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قسم جراحة الفم

Complication of Surgical Tooth Extraction

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Introduction:

The extraction itself is accomplished in two stages. During the first stage, the tooth is separated from the soft tissues surrounding it using a desmotome or elevator; during the second stage, the tooth is elevated from the socket using forceps or an elevator.

INDICATIONS FOR REMOVAL OF TEETH:

- Caries
- Pulpal Necrosis
- Periodontal Disease
- Orthodontic Reasons
- Malposed Teeth
- Cracked Teeth
- Impacted Teeth
- Supernumerary Teeth
- Teeth Associated with Pathologic Lesions
- Teeth Involved in Jaw Fractures
- Financial Issues.

CLINICAL EVALUATION OF TEETH FOR REMOVAL:

- Access to the Tooth
- Mobility of the Tooth
- Condition of the Crown.

RADIOGRAPHIC EXAMINATION OF THE TOOTH FOR REMOVAL :

It is essential that proper radiographs be taken of any tooth to be removed. In general, 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. The mounting should be labeled with the patient's name and the date on which the film was exposed. Radiographs that are taken, but not available during surgery, are of limited value. The relationship of the tooth to be extracted to adjacent erupted and unerupted teeth should be noted. If the tooth is a primary tooth, the relationship of its roots to the underlying succedaneous tooth should be carefully considered. The extraction of a primary tooth can possibly injure or dislodge the underlying tooth. If surgical removal of a root or part of a root is necessary, the relationship of the root structures of adjacent teeth must be known. Bone removal should be performed judiciously whenever it is necessary, but it is particularly important to be careful if adjacent roots are close to the root being removed.

The main indications for performing a surgical extraction are :

1. Teeth of the maxilla or mandible that present unusual root morphology .In such cases, a surgical extraction is performed preventively, because their removal is impossible with the simple technique without complications arising (e.g., root breaking, fracture of alveolar bone, etc.).

2. Teeth with hypercementosis of root and root tip, presenting large bulbous roots

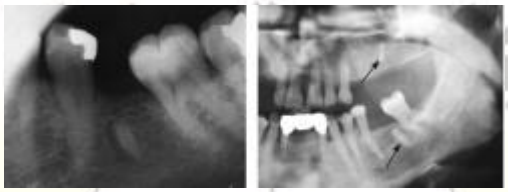
3. Teeth with dilaceration of root tips .
4. Teeth with ankylosed roots or with abnormalities, e.g., dens in dente
5. -Impacted and semi-impacted teeth .The extraction of these teeth is accomplished employing a surgical technique, depending on the type and localization of the impacted or semi-impacted tooth.

6. Teeth fused with an adjacent tooth or teeth fused with an adjacent tooth in the apical area.If extraction were to be attempted using the simple technique in these unusual cases, then part of the alveolar process could be fractured or removed together with the teeth.

7. Broken root tips that have remained in the alveolar bone and are involved in osteolytic lesions, or are in such a position that, in the case of denture placement, they could create problems in the future.

8. Maxillary posterior teeth, whose roots are included in the maxillary sinus .When the maxillary sinus extends as far as the alveolar ridge, the bone found in the posterior area of the maxilla is also weakened. This increases the risk of fracture of the maxillary tuberosity if the extraction involves a firmly anchored tooth (molar), because with the simple technique great forces are generated during its removal.

9. Roots of teeth found below the gum line, when their removal is impossible any other way .



10. Roots with periapical lesions, whose entire removal through the tooth socket would not be possible with curettage alone

11. Deciduous molars whose roots embrace the crown of the subjacent premolar. If the simple extraction technique were to be attempted, there is a great risk of concurrent luxation of the premolar .

12. Posterior teeth with supra eruption. It is well known that when the antagonist is missing, these teeth present supra eruption to a great degree, which is accompanied by the dragging down of the alveolar process. As such, the extraction must be carried out using the surgical technique with concurrent recontouring of the alveolar process of the area

The contraindications for a surgical extraction are as follows:

1. Asymptomatic fractured root tips, whose pulp was vital, located deep in the socket. The extraction of such root tips should not be considered, especially in older patients,when:

    a. There is a risk of serious local complications, such as the dislodging of a root tip intothe maxillary sinus or injury of the inferior alveolar nerve, mental nerve, or lingual nerve.
    b. A large part of the alveolar process needs to be removed.
    c. There are serious health problems present. If a patient with health problems needs to have a surgical extraction, then it must be performed with the cooperation of the treating physician and only if the general status of the patient has improved; the necessary preventive measures must also be taken.

Perioperative Complications :

Fracture of Crown or Luxation of Adjacent Tooth :

The fracture of the crown of an adjacent tooth that presents extensive caries or a large restoration is a common complication during the extraction procedure. Luxation or dislocation

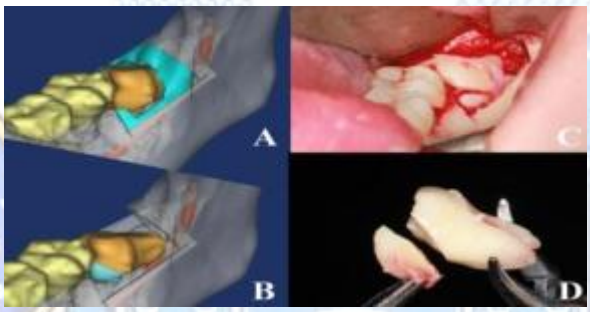
of an adjacent tooth occurs when a great amount of force is exerted during the luxation attempt, particularly when the adjacent tooth is used as a fulcrum. The same complication may arise if care is not taken during the extraction of a deciduous molar. In this case, the forceps may grasp

the crown of the succedaneous permanent premolar together with the deciduous tooth and luxate it as well

when an adjacent tooth is inadvertently luxated or partially avulsed, the tooth is stabilized for approxsmately 40–60 days. If there is still pain during percussion

even after this period, then the tooth must be endodontically treated. If the tooth is dislocated, it must be repositioned and

stabilized for 3–4 weeks.



Soft Tissue Injuries :

Soft tissue injuries are a common complication and most times are due to the inept or inadvertent manipulation of instruments (e.g., slippage of elevator) during the removal of teeth.The areas most often injured are the cheeks, the floor of the mouth, the palate, and the retromolar area . Injury by the eleva tor may also occur at the corner of the mouth and lips because of prolonged and excessive retraction force and pressure during the extraction of posterior maxillary and mandibular teeth, especially when patients have a reduced aperture Treatment. When injuries are small and localized at the region of the cheek, tongue, or lips, then no particular treatment is considered necessary. In certain cases healing is facilitated if the lesion is covered with petrolatum (Vaseline) (e.g., lip injury), or with any other appropriate ointment. This may also lessen the patient's discomfort. When the injury is extensive, though, and there is also hemorrhaging, the surgical procedure must be postponed and the dentist must control the bleeding and proceed with suturing of the wound.

Fracture of Alveolar Process :

This complication may occur if extraction movements are abrupt and awkward, or if there is ankylosis of the tooth in the alveolar process, whereupon part of the labial, buccal, palatal or lingual cortical plate may be removed together with the tooth.

Fracture of the alveolar process occurs most often during the extraction of canines, especially if the bone of the region has become weak due to injury or because of a previous extraction of the lateral incisor or the first premolar. Fracture of the lingual cortical plate is especially significant,because the lingual nerve may also be traumatized .

Treatment: When the broken part of the alveolar process is small and has been reflected from the perosteum, then it is removed with forceps and the sharp edges, if any, of the remaining bone are smoothed . Afterwards, the area is irrigated with saline solution and the wound is sutured. If the broken part of the alveolar process is still attached to the overlying soft tissues, then it may remain after stabilization and suturing of the mucoperiosteum

Fracture of Maxillary Tuberosity :

Fracture of the maxillary tuberosity is a grave complication, which, depending on its extent, may create problems for the retention of a full denture in the future.

This complication may occur during the extraction of a posterior maxillary tooth and is usually due to the following reason:-

a. Weakening of the bone of the maxillary tuberosity,Due to the maxillary sinus pneumatizing into the alveolar process. In this case, risk of fracture is increased if the extraction of a molar is performed with forceful and careless movements.
b. Ankylosis of a maxillary molar that presents great resistance to movements during the extraction at- tempt. An extensive fracture of the buccal bone or the distal bone surrounding the ankylosed tooth may occur
c. Decreased resistance of the bone of the region, due to a semi-impacted or impacted third molar.

Treatment: When the fracture occurs and the fractured segment has not been reflected from the periosteum, it is repositioned and the mucoperiosteum is sutured. In this case, the scheduled extraction of the tooth is postponed, if possible, for approximately 1.5– 2 months, whereupon the fracture will have healed and the extraction may be performed with the surgical technique. If, however, the bone segment has been completely reflected from the tissues and oroantral communication occurs, the tooth is first removed and the bone is then smoothed and the wound is tightly sutured. Broad-spectrum antibiotics and nasal decongestants are then prescribed.

Fracture of Mandible :

Fracture of the mandible is a very unpleasant, but for- tunately rare, complication that is associated almost exclusively with the extraction of impacted mandibular third molars. This may occur during the use of excessive force with the elevator, when an adequate path- way for removal of the impacted tooth has not been created. A fracture may also occur during the extraction of a deeply impacted tooth, of a tooth with firm anchorage, or of an ankylosed tooth, even with small amounts of force applied. This may easily occur when the mandible is atrophic or if the bone has become weak, such as when other impacted teeth are also present, or in the case of extensive edentulous regions and the presence of large pathologic lesions in the area of the tooth to be extracted .

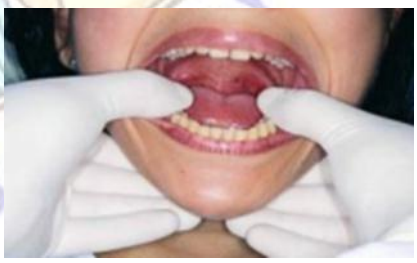
Treatment: When a fracture occurs during the extraction, the tooth must be removed before any other procedure is carried out, in order to avoid infection along the line of the fracture. Afterwards, depending on the case, stabilization by way of intermaxillary fixation or rigid10 internal fixation of the jaw segments is applied for 4–6 weeks and broad-spectrum antibiotics are administered.

Broken Instrument in Tissues :

Breakage of an instrument in the tissues is the result of excessive force during luxation of the tooth and usually involves the end of the blade of various elevators . Also, the anesthesia needle or bur may break during the removal of the bone surrounding the impacted tooth or root . Breakage may be the result of repeated use of the instrument altering its metallic composition(mainly of the bur). In these cases, after precise radiographic localization, the broken pieces are removed surgically at the same time as extraction of the tooth or root.

Dislocation of Temporomandibular Joint :

This complication may occur during a lengthy surgical procedure on patients who present a shallow mandibular fossa of the temporal bone, low anterior articular tubercle, and round head of condylar process. In unilateral dislocation the mandible deviates towards the healthy side , while in bilateral dislocation, the mandible slides forward in a gaping prognathic position. The patient is unable to close their mouth (open bite) and movement is restricted. In order to avoid11 such a complication, the mandible must be firmly supported during an extraction and patients must avoid opening their mouth excessively, especially those with a history of "habitual temporomandibular joint luxation." Treatment. Immediately after the dislocation, the thumbs are placed on the occlusal surfaces of the teeth, while the rest of the fingers surround the body of the mandible right and left . Pressure is then exerted downward with the thumbs and simultaneously upwards and posteriorly with the rest of the fingers, until the condyle is replaced in its original position . After repositioning, the patient must limit any movement of the mandible that may lead to excessive opening of the mouth for a few days. When luxation is habitual, the mandible is often repositioned in its original position spontaneously.



Subcutaneous or submucosal emphysema:

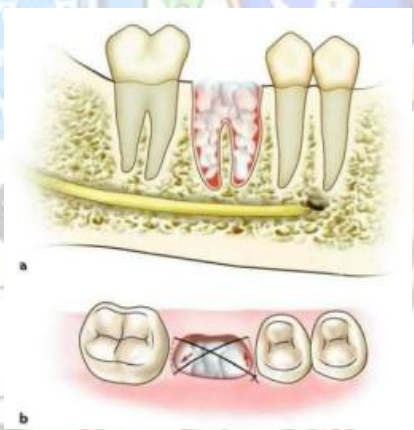
This complication may occur as a result of air entering the loose connective tissue, when an airrotor is used in the surgical procedure for the removal of bone or for sectioning the impacted tooth. Clinically, the region swells, sometimes extending into the neck and facial area, with a characteristic crackling sound during palpation (crepitus). **There is no specific treatment**. It usually subsides spontaneously after 2–4 days. If it is very large in size, paracentesis may help to remove the air. Some people recommend the administration of antibiotics

Hemorrhage:

Hemorrhage is a common complication in oral surgery, and may occur during a simple tooth extraction or during any other surgical procedure. In all cases, hemorrhage may be due to12 trauma of the vessels in the region as well as to problems related to blood coagulation. Profuse hemorrhage may occur as a result of injury or severance of the inferior alveolar vessels or the palatal artery. Severe hemorrhagic diatheses (e.g., hemophilia, etc.) should be ascertained by taking a thorough medical history, and management must be planned before the surgical procedure. Postoperative bleeding in healthy patients may be the result of poor hemostasis of the wound due to insufficient compression, or to inadequate removal of inflammatory and hyperplastic tissue from the surgical field.

Treatment: The main means of arresting bleeding are compression, ligation, suturing, electrocoagulation and the use of various hemostatic agents. Compression aims at causing vasoconstriction and decreasing the permeability of the capillaries, and is achieved by placing gauze over the bleeding site with pressure. Placing pressure by biting on a gauze for 10–30 min over the postextraction wound or other superficial bleeding areas is usually sufficient. If the bleeding does not stop after applying pressure for the aforementioned time, then there is a hemorrhagic problem to a certain degree and blood flow must be arrested, depending on the case. Bone hemorrhage is adequately treated by means of compression of the bone surrounding the vessel, in order to obstruct blood flow. This may be achieved by using a mallet and a small blunt instrument. Sterile bone wax may also be used to arrest bone bleeding, which is placed with pressure inside the bleeding bone cavity. Packing iodoform gauze, which also has antiseptic properties, inside the alveolus may arrest bone bleeding as well. This gauze may remain inside the cavity, depending on the case, for between 10 min and 3–4 days, after which it is removed. Suturing the wound mechanically obstructs the severed end of the bleeding vessel. This technique is used for arresting soft tissue hemorrhage as well as postextraction13 bleeding that is treated with tightly suturing the wound margins. If it is impossible to coapt the wound margins, a gauze pack is placed over the wound, which is stabilized with sutures over the postextraction socket for 2–3 days . Ligation is the most successful way to control soft tissue hemorrhage that involves a large vessel. If, for example, a large vessel is severed during the surgical procedure, a hemostat is used to clamp and ligate the vessel . If a small-sized vessel is bleeding, then a narrow hemostat is used to clamp the bleeding area of the soft tissues, arresting hemorrhage within a few minutes, without ligation of the tissues. Electrocoagulation is based on the coagulation of blood through the application of heat, resulting in the retraction of tissues in a necrotic mass. Hemostatic materials, such as vasoconstrictors (adrenaline), alginic acid, desiccated alum, etc., have proven to be very effective in the control of bleeding. These materials are used to arrest capillary hemorrhage and are used topically over the bleeding area. Other materials are also used, such as fibrin sponge, gelatin sponge, oxidized cellulose, etc.,

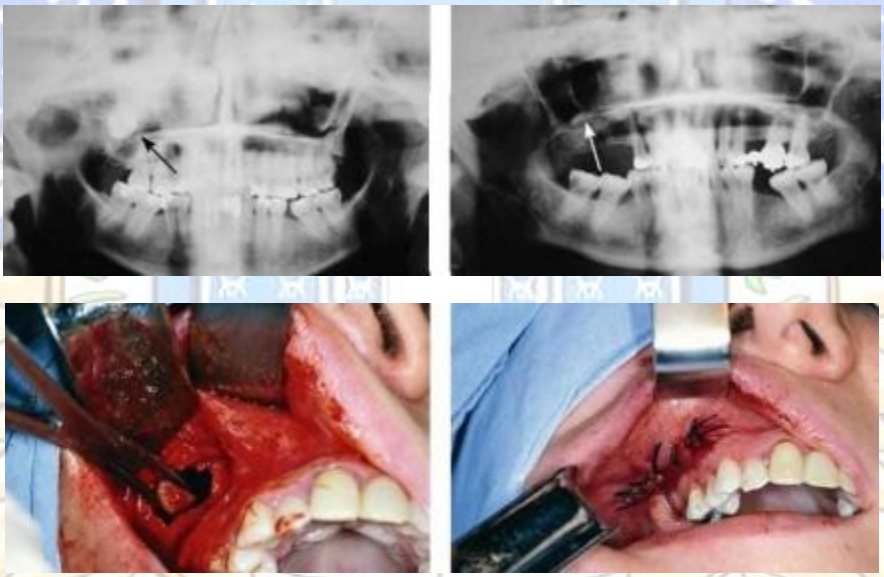
whose hemostatic properties cause blood coagulation by creating a normal blood clot at the severed ends of the bleeding vessels. These materials are suitable only for local application and are used to arrest generalized capillary bleeding, especially to control bleeding of the postextraction alveolus. The procedure for using the hemostatic agents is usually as follows. In the case of a relatively small hemorrhage, which persists despite biting on a gauze pack over the postextraction wound, an absorbable hemostatic sponge is placed inside the alveolus and pressure is applied over the gauze, or the wound margins are sutured with a figure-eight sutureIt is difficult for the dentist alone to control bleeding in patients with a hemorrhagic diathesis. In such cases, after adhering to the specified aforementioned measures, a pressure pack is placed over the wound and the patient is referred to a hospital for more effective treatment (administration of replacement factors, etc.).



Displacement of Root or Root Tip into Soft Tissues:

This complication may occur in the following situations: When the buccal or lingual cortical plate, as well as the root tip region of maxillary posterior teeth is eroded. In this case, the root or root tip may easily be displaced during luxation towards the buccal soft tissues or the floor of the mouth, or between the bone and mucosa of the maxillary sinus, respectively. In the case of perforation of the bone as a result of continuous attempts to remove the root tip, which may be displaced as described above. Treatment. Removal of the root tip, especially from buccal soft

tissues, is not particularly difficult if its exact position has been localized. This localization is achieved with careful palpation of the area suspected of containing the displaced root tip. Displacement of the root tip between bone and the mucosa of the maxillary sinus does not usually require any **treatment:** The root tip usually remains in this position and the patient is given antibiotics. The exact position of the root tip must be verified, though, to make sure that it is not inside the maxillary sinus. If the root tip has been displaced into the floor of the mouth, its exact position must be verified clinically and radiographically, because the area's anatomy complicates the removal procedure.



Displacement of Impacted Tooth, Root, or Root Tip into Maxillary Sinus:

This complication may occur particularly during an attempt to luxate an impacted maxillary third molar, when the impacted tooth is close to the maxillary sinus and the surgical procedure has not been carefully planned . In order to avoid such a complication, exposure of the impacted tooth must be adequate in terms of the extent of the flap and the amount of bone removed, so that the forces exerted during luxation are maximally controlled. A root or root tip (usually the palatal root of a molar) may also be displaced into the maxillary sinus during the removal attempt .

Treatment: If the tooth or root tip cannot be removed with the surgical technique immediately after the complication arises, any attempt to find the tooth or root tip with various instruments must be avoided and the patient should be informed of the situation.Antibiotic treatment and nasal decongestants are also administered, and surgical removal is scheduled. It must be treated as soon as possible, because there is a risk of infection of the maxillary sinus, which usually worsens due to the existing oroantral communication. The exact position of the tooth or root tip must be confirmed with radiographic examination. Removal of the tooth or root from the maxillary sinus is usually achieved with trephination of the maxillary sinus using a Caldwell–Luc or Lindorf approach**.**

Oroantral Communication:

This is a common complication, which may occur during an attempt to extract the maxillary posterior teeth or roots. It is identified easily by the dentist, because the periapical curette enters to a greater depth than normal during debridement of the alveolus, which is explained by its entering the maxillary sinus . Oroantral communication may also be confirmed by observing the passage of air or bubbling of blood from the postextraction alveolus when the patient tries to exhale gently through their nose while their nostrils are pinched (Valsalva test). If the patient exhales through their nose with great pressure, there is a risk of causing oroantral communication, even though communication may not have occurred initially, such as when only the mucosa of the maxillary sinus is present between the alveolus and the antrum.Oroantral communication may be the result of:

1. Displacement of an impacted tooth or root tip into the maxillary sinus during a removal attempt.
2. Closeness of the root tips to the floor of the maxillary sinus. In this case the bony portion above the root tips is very thin or may even be absent, whereupon oroantral communication is inevitable during extraction of the tooth, especially if the alveolus is debrided unnecessarily .
3. The presence of a periapical lesion that has eroded the bone wall of the maxillary sinus floor .

4. Extensive fracture of the maxillary tuberosity (during the extraction of a posterior tooth), whereupon part of the maxillary sinus may be removed together with the maxillary tuberosity.
5. Extensive bone removal for extraction of an impacted tooth or root. Preventive Measures. In order to avoid oroantral communication as well as displacement of an impacted tooth or root into the maxillary sinus, the following preventive measures are recommended: Radiographic examination of the region surrounding the tooth to be extracted Careful manipulations with instruments, especially during the luxation of a root tip of a maxillary posterior tooth Careful debridement of periapical lesions that are close to the maxillary sinus Avoiding luxation of the root tip if visualization of the area is hindered by hemorrhage.

Treatment: The management of oroantral communication depends on its size and when treatment is to be scheduled. For a small-sized oroantral communication, which is perceived immediately after the extraction, treatment consists of suturing the gingiva with a figureeight suture after filling the alveolus with collagen, unless there are enough soft tissues, in which case placement of tight sutures over the wound is preferred. When the soft tissues do not suffice, a small portion of the alveolar bone is removed with a bone rongeur so that the buccal and palatal mucosa can be reapproximated more easily, facilitating closure of the oroantral communication. Infection of the maxillary sinus is thus avoided, and the blood clot is held in place, which will aid in the healing process. The same procedure applies to the closure of larger-sized oroantral communications.

The administration of prophylactic antibiotics is not deemed necessary, unless

the oroantral communication is the result of an extraction of a tooth with acute periapical inflammation, upon which broadspectrum antibiotics must be administered. Nasal decongestants must also be prescribed. The patient is informed of the situation, and given appropriate instructions (e.g., avoiding sneezing, blowing nose), and is rescheduled for examination in 15 days. A large oroantral communication or one that has remained open for 15 days or longer must be treated using other techniques (such as the closure with flap procedure, either immediately or at a later date), which ensure restoration. These techniques are achieved using pedicle mucoperiosteal flaps (buccal, palatal, and bridge flaps) . The technique of immediate closure with a flap procedure is indicated when the sinus is free of disease. In this case, the oroantral fistula is covered, without operating on the antrum also. However, when infection of the maxillary sinus is present, the flap procedure technique is performed together with trephination of the antrum. Oronasal communication may also occur, either labially or palatally . In the first case, the complication may occur especially during the surgical removal of impacted canines with a labial localization, during apicoectomies, etc. In the latter case, the communication occurs during the attempt to remove cysts, palatal exostoses, and deeply impacted canines.

Nerve Injury:

Nerve injury, especially the severance of large nerve branches, is one of the most serious complications that may occur during oral surgical procedures. The most common nerve injuries are of the inferior alveolar, mental, and lingual nerves. Nerve trauma may cause sensory disturbances (anesthesia or hypesthesia1), paresthesia2), dysesthesia3)) in the innervated area, resulting in various undesirable situations, such as a burning sensation, tingling, needles and pins, biting of the tongue and lips, abnormal chewing, burns through consumption of hot foods, etc. Before describing the complications, basic information involved in the classification of nerve injuries is provided, so that the diagnosis, prognosis, and treatment may be more easily understood. According to Seddon's classification (Seddon 1943) of nerve injuries,

there are three types of nerve damage: neurapraxia, axonotmesis, and neurotmesis.

Neurapraxia: This type of damage has the most favorable prognosis and may occur even after simple contact with the nerve. Nerve conduction failure is usually temporary and there is complete recovery, without permanent pathologic and anatomic defects. Recovery is quite rapid and occurs gradually within a few days to weeks.

Axonotmesis: This is a serious injury of the nerve resulting in degeneration of the nerve axons, without anatomic severance of the endoneurium. Regeneration and recovery of sensation is slower than in neurapraxia and usually begins as paresthesia 6–8 weeks after injury. Regeneration of the nerve may be exceptionally favorable, but there is a chance of a certain degree of sensory disturbance of the area remaining.

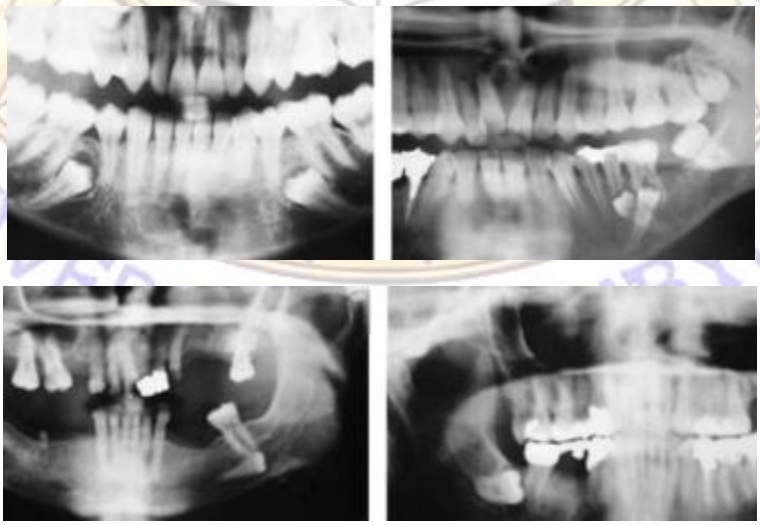
Neurotmesis: This is the gravest type of nerve injury, resulting in discontinuation of conduction due to severance of the nerve or due to the formation of scar tissue at the area of trauma. Neurotmesis may be produced by: trauma of the nerve branch due to traction, ischemia due to prolonged compression, severance or tearing of the nerve, as well as certain chemical substances. This type of injury may cause permanent damage to nerve function, including paresthesia or even anesthesia. The formation of scar tissue may also prevent axon regeneration. Etiology . Nerve injury may occur in the following cases: During administration of a nerve block (rarely) of the inferior alveolar nerve and mental nerve.While creating an incision that extends to the region of the mental foramen and the lingual vestibular fold. While creating an incision at the alveolar ridge of an edentulous patient, whose mental foramen, due to bone resorption, is localized superficially . During excessive flap

retraction and compression with retractors during retraction in the region of the mental nerve or at the lingual region of the third molar . When bone near a nerve is excessively heated, if the bur of the surgical handpiece is not irrigated with a steady stream of saline solution. In the case of removal of impacted teeth, roots and root tips that are deep in the bone and are close to the mental or inferior alveolar nerves . During perforation of the lingual cortical plate, when roots of a posterior tooth are sectioned or if a crown of an impacted third molar is sectioned (injury to lingual nerve).

When a bur enters the mandibular canal, during sectioning (separation of the crown from the root) of an impacted mandibular third molar . During fracture of the lingual cortical plate. In the case of displacement of a root tip inside the mandibular canal (trauma of the inferior alveolar nerve) . A very serious injury may result (at a later date) if, during the removal attempt, inadvertent manipulations with instruments injure the nerve. During debridement of a periapical lesion of posterior teeth that are in direct contact with the mandibular canal .

In the case of compression of the lingual nerve, due to excessive retraction of the tongue with a retractor during the surgical procedure.

In the case of compression and strangulation of a nerve, after inadvertent suturing of the nerve during the suturing of a flap



Prognosis. The prognosis for recovery of an injured nerve depends on the type of damage, the age of the patient, correct treatment of the case, and the time that elapsed until management of the injury. Neurapraxia and axonotmesis, which are usually the result of short-term compression, present the most favorable prognosis. In cases such as these, even though there is nerve degeneration, recovery is quite rapid. On the other hand, in neurotmesis, where the nerve has been severely traumatized (compression, ischemia, severance), prognosis is poor because, after destruction of its structure, complete regeneration is extremely difficult and normal sensation never returns completely.

Treatment: No particular therapy is indicated for neurapraxia or axonotmesis, unless there is a root tip or other foreign body compressing the nerve, in which case it must be removed. Treatment is usually palliative, including the administration of analgesics in painful situations, and multivitamin supplements of the vitamin B complex to restore sensation more rapidly. Damage to the nerve as a result of neurotmesis must be treated as soon as possible; often, a graft must replace the injured nerve segments or the severed segments must be sutured.

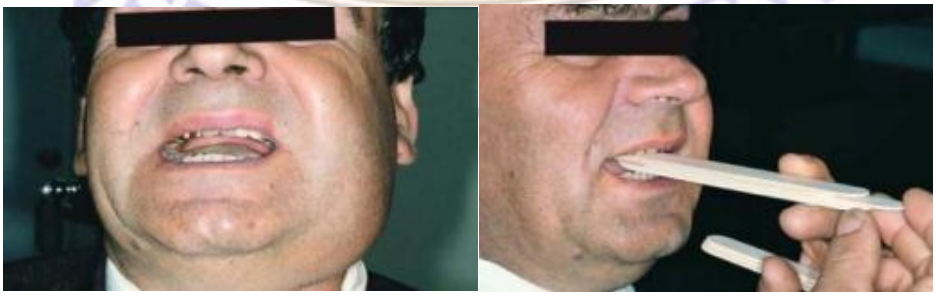
Postoperative Complications :

Trismus :

Trismus usually occurs in cases of extraction of mandibular third molars, and is characterized by a restriction of the mouth opening due to spasm of the masticatory muscles . This spasm may be the result of injury of the medial pterygoid muscle caused by a needle (repeated injections during inferior alveolar nerve block) or by trauma of the surgical field, especially when difficult lengthy surgical procedures are performed. Other causative factors are inflammation of the postextraction wound, hematoma, and postoperative edema.

Treatment : The management of trismus depends on the cause. Most cases do not require any particular therapy. When acute inflammation or hematoma is the cause of trismus, hot mouth rinses are recommended initially, and then broad-spectrum antibiotics are administered. Othersupplementary therapeutic measures include:

- Heat therapy, i.e., hot compresses are placed extra- orally for approximately 20 min every hour until symptoms subside.
- Gentle massage of the temporomandibular joint area.
- Administration of analgesics, anti-inflammatory and muscle relaxant medication.
- Physiotherapy lasting 3–5 min every 3–4 h, which includes movements of opening and closing the mouth, as well as lateral movements, aimed at increasing the extent of mouth opening.
- Administration of sedatives [bromazepam (Lexot- anil): 1.5–3 mg, twice daily], for management of stress, which worsens while trismus persists, leading to an increase of muscle spasm in the area.



Hematoma:

This is a quite frequent postoperative complication due to prolonged capillary hemorrhage ,when the correct measures for control of bleeding are not taken (ligation of small vessels, etc.). In this case blood accumulates inside the tissues, without any escape from the closed wound or tightly sutured flaps under pressure. Depending on the operation, the hematoma may be submucosal, subperiosteal, intramuscular or fascial. As for patients with hemorrhagic diatheses, hematomas formed in the palatopharyngeal arches are considered most dangerous of all.

Treatment: If a hematoma is formed during the first few hours after the surgical procedure, therapeutic management consists of placing cold packs extraorally during the first 24 h, and then heat therapy to help it to subside more rapidly. Some people recommend the administration of antibiotics to avoid suppuration of the hematoma, and analgesics for pain relief.

Ecchymosis

In certain cases, after the surgical procedure, ecchymosis may develop on the patient's skin, which presents as friable capillaries and decreased tissue tone. Other than the generalized trauma of the area, it may be the result of damage during flap retraction with various retractors .In order to avoid such a complication, retractors must be handled gently, especially in the region of the mental foramen, zygomaticoalveolar crest, and canine eminence.

Treatment: No particular treatment is required. The patient should be informed that it is not a serious situation and that ecchymoses gradually subside within a few days, changing color in the process.

Diffuse ecchymosis after surgical removal of the root of a mandibular premolar. This may be the result of excessive retraction of the flap using retractors

Edema

Edema is a complication secondary to soft tissue trauma, up to a point. It is the result of extravasation of fluid by the traumatized tissues because of destruction or obstruction of lymph vessels, resulting in the cessation of drainage of lymph, which accumulates in the tissues. Swelling reaches a maximum within 48–72 h after the surgical procedure and begins to subside on the third or fourth day postoperatively. Clinically, the edema is characterized by smooth, pale, and taut skin .When swelling is due to inflammation, the skin presents with redness, because of the local hyperemia .Depending on the amount of tissue injury in the area, the edema ranges from small to moderate and, rarely, severe. Sometimes, when the surgical procedure is performed in the maxilla, the edema may extend as far as the lower eyelid, either be- cause the tissues in this area are especially loose ,or because the patient may have a bleeding disorder (latent purpura, etc.). In such cases, the skin hue is cyanotic.

Treatment: A small-sized edema doesn't require any therapeutic management. For preventive reasons, cold packs should be applied locally immediately after surgery. They should be placed for 10–15 min every half hour, for the following 4–6 h. When the edema is severe and especially if it does

not subside, it must be treated carefully, because an edema present for a prolonged period may lead to fibrosis and development of symphyses. In this case the administration of proteolytic or fibrinolytic medication is indicated, and if the edema is secondary to inflammation, then broadspectrum antibiotics are also prescribed. If the edema spreads towards the pharyngomaxillary region (danger of asphyxia), then intravenous administration of 250–500 mg hydrocortisone is indicated, which has a rapid action with excellent results.

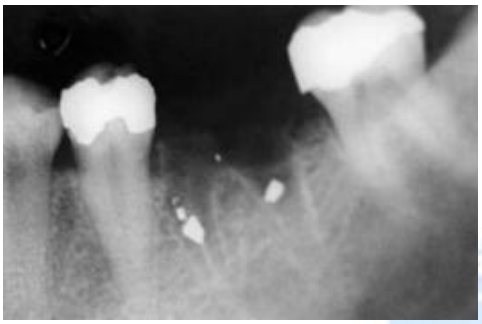
Edema as a result of a difficult surgical procedure to remove an impacted mandibular third molar. The,patient did not present with fever, just a mild

Edema of the lower eyelid with a skin hue ranging from very red to cyanotic, as a result of the surgical removal of an ankylosed maxillary canine. Manipulations and pressure exerted

Postextraction Granuloma

This complication occurs 4–5 days after the extraction of the tooth and is the result of the presence of a foreign body in the alveolus, e.g., amalgam remnants, bone chips, small tooth fragments, calculus, etc. Foreign bodies irritate the area, so that postextraction healing ceases and there is suppuration of the wound.

Treatment: This complication is treated with debridement of the alveolus and removal of every causative agent.



Periapical radiograph of the region of the mandibular first molar, showing amalgam remnants inside the alveolar cavity, responsible for the development of a postextraction

Clinical photograph of a postextraction granuloma shown in previous picture.

Postextraction granuloma in the region of the left mandibular first molar

Painful Postextraction Socket

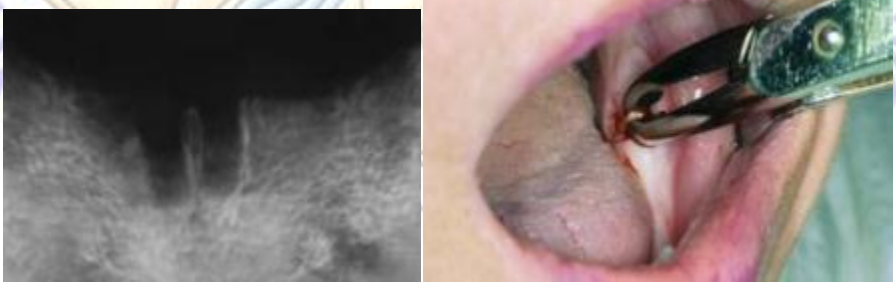
This is a common complication, which occurs immediately after the anesthetic wears off.

It occurs mainly at the postextraction wound of mandibular posterior teeth, although maxillary posterior teeth may also be involved, due to the anatomy of the bone (dense), where sharp bony spicules are easily created, especially if the extractions are difficult and are performed with awkward manipulations.

Treatment: This complication is treated with

- smoothing of the bone margins of the wound, especially the intraradicular bone.
- giving the patient analgesics, gauze impregnated with eugenol should be placed over the wound margins for 36–48 h.
- The uneven bone edges injure the soft tissues of the postextraction socket, resulting in severe pain and inflammation at the extraction site. In this case, the alveolus is filled with a blood clot that becomes organized for postextraction healing, but not for development of epithelium that will cover the wound.

Clinical photograph of case showing sharp bone edges that injure the soft tissues of the postextraction sockets



Radiograph and clinical photograph of a case showing Painful postextraction socket and it's treatment

Fibrinolytic Alveolitis (Dry Socket) :

This postoperative complication appears 2–3 days after the extraction. During this period, the blood clot disintegrates and is dislodged, resulting in delayed healing and necrosis of the bone surface of the socket. This disturbance is termed **fibrinolytic alveolitis** and is characterized by:

- an empty socket
- fetid breath odor
- a bad taste in the mouth
- denuded bone walls
- and severe pain that radiates to other areas of the head.

As for the etiology and pathogenesis of dry socket various factors have been cited, some of which include dense and sclerotic bone surrounding the tooth, infection during or after the extraction, injury of the alveolus, and infiltration anesthesia.

Treatment: This type of complication is treated by

- gently irrigating the socket with warm saline solution, and placing gauze impregnated with eugenol, which is replaced approximately every 24 h, until the pain subsides.
- Also, gauze soaked in zinc-oxide/eugenol may be used, which remains inside the alveolus for 5 days; alternatively iodoform gauze or enzymes are applied locally.
- Recent studies have shown Matthews' and Mitchell's techniques to be very effective. They used dextranomer granules (Debrisan) and collagen paste (Formula K) without observing a foreign body reaction like that observed with the zinc-oxide/ eugenol mix. With this palliative treatment, the pain gradually subsides, and the patient is given instructions to avoid mastication on the affected side while good oral hygiene is emphasized.

Clinical photograph of fibrinolytic alveolitis(dry socket) in the region of the maxillary second molar

Infection of Wound :

Infection of the wound is a complication that may present and spread not only to the superficial surgical wound, but also to the depth and extent of the tissues involved in the surgical manipulations.

Infection of the wound may be caused by:

- The use of infected instruments and disposable materials during the surgical procedure.
- A septic substrate over which the surgical procedure is performed.
- Defective bone substrate secondary to diseases of the skeletal system (osteopetrosis), and radiotherapy of the jaw and facial area.
- Systemic diseases which lead to increased susceptibility to infection (e.g., leukemia, agranulocytosis), as well as those diseases whose therapy causes immunosuppression.
- According to past studies, diabetes mellitus is also included in these systemic diseases. Today, though, specialists do not agree with this point of view and consider that patients with controlled diabetes should not be treated in the same way as those patients who suffer from the aforementioned diseases.

Treatment: When the dentist deems that there is a risk of developing a postoperative infection, prophylactic antibiotics are administered. If the wound has already become infected though, the appropriate antibiotic therapy should be administered, depending on the case

Disturbances in Postoperative Wound Healing :

Wound healing disturbances after a surgical procedure may be caused by general or local factors.

General factors include blood diseases (agranulocytosis, leukemia), diabetes mellitus, osteopetrosis, Paget's disease, osteoporosis, etc.

Local factors include wound infection, inflammatory hyperplastic granuloma, dry socket, irradiated region, benign and malignant neoplasms, wound damage caused by instruments (burs and elevators), and flap dehiscence due to rupture of sutures.

Wound dehiscence due to rupture of sutures at the vertical releasing incision, resulting in delayed healing

Delayed healing after a surgical extraction. The clinical photograph shows the presence of fibrinolytic alveolitis (dry socket).

Necrotic sloughing in the region of a lateral incisor, as a result of inadvertent manipulations with various instruments (bur, elevator,

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إهداء

قال تعالى: (قل إعملوا فسيرى الله عملكم ورسوله والمؤمنون
إلهي لا يطيب الليل إلا بشكرك ولا يطيب النهار إلا بطاعتك
ولا تطيب اللحظات إلا بذكرك
ولا تطيب الآخرة إلا بعفوك
ولا تطيب الجنة إلا برؤيتك

إلى من بلغ الرسالة وأدى الأمانة.. ونصح الأمة.. إلى نبي الرحمة ونور العالمين سيدنا محمد(صلى الله عليه وآله وسلم)

إلى من كلله الله بالهيبة والوقار .. إلى من عملني العطاء دون انتظار .. إلى من احمل اسمه بكل افتخار
والدي العزيز

إلى ملاكي في الحياة .. إلى معنى الحب و إلى معنى الحنان والتفاني .. إلى بسمة الحياة وسر الوجود
إلى من كان دعائها سر نجاحي وحنانها بلسم جراحي إلى أغلى الحبايب
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إلى منارة العلم والعلماء إلى الصرح الشامخ ... جامعة بابل
إلى الذين حملوا أقدس رسالة في الحياة .. إلى الذين مهدوا لنا طريق العلم والمعرفة
أساتذتنا الأفاضل