieve hemostasis.
(iv) Use of hemostatic agents like bone wax, surgicel, gelfoam, collagen plugs, tranexamic acid 5%.
(v) Hypotensive anaesthesia (G.A) and use of vasoconstrictors in L.A.

Local Measures: Pressure with oral packs
Local Measures: Suturing & Ligation

Suturing

Ligation

Electrocautery
Local Measures: Bone Wax

Local Measures: Surgicel (Oxidised Regenerated Cellulose)
Local measures: Gelfoam with activated thrombin

Local Measures: Etik Collagen (Packed collagen)
Local Measures: Tranexamic acid 5%

Dry socket

- Also called as:
  - Alveolar osteitis
  - Alveolalgia
  - Alveolitis sicca dolorosa
  - Post operative osteitis
  - Localised acute alveolar osteomyelitis
  - Fibrinolytic alveolitis
  - Painful socket
  - Necrotic socket alveolitis
Dry socket

• Dry socket or alveolar osteitis is delayed healing but it is not associated with an infection.
• This clinical entity is a localized osteitis involving either the whole or a part of the condensed bone lining of a tooth socket.
• More generally seen under local anesthesia than general anesthesia. Mandible is more frequently affected than maxilla.
• The occurrence of a dry socket after a routine tooth extraction is rare (2% of extractions), but it is frequent after the removal of impacted mandibular third molars and other lower molars (20% of extractions in some studies).

Dry socket

Symptoms:
1. Dull, aching, throbbing pain in the area of the socket, which is moderate to severe and may radiate to other parts of the head such as the ear, temple and neck.
2. The pain normally starts on the 2 to 4 day after the extraction, and may last 10-40 days. The pain may be so strong that even strong analgesics do not relieve it.
3. Intraoral halitosis (oral malodor).
4. Bad taste in the mouth.

Signs:
1. An empty socket, which is partially or totally devoid of blood clot.
2. Exposed bone walls which are extremely painful and sensitive to touch.
3. Inflamed surrounding soft tissues.
Etiology

1. Infection of the socket occurring before or during or after extraction.
2. Traumatic extraction.
3. Vasoconstrictor in local anesthetic solution may predispose to ‘dry socket’ by interfering with the blood supply of the bone.
4. Impaired blood supply due to dense bone and decreased vascularity (e.g. in the mandible).
5. Oral contraceptives (estrogen) will increase the fibrinolytic activity and increase the incidence of dry socket.

6. Osteosclerotic disease of bones as seen in Paget disease.
7. Radiotherapy causes endarteritis and ischemia of the bone or osteomyelitis.
8. Generalised debilitating conditions.
   - diabetes mellitus
   - malnutrition
   - immune deficiency
   - hypertension
9. Loss of clot due to sucking or vigorous and constant mouth rinsing.
**Etiology**

10. Smoking
11. Excessive curettage of the socket after extraction.
13. Oral anaerobic bacteria 'Treponema denticola' which is a normal inhabitant of oral cavity has fibrinolytic activity. The enzymes produced by this microorganism have a plasmin like activity leading to breakdown of the clot.

**Prevention**

- The tooth should be scaled and gingival inflammation treated at least 1 week before the extraction of teeth.
- Rinsing with chlorhexidine (0.2%) or placing chlorhexidine gel (0.2%) in the sockets of extracted teeth reduces the frequency of dry socket.
- Minimum amount of local anesthetic solution necessary should be administered.
- The teeth should be removed atraumatically as possible.
Management of dry socket

• L.A
• Socket should be irrigated with warm normal saline and all degenerated blood clot should be removed.
• Sharp bony spurs-excised with rounger forceps, bone file or smoothed with wheel stone.
• The socket should not be curetted down to bare bone because this increases the amount of exposed bone and pain.
• A small strip of iodoform gauze soaked with the medication is inserted into the socket.

Management of dry socket

• Examples of medicated dressings include antibacterials, topical anesthetics and obtundants, or combinations of all three, e.g. zincoxide and eugenol impregnated cotton pellets, alvogyl (eugenol, iodoform and butamen), dentalone, bismuth subnitrate and iodoform paste (BIPP) on ribbon gauze and metronidazole and lidocaine ointment, Whitehead’s varnish (iodoform, benzoin, prepared storax, balsam of tolu and solvent ether).
Management of dry socket

- The dressing is changed every other day for the next 3 to 6 days, depending on the severity of the pain.
- The socket is gently irrigated with saline at each dressing change.
- Once the patient's pain decreases, the dressing should not be replaced, because it acts as a foreign body and further prolongs wound healing.

Post-operative swelling

- It is common after extensive surgical interference “open-method”. Cold applications to the face will prevent or reduce swelling. Analgesics are used for relief of pain.
Trismus

- It is defined as inability to open the mouth due to muscle spasm.
- **Causes:**
  1. Oedema.
  2. Haematoma formation.
  3. Spread of the infection from the extraction site into the masticatory muscles (mainly masseter and medial pterygoid).
  4. Infection due to contaminated needle “mandibular block”.
- **Treatment**
  1. Application of intra-oral heat by means of shortwave diathermy or the use of warm saline mouth-baths
  2. Antibiotics and analgesic.

Osteomyelitis

- It is an extensive infection involving the bone, bone marrow and periosteum and affects a large area of the bone.
- **Clinical picture**
  1. Intense penetrating bone pain.
  2. Anesthesia of the lower lip
  3. Pus may be seen.
  4. General malaise
  5. Swelling and tenderness.
  6. In chronic cases there is sinus tracks or fistulas draining pus. Sequestration which is the separation of necrotic dead bone by osteoclastic activity.
Osteomylitis

- The sequestration occurs with Staph infection which cause bone resorption, also there is a subperiosteal new bone formation which is the body defense mechanism “involucrum”.
- X-ray: irregular radio-opaque lesion surrounded by radiolucent line.
- Treatment
  1. Intra bony drainage.
  2. Removal of sequestra (sequestrectomy).
  3. Antibiotics and analgesic.

Traumatic arthritis of the TMJ

- It complicates difficult extractions if the lower jaw is not supported.
- Clinical features:
  1. TMJ pain and tenderness
  2. Limitation of jaw movement
- Prevention:
  - The operator should use his left hand correctly and the assistant support the mandible by holding it under the angles.
  - If it is known that the patient has a history of a previous dislocation of the temporomandibular joint it is a wise precaution to get him to hold a rubber bite block tightly between his teeth on the contralateral side during a dental extraction.