Oral and Maxillofacial Surgery

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Purpose of Oral and maxillofacial surgery

OMF surgery is unique in requiring a dual qualification in medicine and dentistry, and is often seen as the bridge between medicine and dentistry, treating conditions that require expertise from both backgrounds such as head and neck cancers, salivary gland diseases , facial disproportion , facial pain, temporomandibular joint disorders, impacted teeth, cysts and tumors of the jaws as well as numerous problems affecting the oral mucosa such as mouth ulcers and infections.

Many OMF surgeons focus on one of these areas to develop a sub-specialist interest within the scope of the wider specialty.

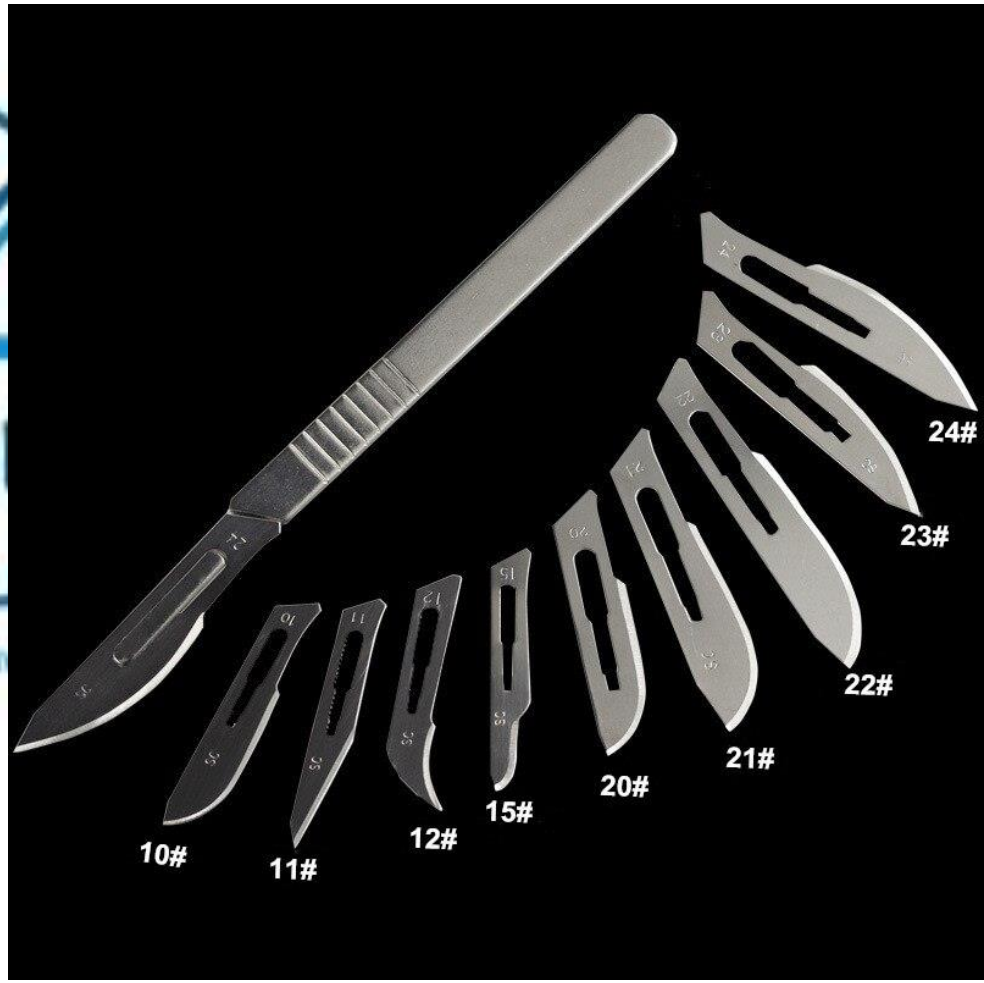
Instruments

Instruments for incising tissue:

Most surgical procedures begin with an incision. The instrument for making an incision is the :

Scalpel: composed of an handle and a disposable, sterile sharp **blade**.

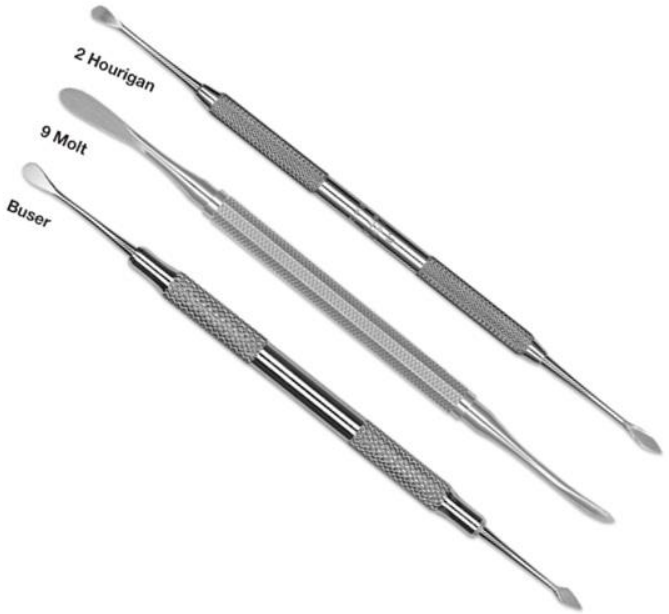
The most commonly used scalpel blade for intraoral surgery is the no.15 blade.



Instruments for elevating Mucoperiosteum:

After an incision through mucoperiosteum has been made, the mucosa and periosteum should be reflected from the underlying bone in a single layer with a periosteal elevator.

periosteal elevator has a sharp ,pointed end and a broader flat end. The pointed end used to reflect dental papillae from between teeth, and the board end is used for elevating the tissue from the bone.



Instruments for retracting soft tissue:

It is critical to have good vision and good access to perform good surgery. To this end, a variety of **retractors** have been designed to retract the cheeks, tongue, and mucoperiosteal.

The instrument most commnly used to retract the tongue is the mouth mirror.

Instrument for controlling hemorrhage:

When incision are made through tissue, small arteries and veins are incised, causing bleeding that may require more than simple pressure to control. When this is necessary, an instrument called a ***hemostat*** is used .

Instruments for removing bone:

Rongeur forceps: this instrument has sharp blades that are squeezed together by the handles, cutting or pinching through the bone.

Chisel and Mallet

Bone file: final smoothing of bone before suturing the flap. It is usually a double-ended instrument.

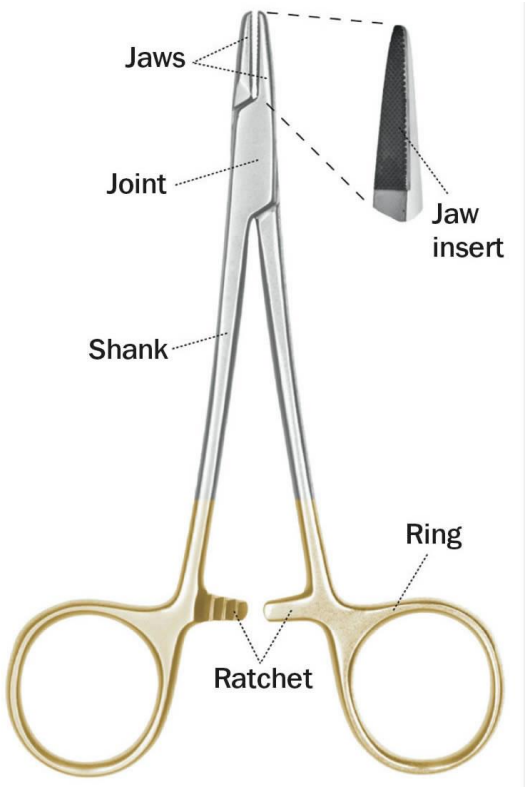
Bur and handpiece

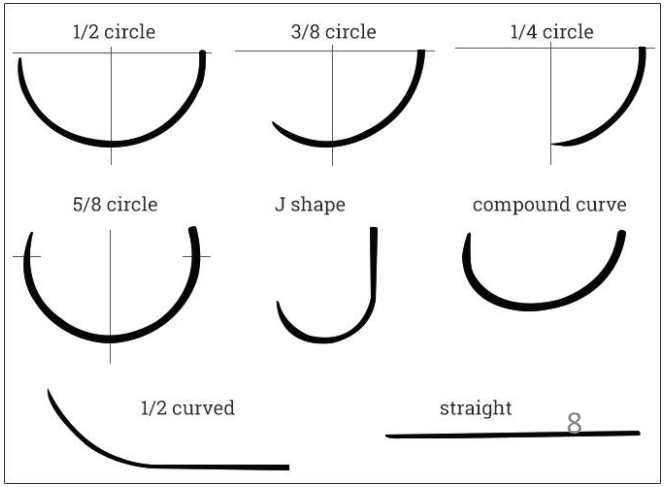
Instruments for suturing mucosa:

The needle holder is the instrument used to place the sutures.

Needle Holder: is an instrument with a locking handle and a short, stout beak. The beak of the needle holder is shorter and stronger than the beak of hemostat. The face of the beak of the needle holder is crosshatched to permit a positive grasp of the suture needle and suture. The hemostat has parallel grooves on the face of the beaks.

Needle: the needle used in closing mucosal incisions is usually a small half-circle or thee eighths- circle suture needle.





Suture material : are classified by size, resorbability, and whether or not they are monofilament or polyfilament.

Scissor: the final instrument necessary for placing sutures are suture scissors. The scissors have short cutting edges, because their sole purpose is to cut sutures.

Instruments for extraction:

Extraction forceps: are used for removing the tooth from the alveolar bone. They are designed in many styles and configurations to adapt to the variety of teeth for which they are used.

The basic components of dental extraction forceps are:

The handle

The hinge

The beaks

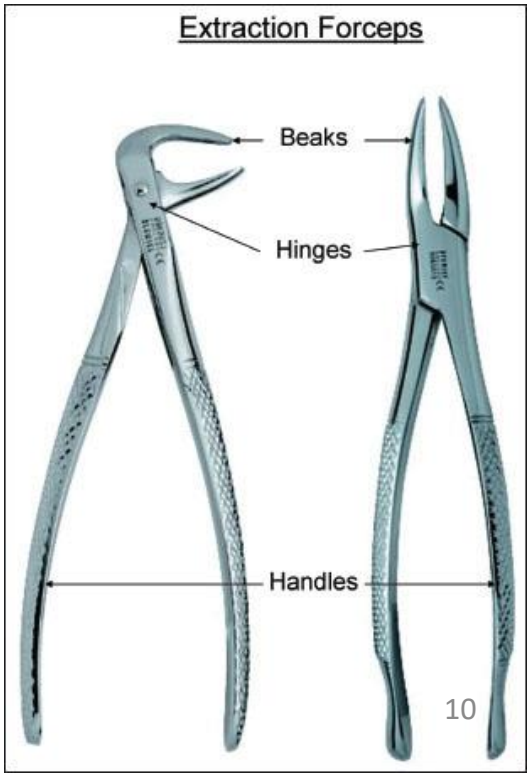


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Fig. 1

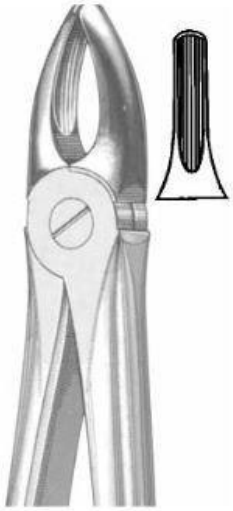

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Fig. 2

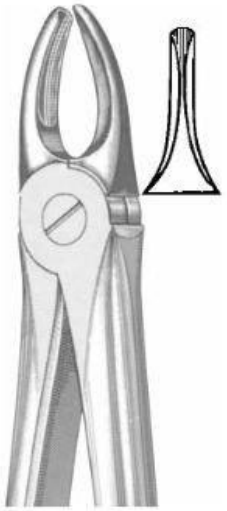

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Fig. 3

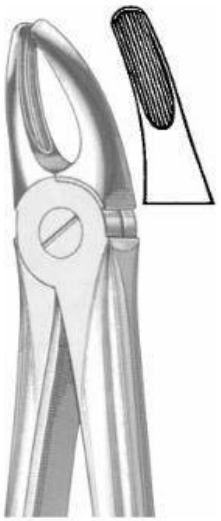

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Fig. 7

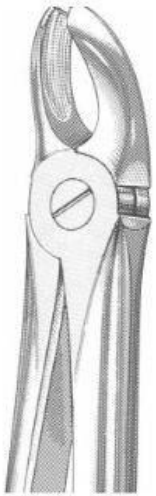

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Fig. 17

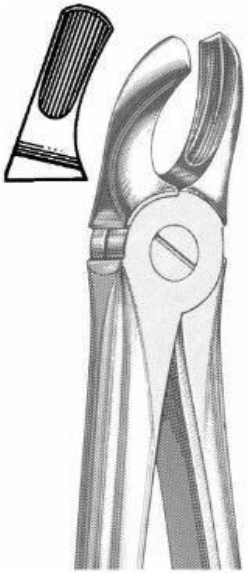

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Fig. 18

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Fig. 4

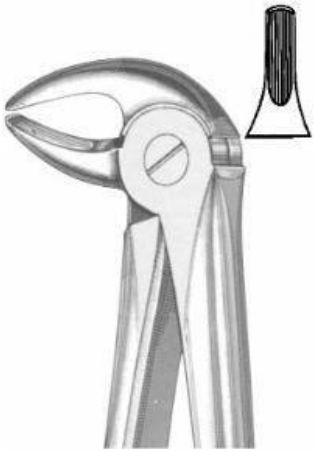

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Fig. 13

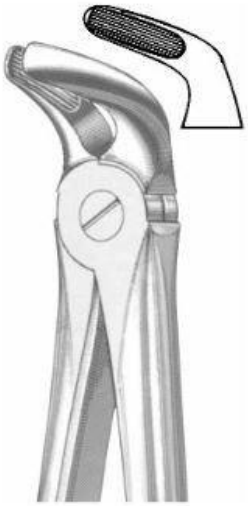

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Fig. 8

Dental elevators:

One of the most important instruments used in the extraction procedure is the dental elevator. These instruments are used to luxate teeth from the surrounding bone.

The three major components of the elevator are the handle, shank, and blade.

Surgical Tooth Extraction

Steps of Surgical Extraction

The surgical extraction techniques for single-rooted and multi-rooted teeth are similar, and include the following steps:

1. Creation of a flap.

2. Removal of bone and exposure of an adequate part of the root.

3. Extraction of the tooth or root with elevators or forceps.

4. Postoperative care of wound and suturing.

The surgical extraction involves teeth with intact crowns, roots and root tips, and presents certain characteristics in each of these cases.

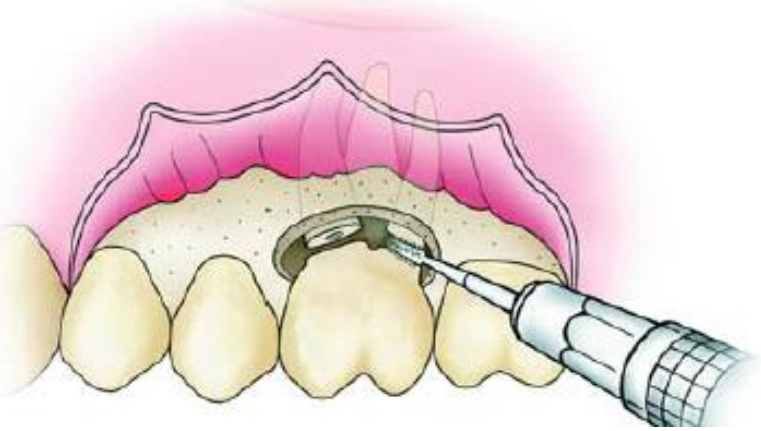
1- Teeth with unusual root morphology

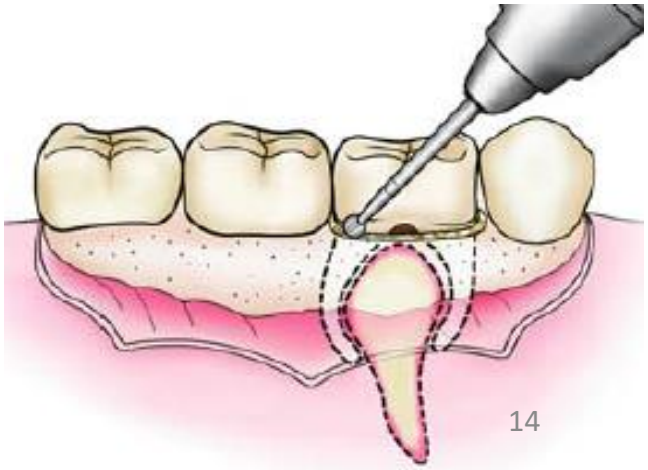
2-Extraction of Multi-Rooted Tooth

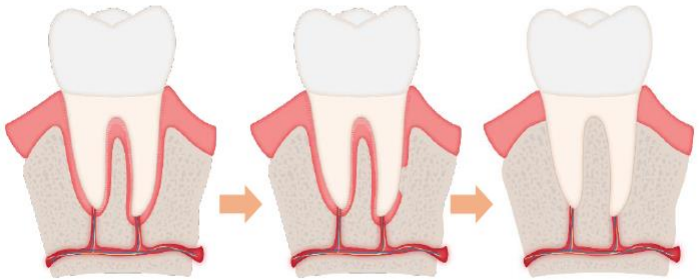
3- Extraction of an Intact Tooth with Hypercementosis of the Root Tip (is excessive deposition of non-neoplastic cementum over normal root cementum, which alters root morphology)

4- Extraction of Deciduous Molar that Embraces Crown of Permanent Tooth

5- Extraction of Ankylosed Tooth (means the fusion between alveolar bone and root of a tooth)







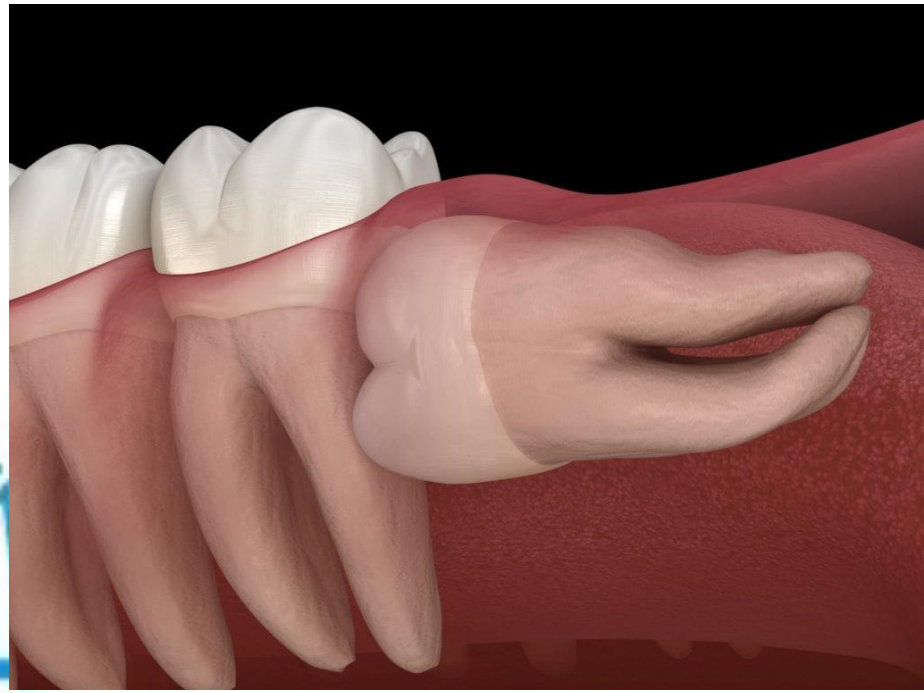
Impacted teeth:

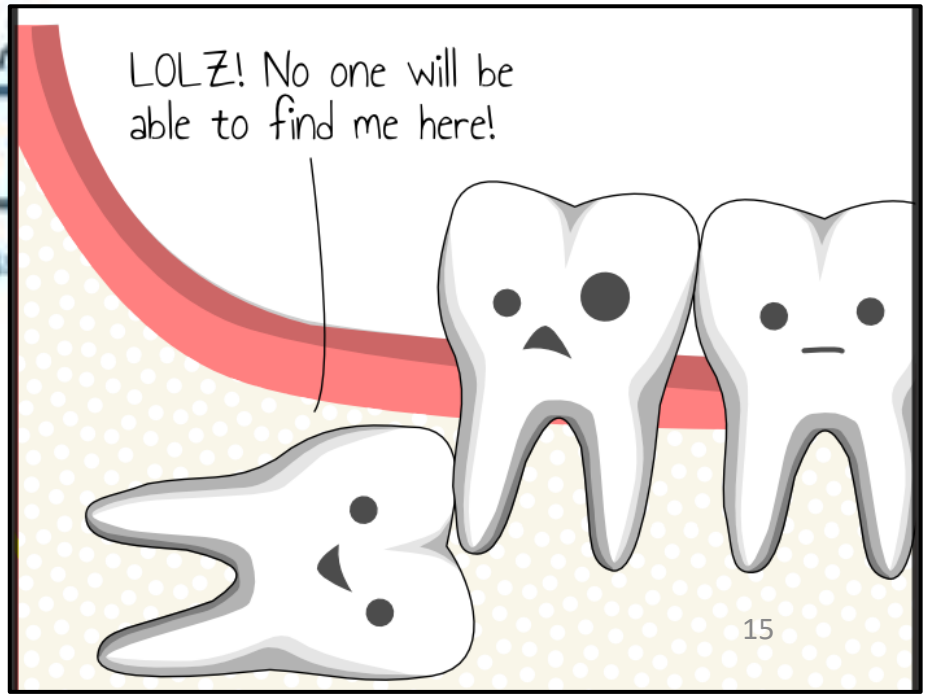
An impacted tooth is one that fails to erupt into dental arch within the expected time.

unerupted :includes both impacted teeth and teeth that are in the process of erupting.

Embedded: is occasionally used interchangeably with the term impacted

The most common impacted teeth are the maxillary and mandibular third molars followed by the maxillary canines and mandibular premolars.





Angulation :

Bone impacted teeth are typed and named for the tilt angle of the impaction. Examples of the impact classifications and described here:

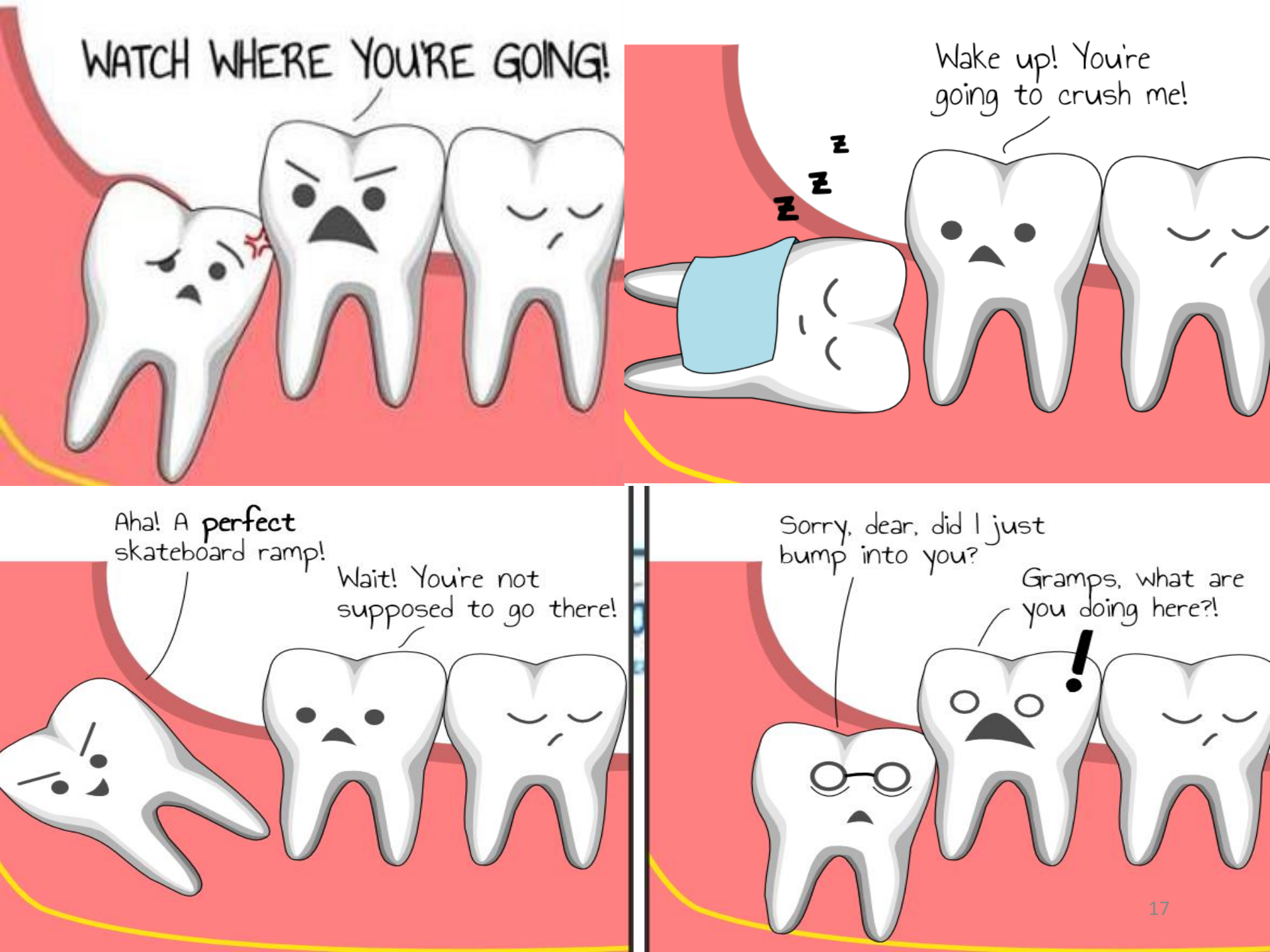
Horizontal impaction: the tooth is horizontally tilted; may be leaning parallel to the floor at various angles; crown may be perpendicular to an adjacent tooth crown.

Vertical impaction: tooth is in upright position but in close proximity to or under the crown of a nearby tooth.

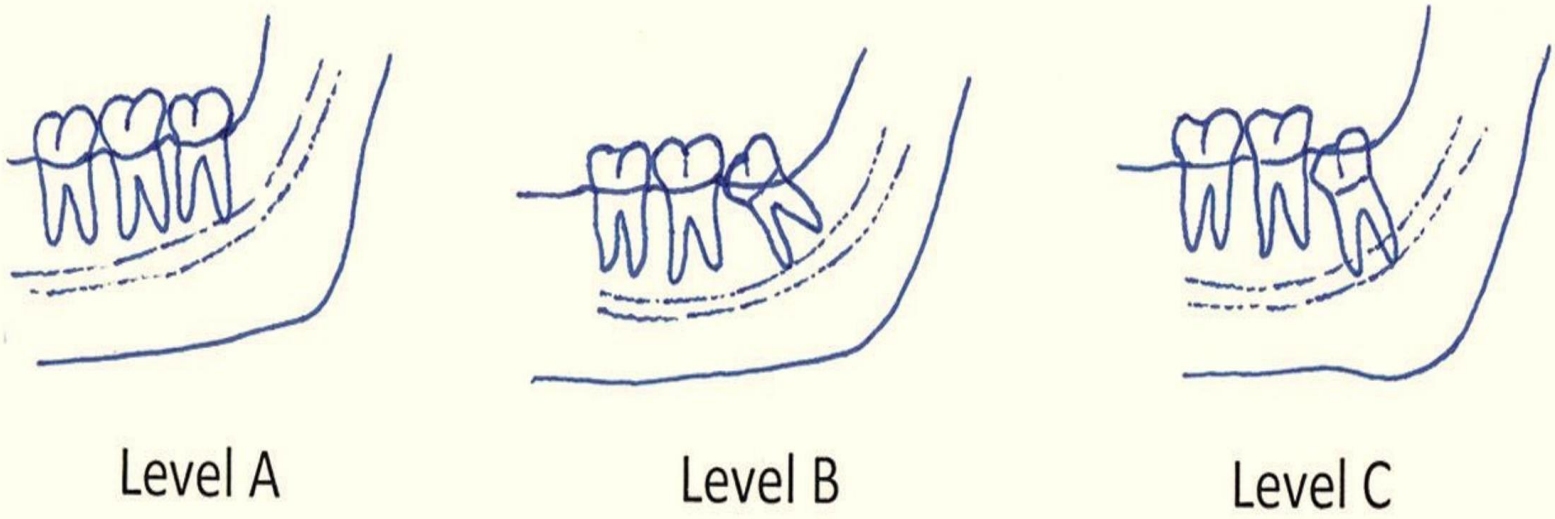
Distoangular impaction: crown of the tooth is slanted toward the distal surface and is covered by tissue and/or bone.

Mesioangular impaction: the crown of the tooth is mesially tilted and covered by tissue and/or bone.

Transverse impaction: tooth is situated sideways to the adjacent teeth and occlusal plane, and it is covered by tissue and/or bone.


WATCH WHERE YOU'RE GOING!
Wake up! You're going to crush me!
Z
Z
Z
Aha! A perfect skateboard ramp!
Wait! You're not supposed to go there!
Sorry, dear, did I just bump into you?
Gramps, what are you doing here?!

Impaction Depth (Pell & Gregory classification)

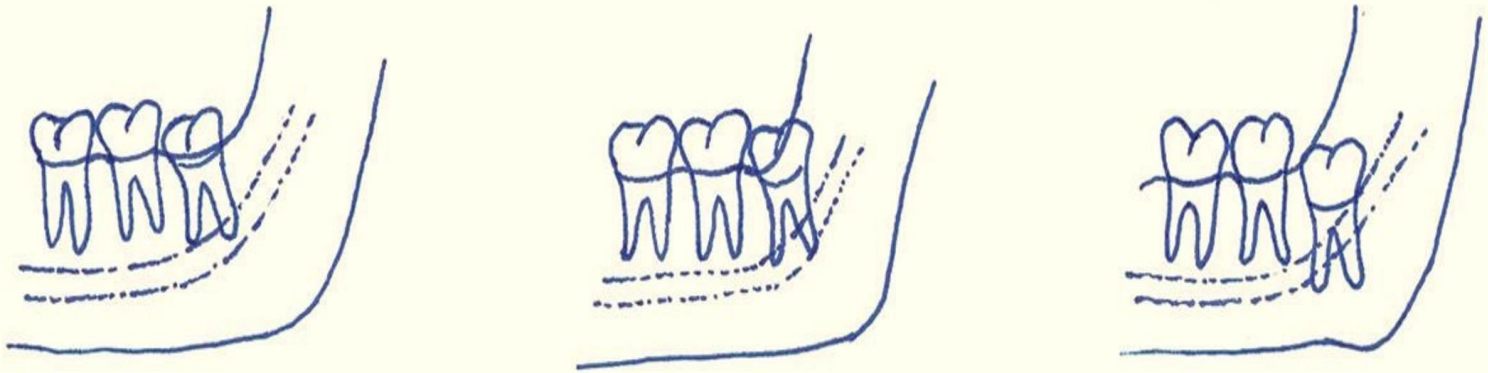


Level A

Level B

Level C

Ramus Relationship (Pell & Gregory classification)

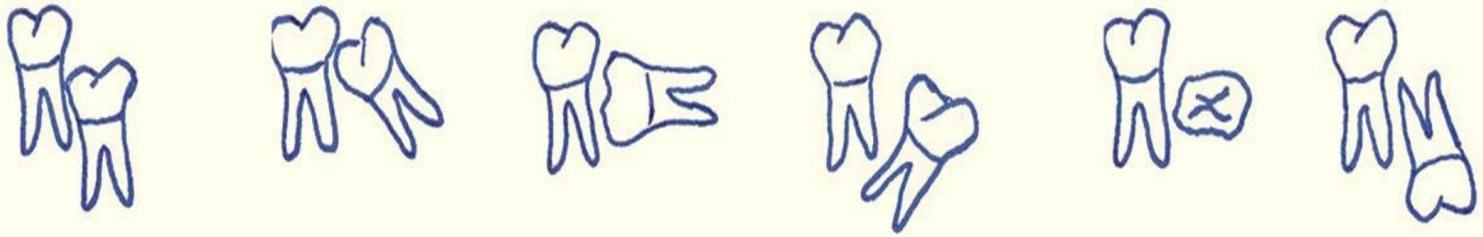


Class I

Class II

Class III

Angulation (Winter's classification)



Vertical

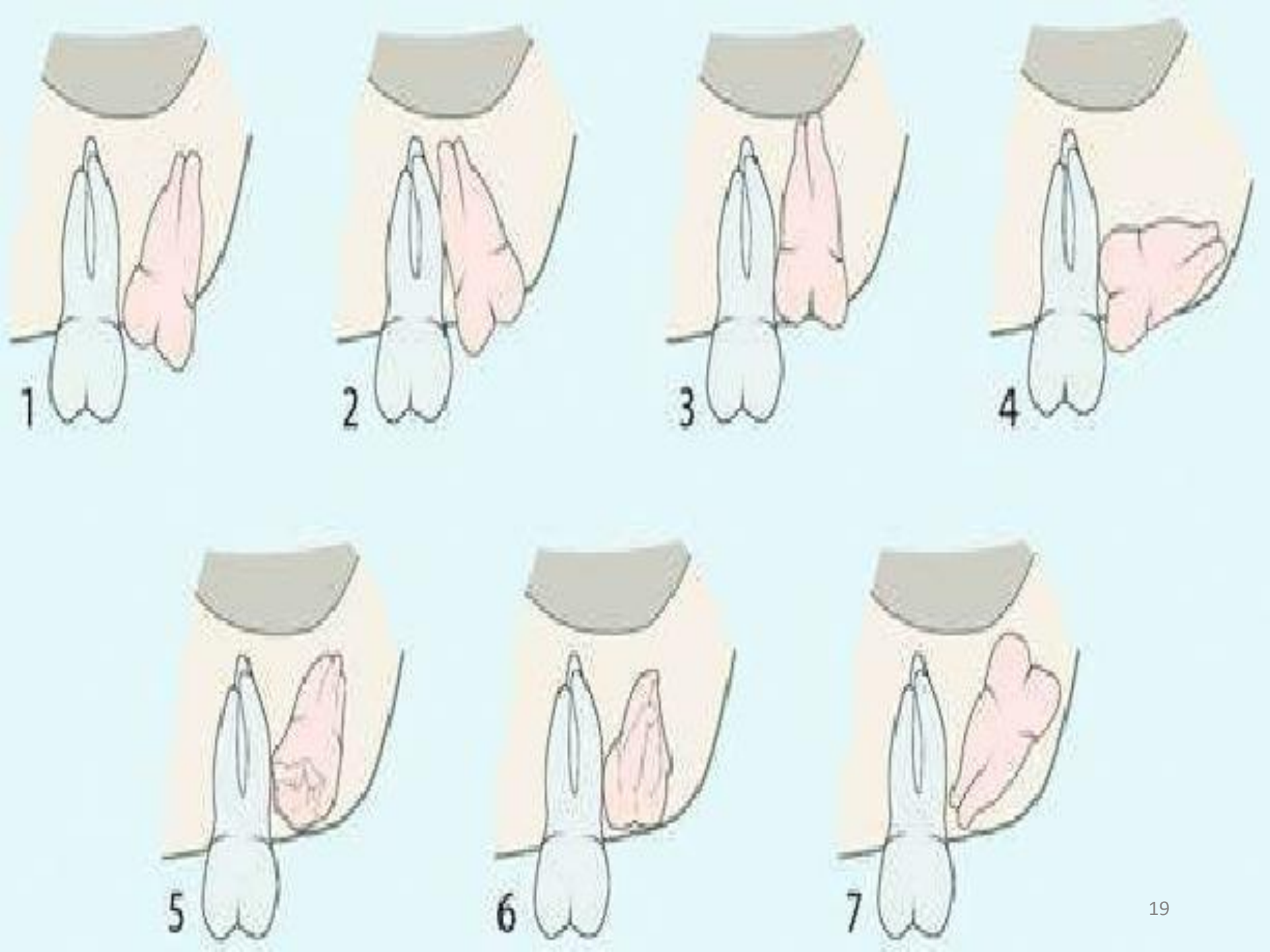
Mesioangular

Horizontal

Distoangular

Buccolingual

Others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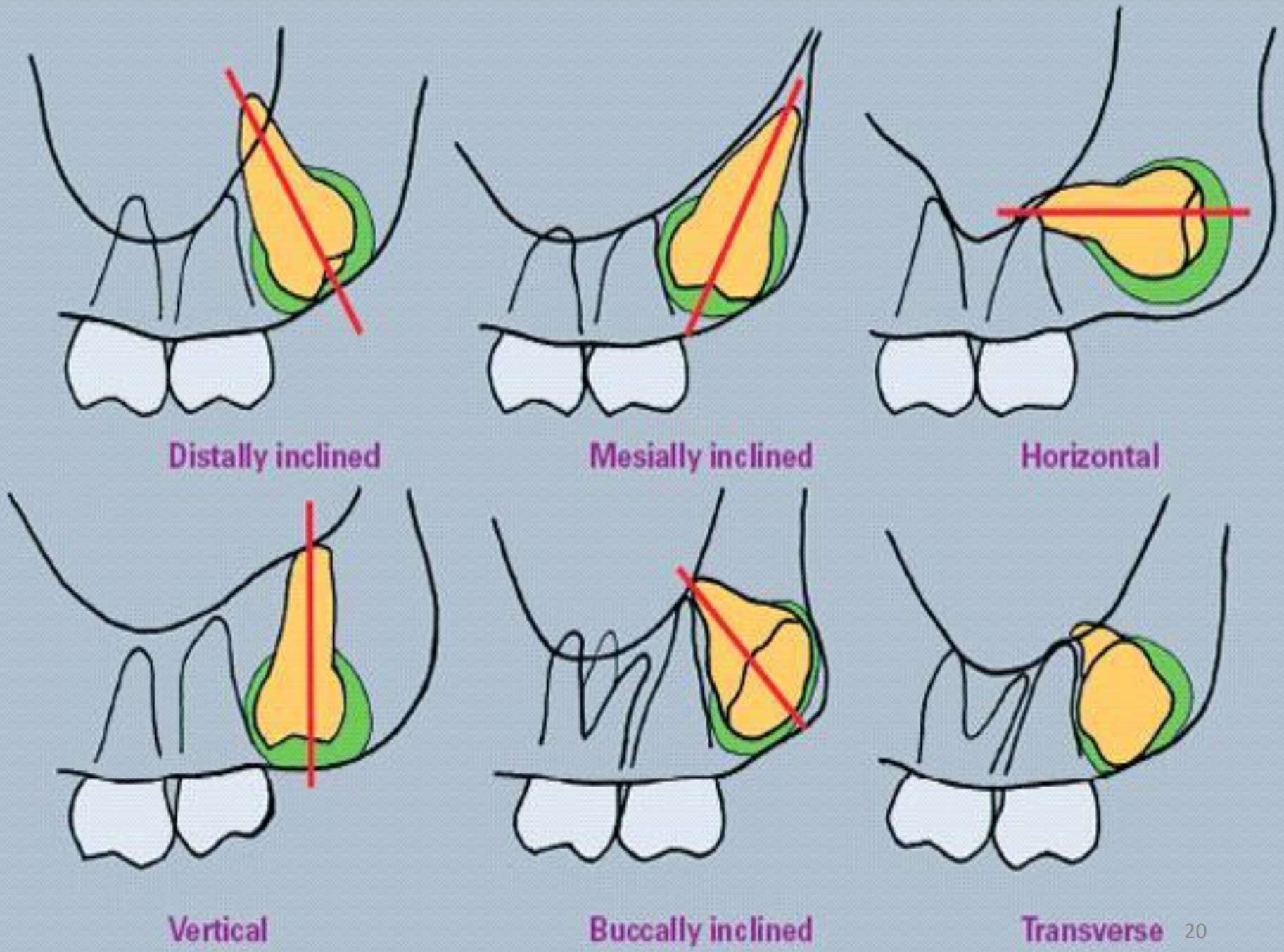
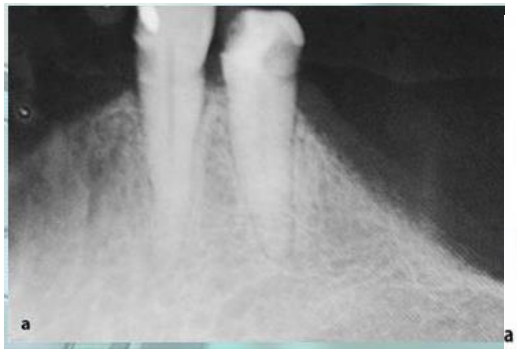
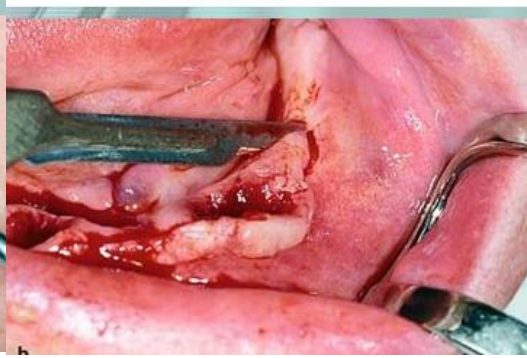
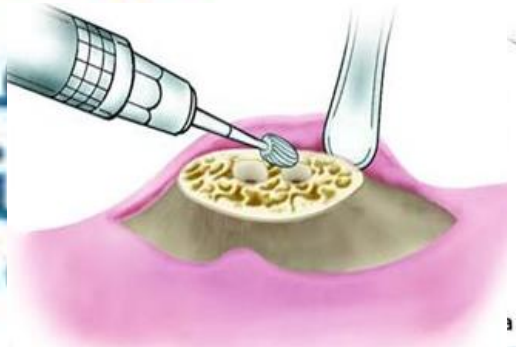
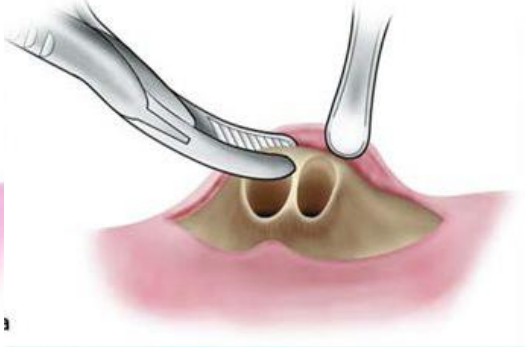

Distally inclined
Mesially inclined
Horizontal
Vertical
Buccally inclined
Transverse

Multiple Extraction

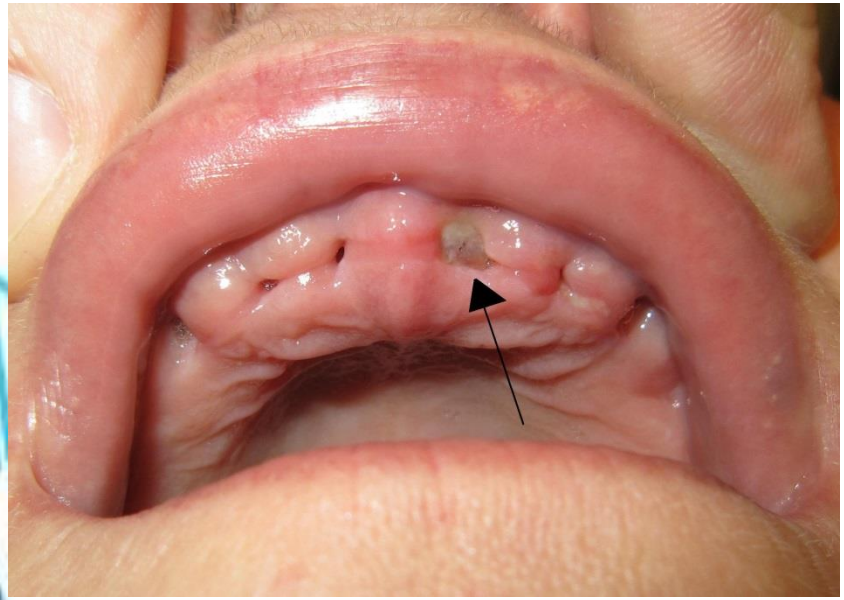
A multiple extraction involves the removal of two or more teeth during one procedure. When multiple teeth are extracted, the alveolar bone crests have to be removed and smoothed to prepare the ridges for denture or appliance wear. This reduction procedure is termed an **alveolectomy**.





One potential complication resulting from extraction of teeth is **alveolitis** (infection or inflammation of the alveolar process). This loss of the natural clotting is commonly called a **dry socket.**

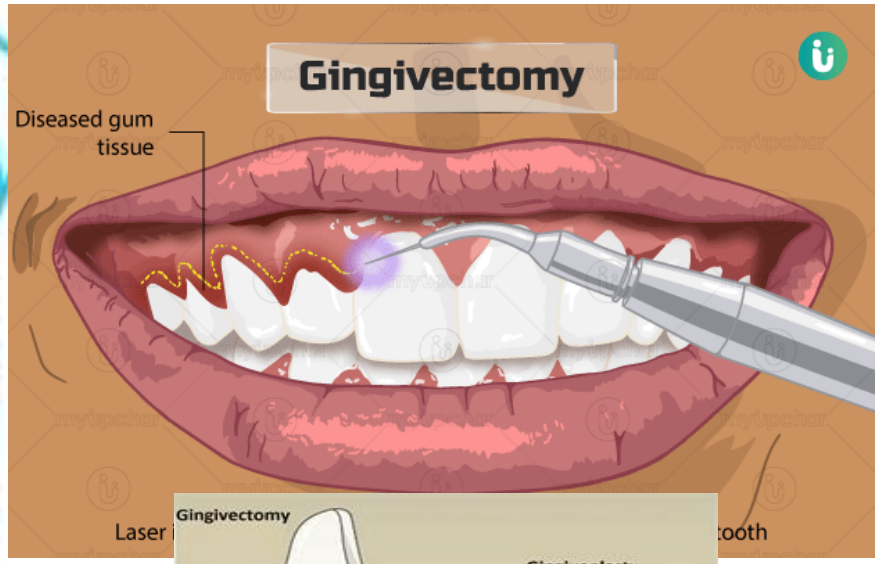


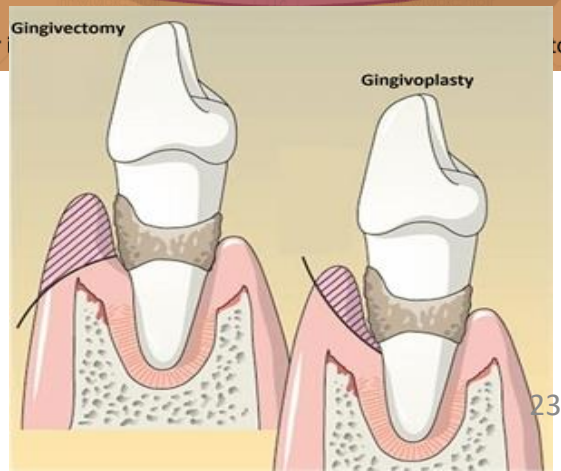
Procedures Involved in Soft-Tissue Surgery

Many procedures performed by the oral surgeon are limited to, or involve, soft tissue of the oral cavity. Some of these soft-tissue surgeries are commonly completed by the general dentist and other specialists, particularly the periodontist, as well:

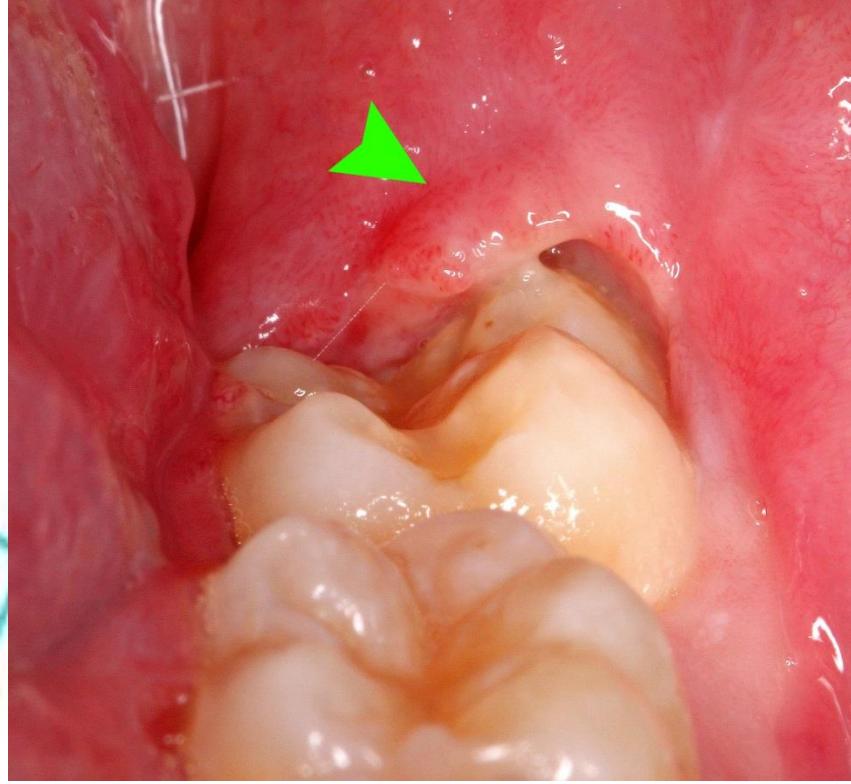
Gingivectomy: surgical excision of unattached gingival tissue.

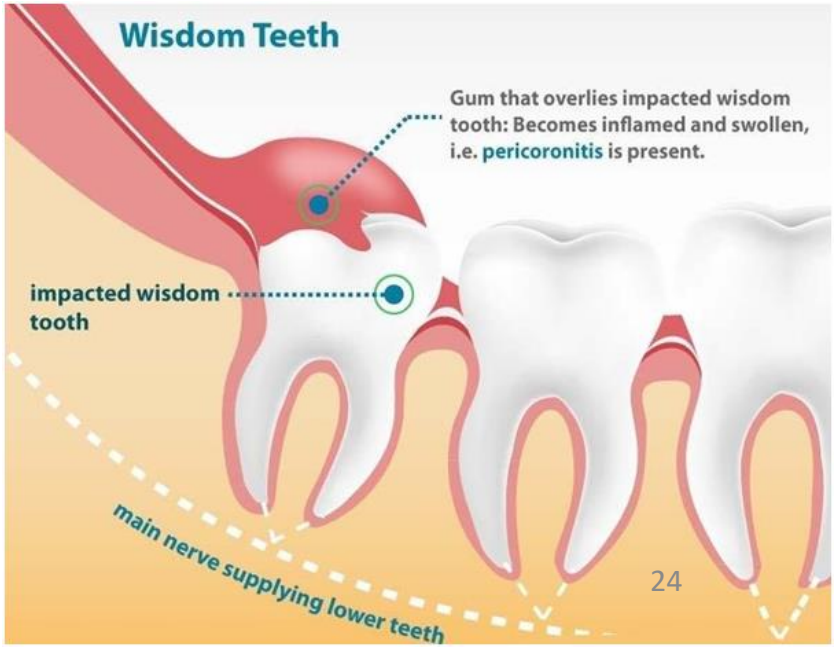
Gingivoplasty: surgical recountour of the gingival tissues.



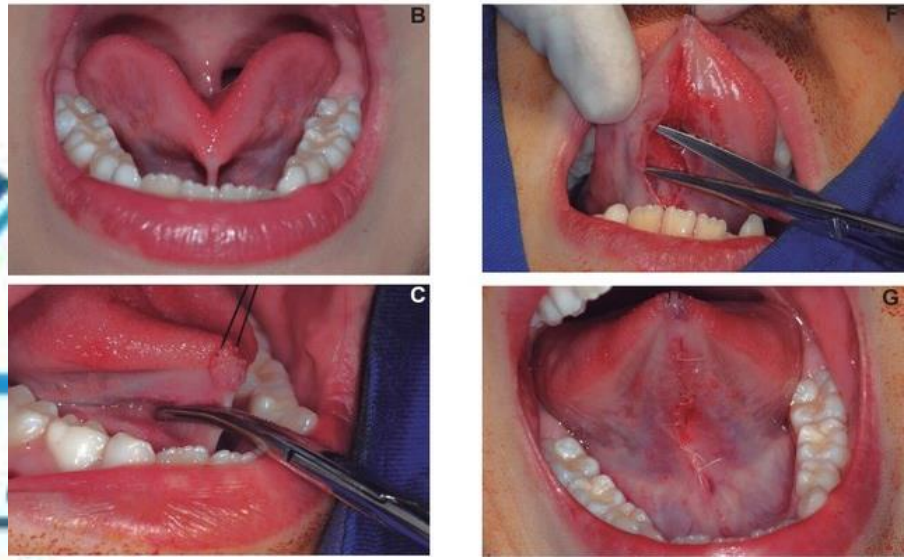


Periodontal flap surgery: laser or scalpel sectioning and tissue removal that may be necessary for extensive singular pocket involvement or when during tooth eruption, tissue flap coverage of incoming teeth, particularly third molars, obstructs or impacts food around the crown, causing gingival irritation and an infection termed **pericoronitis**.





Frenectomy: surgery that may be performed on the maxillary labial frenum to correct diastema (space between two teeth), or on the mandibular lingual frenum to correct ankyloglossia (shortness of the tongue frenum, tongue tied)



Incision and drainage: procedure performed for a periodontal abscess. An incision is made into the affected area, and an opening is obtained to remove and drain infected matter. In some cases, a small piece of rubber dam, or Iodoform gauze, is inserted into the incision to maintain the opening for drainage.

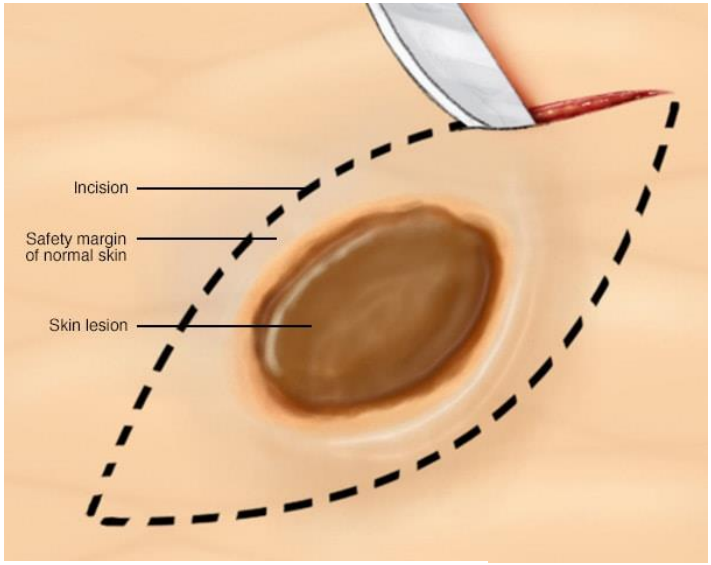
Other tissue surgery may involve removal of the salivary glands, cysts, or any assorted **malady** (disease or disorder)of the mucous membranes and oral structures.

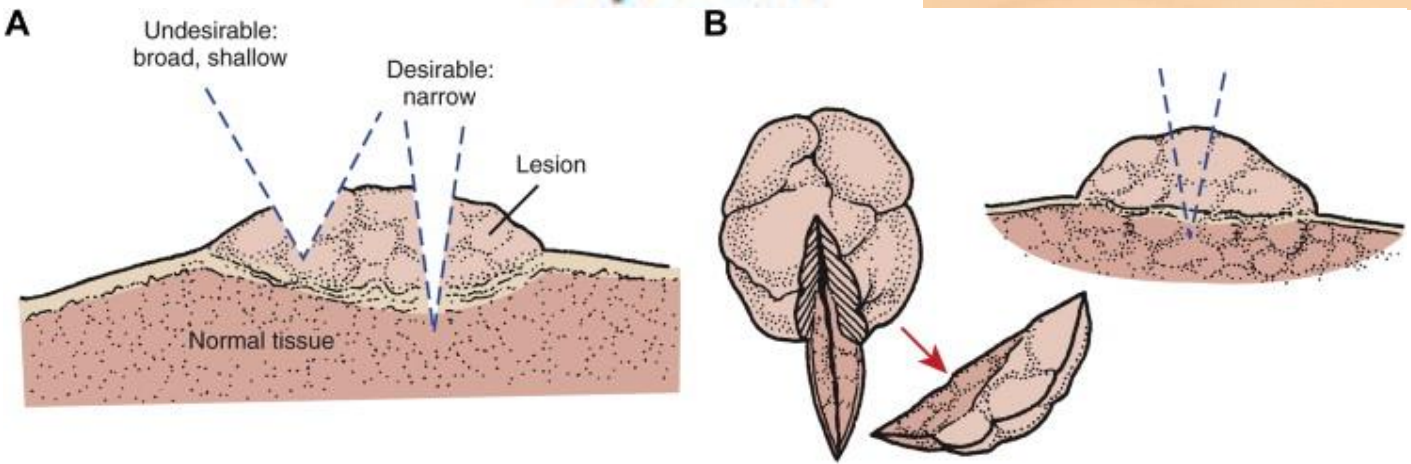
Tissue Biopsy

Another tissue surgical procedure performed by an oral surgeon is a biopsy (small tissue incision). The common types of dental biopsies are:

Excision biopsy: removal of the entire lesion of affected tissue with some underlying normal tissue.

Incision biopsy: removing a wedge-shaped section of affected tissue along with some normal adjacent tissue.



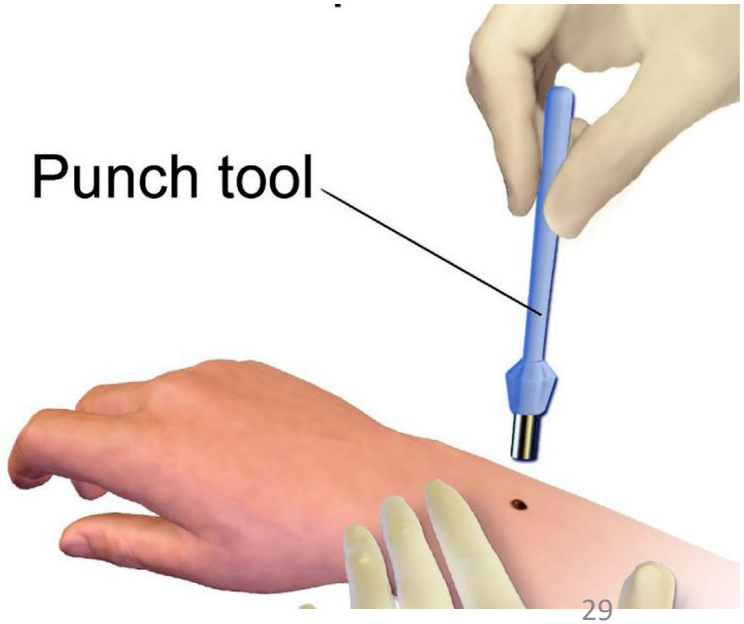


Exfoliative biopsy: scraping with glass slide or tongue depressor to collect tissue cells for microscopic study.

Brush biopsy: much like the exfoliative test, a pipe stem brush is drawn across the mouth tissues, scraped against a glass slide, fixed with a solution, and sent to the lab for a computer-assisted reading

Fine needle aspiration (FNA) is a diagnostic procedure used to investigate lumps or masses. In this technique, a thin 23-25 gauge, hollow needle is inserted into the mass for sampling of cells that, after being stained, are examined under a microscope.

Punch biopsy: is a diagnostic test where a small, tube-shaped piece of skin and some other tissue underneath are removed using a sharp cutting tool.



Tissue Diseases

The term applied to cancerous tumors is **malignant**. By contrast, **benign** tumors are not considered life-threatening or deadly. Some of the tissue diseases occurring in the oral cavity are:

Leukoplakia: formation of white patches on the mucous membrane of the oral cavity that cannot be scraped off and have the potential for malignancy.

Fibroma: benign, fibrous, encapsulated connective tissue tumor.

Papilloma: benign, epithelial tumor of the skin or mucous membrane.

Hemangioma: benign tumor of dilated blood vessels.

Granuloma: granular tumor usually occurring with other diseases.

Melanoma: malignant, pigmented mole or tumor.

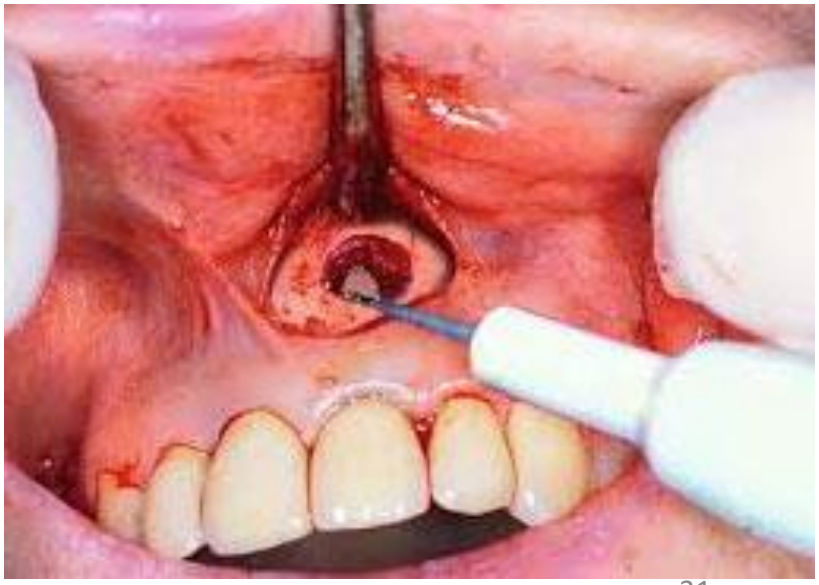
Basal or squamous cell carcinoma: malignant growth of epithelial cells.

Procedures Involved in Minor Bone Surgery:

Some tissue surgeries involve treatment of the alveolar bone (osteoplasty= forming or recontouring bones). Related terms are:

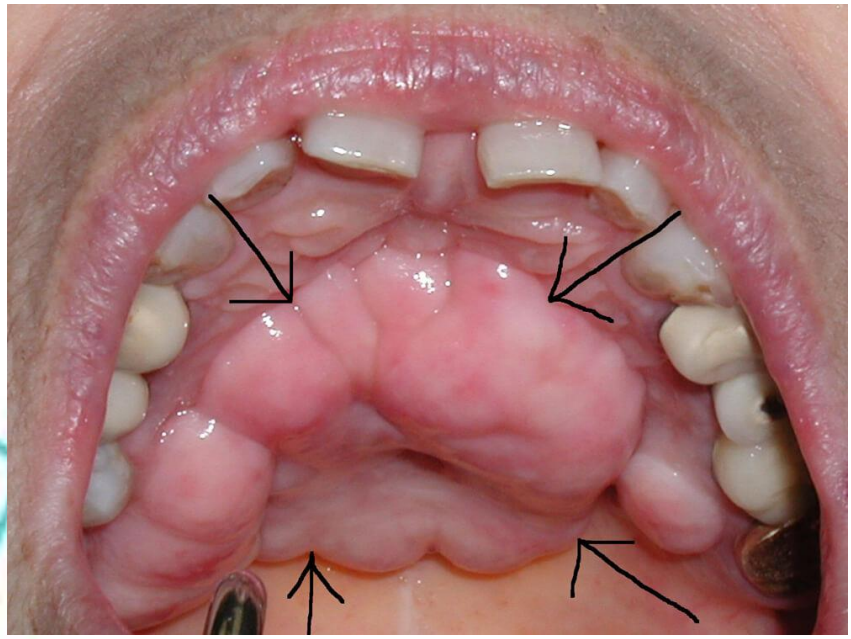
Alveolectomy: usually performed to remove alveolar bone crests remaining after tooth extraction in preparation for a smooth bone ridge for denture wear.

Apicoectomy: usually requires opening of the periodontium, including some alveolar bone, and exposure with removal of the root apex. Many times this surgery is followed with a retrofill root canal treatment.



Exostosis: (bony outgrowth) removing overgrowths and smoothing off of bone edges in preparation for dentures.

Torus: (rounded elevation)an excessive bone growth; a torus on the lingual side of the mandible is termed a *torus mandibularis*. In the roof of the mouth, it is termed *torus palatinus*.



Cysts (abnormal,closed-walled sac present in or around tissue): usually X-ray detected and removed before they enlarge and destroy bone tissue.

Some types are:

Dentigerous: cystic sac containing a tooth or tooth bud particle.

(a) (b)

Radicular: cyst located alongside or at the apex of a tooth root; also called periapical cyst.

Ranula: cystic tumor or fluid collection found on the underside of the tongue or in the sublingual ducts; usually the results of a blocked duct.

Surgical procedures involved in fracture repair:

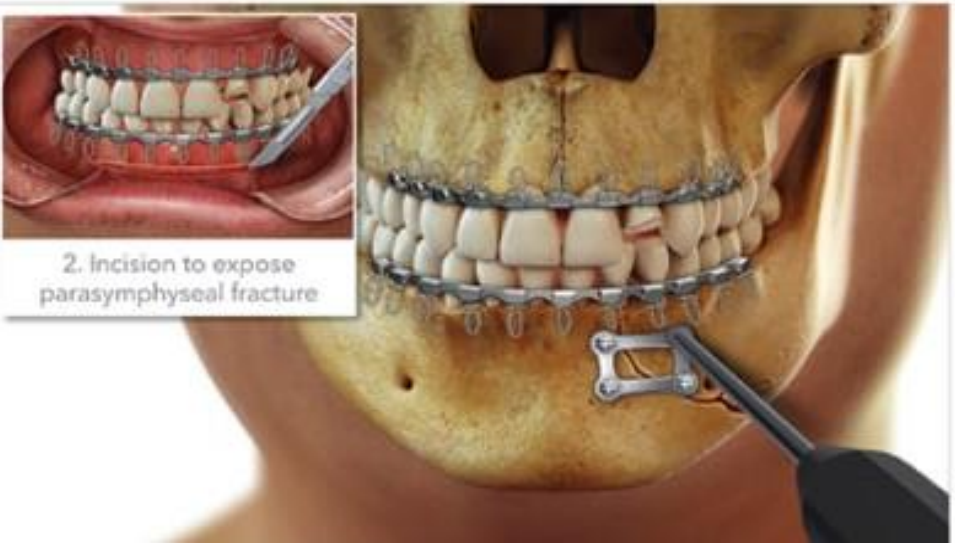
Repair of fractured maxilla and mandible bones are reserved for treatment by an oral maxillofacial specialist. Reduction can be complete in two fashions: closed or open reduction.

Closed fracture reduction: repair with intraoral fixation, tooth wiring, or ligation methods in which the teeth are "wired together" in proper alignment while awaiting bone healing.

Open fracture reduction: more complicated procedure involving osteotomy and rigid fixation, perhaps bone plate, mesh, pins, grafts, and other fixation devices. Open reduction requires not only alignment by fixation of the teeth but also repositioning and correction of fractures after surgical access through the periosteum.

Initial condition: open mandibular symphysis fracture, left mandibular body fractur & chipped #10 tooth

1. Placement of archbars



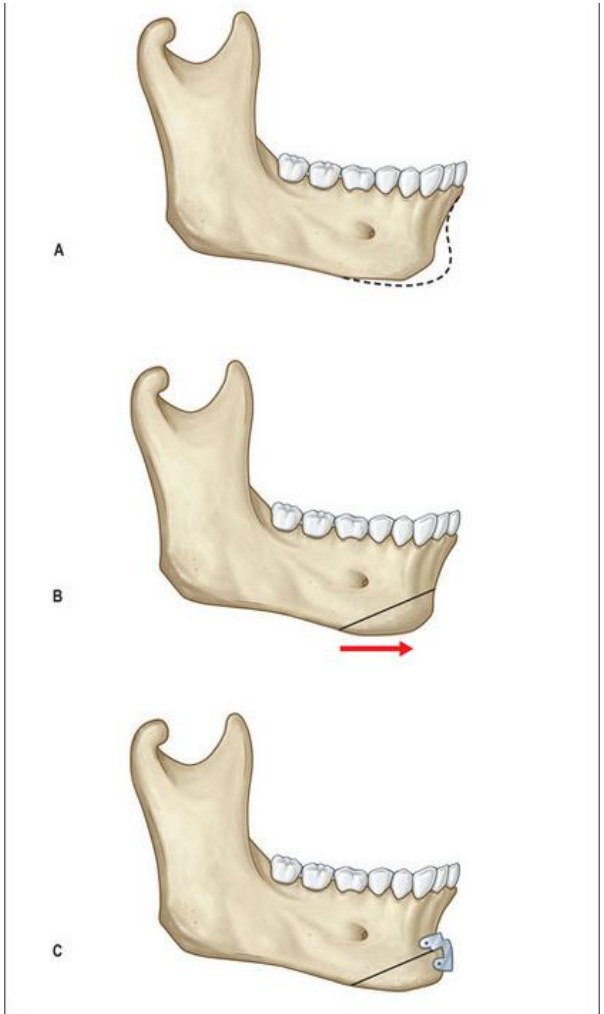
2. Incision to expose parasymphyseal fracture

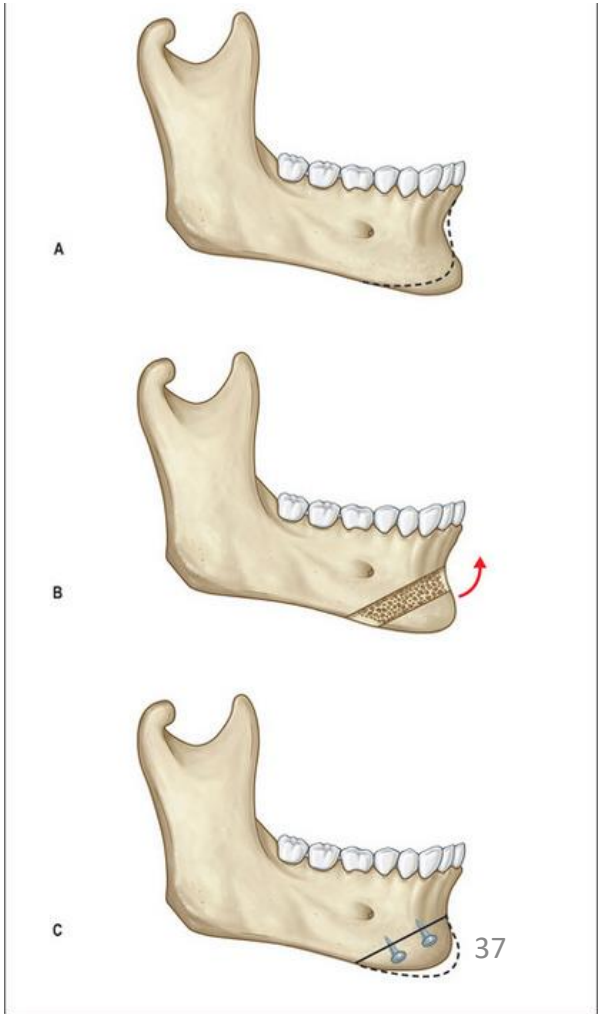
Procedures Involved in Maxillofacial Surgery:

More complicated or involved surgical intervention with tissue and bone elements is called maxillofacial reconstruction and beautification. Some procedures come as a result of congenital deformities, some from trauma occurrences, and others from disease damage. The oral maxillofacial surgeon may work alone or with other professionals in a team effort. Examples of reconstruction surgeries are:

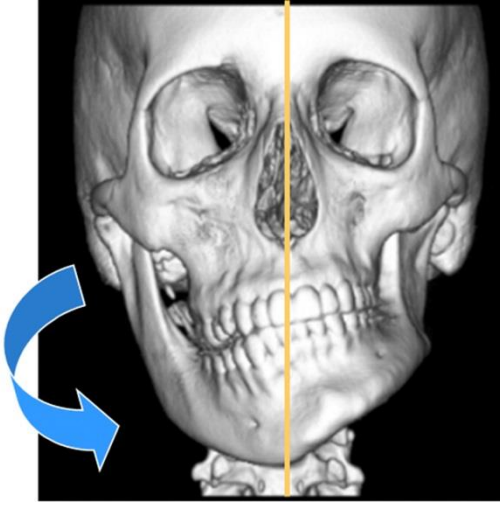
genioplasty: plastic surgery of the chin or cheek. Chin size is classified in one of six ways:

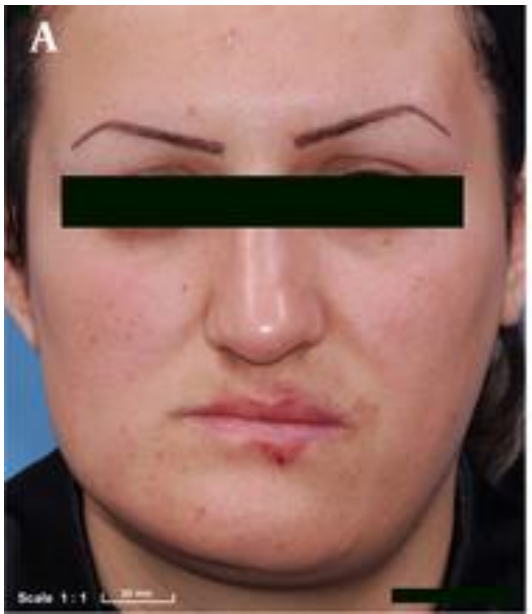
- **macrogenia**: large or excessive chin.
- **Microgenia** : undersized chin.





- **lateral excessive/deficient** : excessive bone in one direction and deficient bone in another.
- **asymmetrical** : lack of balance of size and shape on opposite sides.
- **pseudomacrogenia**: excess of soft tissue presenting a chin with the look of abnormal size.
- **"witch's chin"**: soft tissue ptosis (*dropping or sagging of an organ*).





Chin size may be altered by chin augmentation, which could involve Tissue liposuction or implanting bone cartilage, grafts, or alloplastic materials.

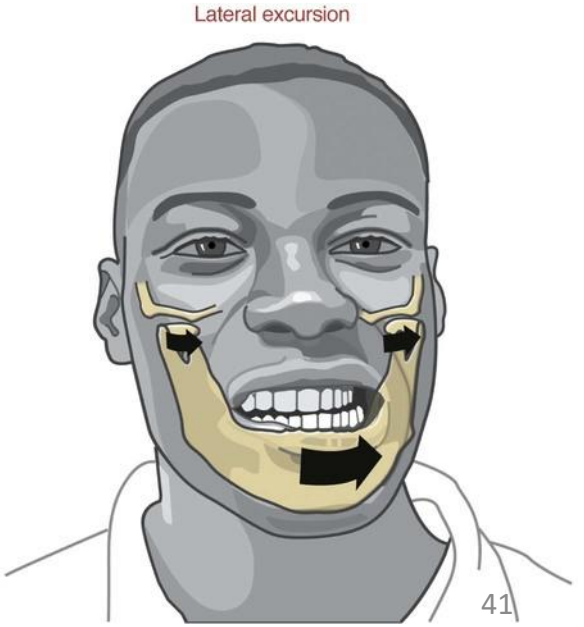
Osteotomy (***bone incision***), surgical movement of bone, or osteoplasty (***to form bones***) removal of bone, usually completed with surgical burs.

chin augmentation: may be termed ***sliding genioplasty*** because it is the option of moving the chin forward by making an incision inside the lower lip and inserting an artificial chin implant or moving the severed bone tip segment forward.

ridge augmentation: use of bone grafts to build or correct an underdeveloped or missing ridge possibly needed for tooth or denture implant or preparation for denture wear.

arthrotomy (***cutting into a joint***): reconstruction and alignment of the mandible for TMJ disorders. The mandible may be altered to obtain one of these three movements:

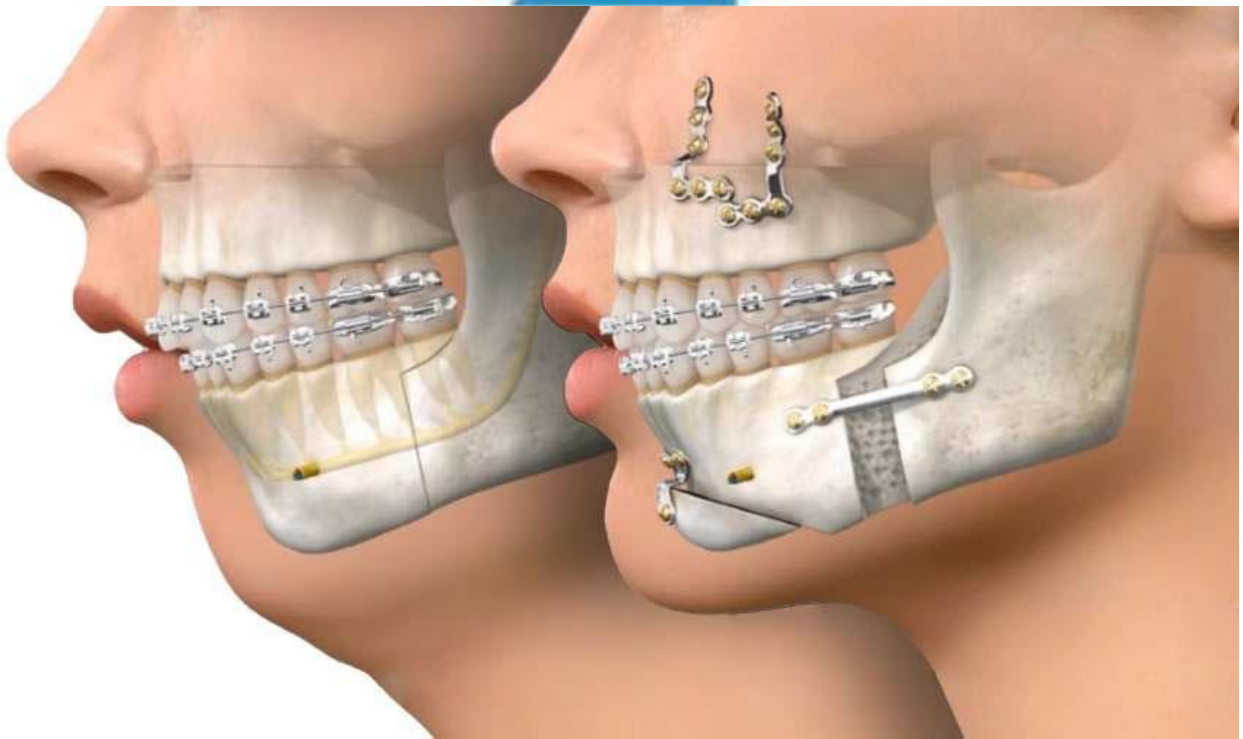
- **retrusive**: position with mandible backward.
- **protrusive** : position with mandible forward.
- **lateral** : position to the side.



cleft lip repair: tissue fissure or incomplete juncture of maxillary lip tissues; congenital effect.

cleft palate repair: congenital fissure in roof of mouth with an opening into the nasal cavity; may be unilateral (one sided) or bilateral (two sided); also may be complete or incomplete.

orthognathic surgery: surgical manipulation of the facial skeleton to restore facial esthetics and proper function to a congenital, developmental, or traumatic-affected patient; performed in cooperation with orthodontic involvement in planning and treatment. Osteotomy and osteoplasty techniques are used on orthodontic prebraced teeth and jaws.



Oral Surgery Procedures Involved with TMJ Dysfunction:

The temporomandibular joint (TMJ), composed of condyle of the mandible and the fossa eminence of the temporal bone, is for vertical and lateral movement of the lower jaw. Any malposition or derangement of these parts of the TMJ may cause pain and dysfunction. Repair of a dysfunctional TMJ depends on the severity of the malady.

Stages	Symptoms	Motion Function
Stage I Early	Painless clicking	No restrictive motion
Stage II Early/Intermediate	Occasional painful clicking, headaches	Intermittent locking
Stage III Intermediate	Frequent pain, joint tenderness, headaches, Painful chewing, locking,	restricted motion
Stage IV Intermediate/Late	Chronic pain, headaches	Restricted motion <35 mm
Stage V Late	Variable pain, joint crepitus, grinding	Painful function

One classification of internal derangement

Medical tests used to determine malposition of the TMJ are:

computerized mandibular scan (CMS): 3D tracking device to record functional movement of the jaw during opening, closing, chewing, and swallowing.

electyromyograph (EMG): surface electrodes instrument to determine muscle activity during function; healthy muscles have low levels of electrical activity, and disarranged muscles register high activity.

electrosonograph (ESG): recording of sounds during opening and closing of the jaw; also observed by use of a stethoscope.

CT (computed tomography, also known as CAT scan): uses X-ray images taken at different angles and computerized into a cross-section of anatomical features. It is used for diagnosis as well as for the preparation of Co-

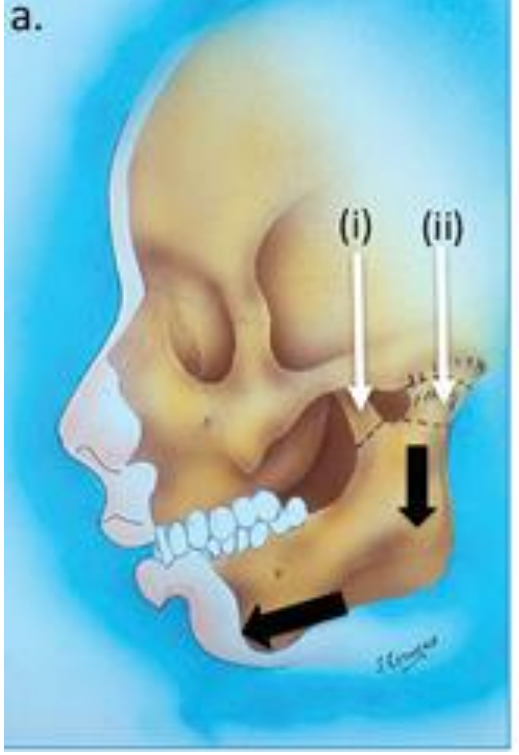
Cr-Mo (Cobalt-Chromium-Molybdenum) prostheses. See Figure 14-6 for an example of a CAT scan view involving the temporomandibular joint disorder (TMD).

Although some minor cases of TMJ dysfunction can be treated by selective grinding and aligning of tooth surfaces, night sleep guards, or temporary stabilization of the bite process, more severe cases of TMJ dysfunction require oral surgical services. Surgical intervention in TMJ treatment includes a variety of techniques, such as:

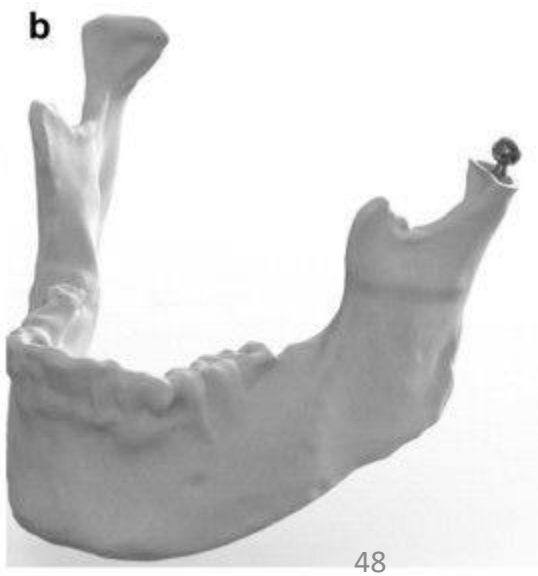
hemiarthroplasty : surgical repair of a joint with a partial joint implant reconstruction. This may be completed by:

autogenous reconstruction: rebuilding of the joint using organic material supplied by the patient, such as rib bone grafts.

alloplastic reconstruction: rebuilding of the joint using inert, synthetic man-made materials; can be manufactured to be resorbable or nonresorbable.



Commercial TMJ implant,



Intramedullary implant

allograft reconstruction: graft material taken from human donors, which can be tested, sterilized, and accepted by patient's body to rebuild the jawbone.

xenograft: harvested from animals, most commonly the cow; specially processed to become biocompatible.

total joint reconstruction: surgical intervention and use of artificial prostheses for the condyle, disc, and fossa of the temporal bone.

revision surgery: surgical correction of an area that has been operated on previously, occurring when further degeneration happens, when previous implants have failed, or when going from a partial joint implant to a total implant.

Procedures Involved in Implantology:

The oral maxillofacial surgeon may work in association with a prosthodontist or dentist in the construction and completion of a dental appliance involving a single implant or multiple dental bone implants. After extensive X-ray, CT scans, measurements, examinations, and planning , the surgeon may perform one of the following types of dental implants:

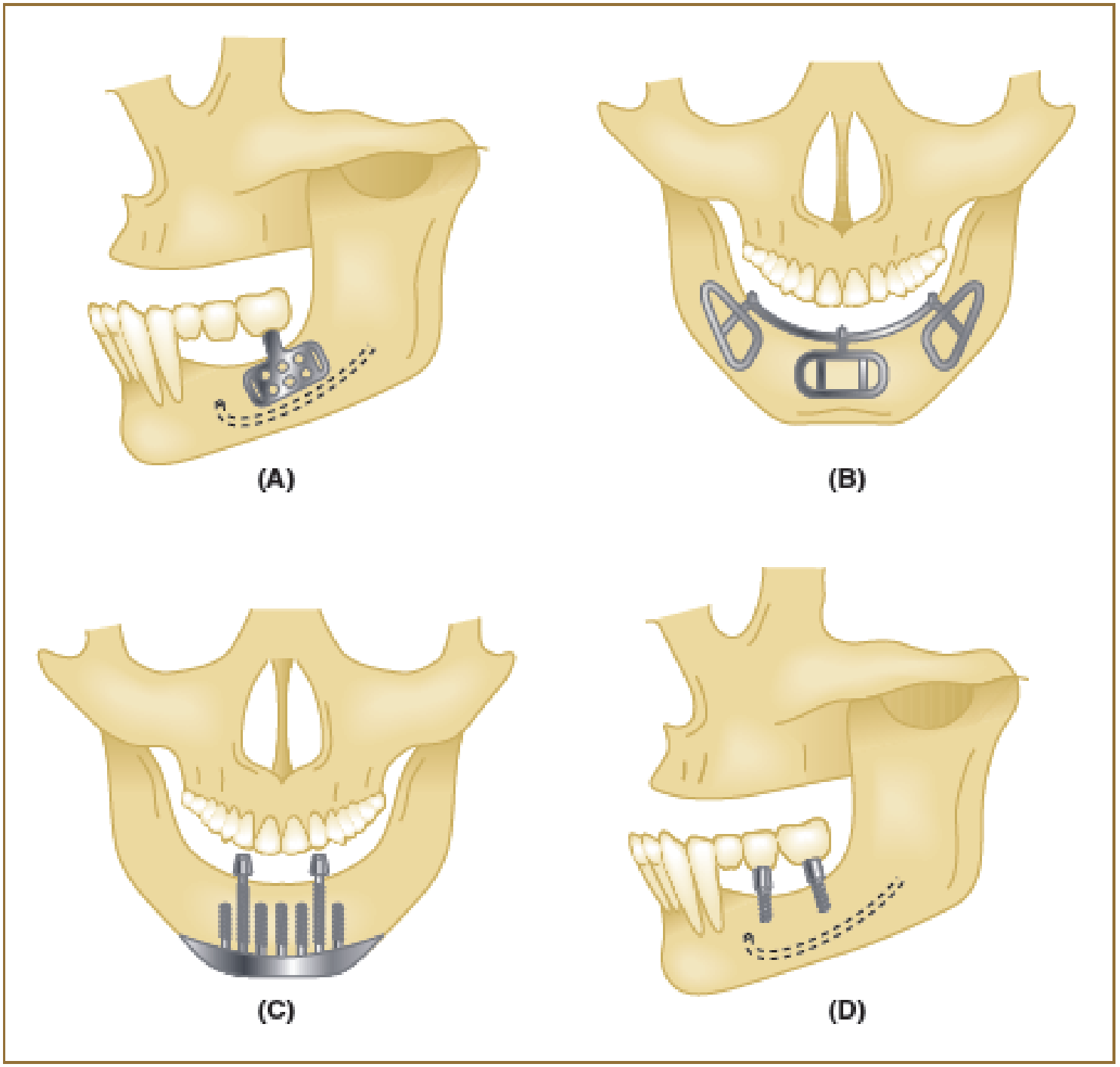
endosteal (*placement within the bone*): also known as osseointegrated implants; can be used as an anchor for a single tooth or areas, depending on the style of implant.

subperiosteal (*beneath the periosteum and placed onto the bone*): usually a cast framework implant with protruding pegs that is placed over the bone and covered by the periosteum; used to hold a base plate for tooth-replacing device, similar to a denture base.

transosteal (*through the mandibular bone*): anchor implants that are placed all the way through the mandible. These are also called staple implants.

endodontic (*within the tooth*): titanium post placed in the apex of endodontically treated tooth to improve the crown–root length ratio.

intramucosal insert: indentations in the palate used to provide anchorage for special mushroom-shaped pads built into the gum side of a removable denture.


(A)
(B)
(C)
(D)

When the jawbone is too thin or insufficient to accommodate an implant device, a bone graft or ridge augmentation may be completed beforehand. With the use of bone-grafting materials and methods mentioned previously in the paragraph on TMJ arthroplasty, the jawbone may be repaired and later used for dental implants. Maxillary sinus openings may cause a lack of bone structure for implant placement. The sinus may be elevated, and bone-grafting materials may be placed to encourage bone growth thick for implant devices.

Implant Material:

Implant pins or frameworks may be fabricated using any of several materials:

titanium: biocompatible with high strength; oxidizes readily on contact with tissue fluid and has a minimum amount of corrosion.

zirconia (zircon oxide ceramic): biocompatible, light colored; may be used in soft-tissue areas; for patients with allergies to other materials and patients who do not want metal framework in the mouth.

polymers and composites: in the research stage; may be used as abutments in partially edentulous mouth.

stainless steel and cobalt-chromium alloys: older but less used metal materials.

cobalt-chromium-molybdenum: implant material used in prosthesis construction for TMJ replacement.

Oral Surgery Role in Esthetic Dentistry:

As part of a combined project consisting of maxillofacial surgeons, prosthodontists, orthodontists, dentists, speech therapists, and others, the following procedures may be performed to alter, repair, give proper function, and present an improved cosmetic appearance:

cleft tongue repair: bifid or split tongue; usually split at the tip.

cleft palate repair: closing of lip and palatine tissues combined with orthodontic treatment.

cleft lip repair: tissue closing and repair of opening tissue gap

cosmetic alterations: some cosmetic repair or improvement work is necessary with extensive bone and tissue replacement or movement. Examples that may be performed are:

- **rhytidectomy :**excision of wrinkles by plastic surgery.
- **blepharoplasty** : plastic surgery of the eyelid.
- **rhinoplasty** : plastic surgery of the nose.
- **Septoplasty**: plastic surgery of the nasal septum.
- **neck liposuction:** suction of fat tissue of the neck.
- **lip, cheek, or chin augmentation**: improvement of tissue.
- **injectible botox and chemical peel:** skin (dermal) adjustment.