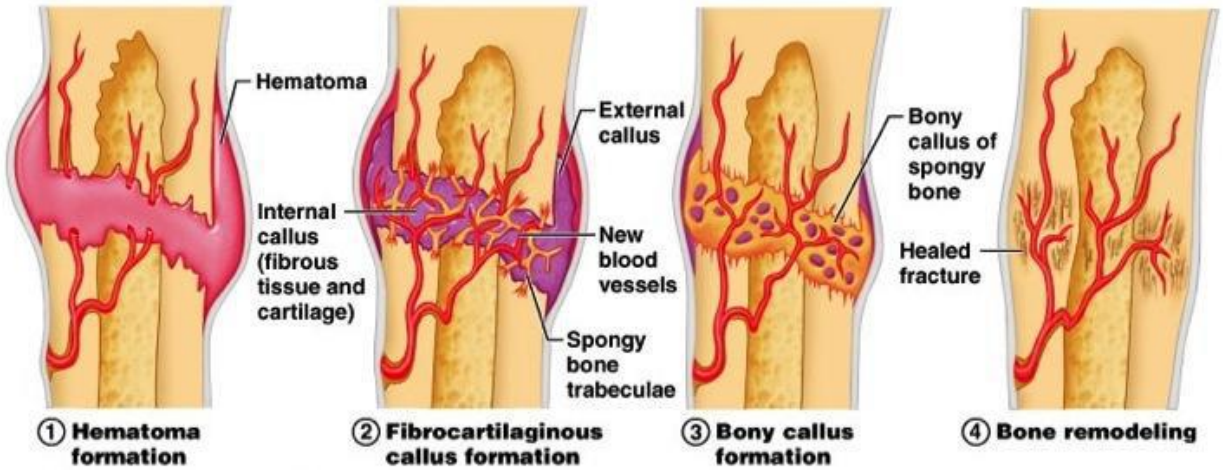
Lec.2+3/ Trauma- Mandibular Fractures

Fracture and Fracture Healing

- A fracture is defined as a break in the continuity of the bone which happens either as a result of violence or because the bone is unhealthy and unstable to withstand normal stresses.
- Owing to its prominence, the mandible is more commonly fractured than the midface.
- The force required to produce mandibular fracture is much higher than that of the maxilla, midface fractures occur with forces between one fifth and one third of those required to produce mand. fractures.
- The periosteum is the most important structure in determining the stability of the fracture.
- The healing process following a fracture includes two aspects; **healing of the soft tissues** and healing of the bone. The viability of the 'soft tissue envelope', specifically its blood supply is crucial. If the blood supply is compromised, there will be greater chances of infection, non-healing and bone loss.
- **Bone healing** occurs in two ways direct and indirect. **Direct bone healing (primary bone healing)** requires sufficient bone to bone contact and no mobility across the # line, Compression across a # is believed to facilitate this healing. This is only possible in the mandible, because direct healing requires heavy plates and large screws to achieve the necessary degree of rigidity and compression.
- **Indirect healing (secondary bone healing)** is a different process and occurs across a fracture where some degree of mobility persists. This is seen in limbs treated with orthopaedic casts and is the natural healing process seen in land mammals. The indirect healing starts as Initial hematoma formation that is followed by the ingrowth of fibrovascular tissue. Gradual ossification occurs and the fracture is encased by 'immature bone' or callus which is replaced by the remodeling process into the lamellar or 'mature' bone.



Fracture classification

A. According to the nature of injury:

1. Civilian-type fracture: fractures with no gross comminution and no extensive loss of hard and soft tissue, which is mostly due to RTAs.

2. Gunshot-type fracture: fractures with gross comminution and there is extensive destruction of both hard and soft tissue, which is mostly due to missile injury.

B. According to the type of fracture (The basic orthopedic classification):

1. Simple (closed): These include closed linear fractures, not opened into the skin or into the oral cavity or into the sinonasal cavities, such as # of the condylar process, coronoid process and ramus of the mandible, and # of the body of the edentulous mandible.

2. Compound (Opened): Fractures of the tooth-bearing portions of the mandible and midface are nearly always open into the mouth via the periodontal membrane. Fractures may be compound through the overlying skin. Nasal and zygomatic fractures are technically 'open' into the sinonasal airway.

3. Comminuted: A comminuted fracture is one where the bone is fragmented into multiple pieces. This usually requires more energy than does a simple fracture. Direct violence to the mandible from penetrating sharp objects and missiles may cause limited or extensive comminution. Such fractures are usually compound and may be further complicated by bone and soft tissue loss.

4. Pathological: Fractures are termed pathological when they result from minimal trauma to a bone already weakened by a pre-existing pathological condition (such as osteomyelitis, neoplasms or generalized skeletal disease). In the face this is most commonly seen in the mandible.

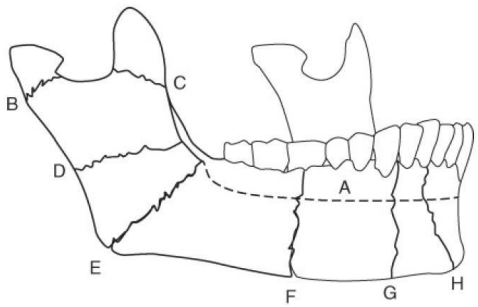
5. Complicated #: occur when injury involves nerves, major blood vessels or joints.

6. Impacted #: some linear #s interdigitate to such extent that there is no clinical movement.

7. Greenstick #: is a rare variant of the simple fracture exclusively in children, the elasticity of bone allows it to bend, only one cortex is fractured with the other being bent. As in # of the condylar neck.

C. According to the Site of Fracture:

1. **Dentoalveolar -A**
2. **Condylar (the most common)_B**
3. **Coronoid_C**



4. **Ramus_D**
5. **Angle_E**
6. **Body (molar/premolar area)_F**
7. **Symphysis (midline)_G**
8. **Para symphysis_H**

D. According to the Cause and Point of Application:

1. Direct fractures

2. Indirect fractures

3. Excessive muscle contraction

When the force is applied to the mandible, the point of application of the force is causing **direct fracture** and the resultant vector travels along the bone causing **indirect fracture**. Common combinations of direct and indirect fractures are:

- **Symphyseal (direct)** combined with **bilateral subcondylar (indirect)** fractures also called **parade ground** fracture or **guardsman's** fracture.
- **Parasymphyseal (direct)** combined with **contralateral subcondylar or angle (indirect)** fracture.
- **Body (direct)** combined with **contralateral angle or subcondylar (indirect)** fracture.

Teeth in the Fracture Line

- The teeth play a major role in determining where the fracture occur.
- The teeth are extremely helpful in reduction and fixation of fractures.
- The occlusion of teeth is delicately balanced mechanism and any disturbance result from malunion of # leads to reduction in the masticatory efficiency and comfort
- The long canine tooth and partially erupted or unerupted wisdom teeth, teeth sockets present lines of relative weakness.
- The teeth themselves are a potential source of infection in many mandibular fractures.
- However, any fracture of the mandible with a tooth in the fracture line is nevertheless a compound fracture and the tooth which may have been devitalized, represents a potential source of infection.

Absolute indications for removal of a tooth from the fracture line:

1. Longitudinal root fracture.
2. Dislocation or subluxation of the tooth.

3. Periapical infection.
4. Advanced periodontal disease.
5. Acute pericoronitis.
6. Infected fracture line.
7. A displaced tooth prevents reduction of the fracture.

Relative indications for removal a tooth from # line:

1.Functionless tooth 2.Advanced caries 3.A tooth that could be added to existing denture

Associated Anatomical Structures

1. The **inferior alveolar nerve and vessels**
2. The **mental nerve** exits the mandible through the mental foramen in the premolar region providing sensory innervations to the lower lip, when damaged; results in paraesthesthesia of lower lip.
3. **Branches of the facial nerve** lie superficial to the mandibular ramus and occasionally the marginal mandibular division of the facial nerve is damaged in association with a fracture of the body or angle.
4. **Inferior dental artery** which is associated with brisk haemorrhage in mandibular body fractures.
5. **Dorsal lingual vein** which is associated with sublingual haematoma.
6. **facial vessels** are also vulnerable where they cross the lower border of the mandible.

Common signs and symptoms of mandibular fracture(s)

- Pain: especially on talking and swallowing
- Numbness of the lower lip due to injury to inferior alveolar nerve, except fractures anterior to mental foramen (e.g symphesial #)
- Swelling
- Trismus and difficulty in moving the jaw
- Drooling
- Bone tenderness over fracture site
- Altered occlusion
- Loosened teeth
- Mobility of fractured segment

- Bleeding from the fracture site especially in body fractures when the inferior alveolar artery is torn, or bleeding from the ear as in some cases of condylar fractures.
- Haematoma; especially sublingual (pathognomonic)
- Step deformity palpable at the site due to displacement of the fracture segments

Local examination:

Extra oral examination:

1.Inspection: ecchymosis, swelling, laceration, ant open bite or bone contour deformity

2.Palpation: step deformity and compression test

Intraoral examination:

1.Inspection: lingual and buccal sulcus ecchymosis, sublingual hematoma (pathognomonic)

2.Palpation: tenderness, step deformity and teeth mobility. The thumb and forefingers of each hand placed on either side of possible # site and gentle pressure is used to elicit mobility across the # line.

Treatment Principles (Steps of Definitive Treatment):

- **Reduction**
- **Fixation**
- **Immobilization**
- **Follow up and Rehablitation**

Reduction

It is the process of approximation and repositioning the ends of the fractured bone in the proper position (restoration of functional alignment of the bone fragments).

In the dentate mandible reduction must be precise when healthy occluding teeth are involved. Less precise reduction may be acceptable if the patient is edentulous or there are no opposing teeth.

Reduction is either **open reduction** or **closed reduction.**

- **Closed reduction** is done by manual manipulation by elastic traction or by wires, without surgically exposing the fracture bone ends
- **Open reduction** is done by manual manipulation after exposing the fracture bone ends surgically. which facilitates anatomical reduction and fixation.

- **Advantages of open reduction**:
  1- The fracture can be reduced exactly by direct vision.
  2- For the refracturing of malunited or non-united fracture

- **Disadvantages of open reduction:**
  1-.As the fracture area is exposed, there is more risk of infection.
  2- If done under general anesthesia, so more risk and cost to the patient.
  3- Submandibular or pre auricular skin scar.

Fixation

- Fracture fixation may be either **internal fixation** or **external fixation (external pin fixation)**
- Internal Fixation can be either rigid or semi-rigid or non rigid fixation.
- Rigid fixation means that there will be no movement across the fracture site. It is maintaining and securing the proper reduction until healing occurs. This produces a level of stability that direct bone healing can take place (assuming there is sufficient bone-to bone contact).

Immobilization

Traditionally, immobilization of the jaws involves linking them temporarily to each other by some form of InterMaxillary Fixation (IMF) - also called MandibuloMaxillary Fixation (MMF).

Methods of immobilization (IMF):-

- **Arch bars -**They are tooth borne devices and the **most versatile form of IMF**.

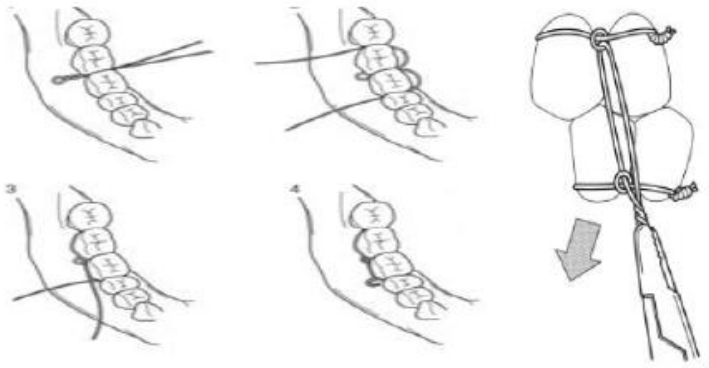
-They are used mandibular fractures, for fixation of avulsed teeth, and dentoalveolar fractures.

-Arch bars are **indicated where** the patient has an insufficient number of suitably shaped teeth or when a direct linkage across the fracture is required.

-They can be custom made or commercially manufactured. Many patterns or designs of arch bars are present; Erich and Jelenko patterns are the most common. Recently hybrid arch bar systems that use bone support have been developed.

- **Bonded orthodontic brackets** By bonding a number of modified orthodontic brackets onto the teeth and applying light wires or intermaxillary elastic bands.

➢ **Interdental wiring** it is **only applicable when the patient has a complete, or almost complete, number of suitably shaped teeth**. 0.5 mm soft stainless wire is usually used. Many different techniques for wire fixation exist; direct interdental wiring, eyelet wiring (commonly used) and Ernst ligatures.



➢ **IMF Screws:** These screws are self-drilling and self-tapping. The screw head is elongated and contains holes for wire placement. They are inserted through small incisions in the labial vestibule avoiding injury to the apices of the nearby teeth, it is regarded as a rapid method to achieve IMF.

➢ **External pin fixation:** This method is seldom used nowadays, it is indicated in special conditions, such as infected #, fractures caused by gunshot injuries or pathological fractures. Ideally, at least two self-tapping screw pins are placed either side of the fracture or defect. The pins linked by an external bar.

➢ **Cap splints:** a cap splint made of acrylic or metal can be fabricated and used for fixation of the fracture. The splint is secured to the mandible by circum-mandibular wiring, using a bone awl.

➢ **Dentures or Gunning-type splints:** for edentulous jaw fractures, complete denture can be used as a splint and if the patient is not denture wearer Gunning-type splints can be fabricated, they take the form of modified dentures with a space in the incisor area to facilitate feeding. They are fixed to the jaws by circum-mandibular and maxillary wires or screws, IMF is achieved by connecting the two splints with wire loops or elastic bands.

Cap splint

Gunning splint

Period of immobilization:

With early uncomplicated treatment in a healthy young adult; union can on average be achieved after 3 weeks, at which time the fixation can be released. Further **1ᑫ2 weeks should be added for** each of:

1. Where a tooth is retained in the fracture line.
2. Patients aged 40 years and over.
3. Patients who are smokers.
4. Mobile or comminuted fractures.

A. Closed Treatment

- This method can be used as a definitive treatment of mandibular fractures or as temporary fragment stabilization in emergency cases.
- It consists of closed reduction with indirect fixation and immobilization with IMF.
- It is the **traditional conservative treatment** of mandibular fractures.
- Closed reduction is achieved without surgical exposure of the fracture site; it utilizes the teeth to achieve normal occlusion and immobilization of the fractured fragments.

The **main indications** of closed treatment are:

1. Non-displaced favorable fractures.
2. Limited resources and facilities for open treatment.
3. Medically compromised patients.
5. Pediatric fractures with mixed dentition phase.
6. Edentulous fractures.

Advantages of closed treatment

✓Non-invasive, simple, easy to master.

✓Can be performed under local anesthesia.

✓Less expensive.


IMF by using Erich Arch bar

Disadvantages of closed treatment

1) The closed treatment does not ensure precise anatomical reduction of the fractures.

2) Difficult to apply in cases of malocclusion, missing, diseased, or damaged teeth.

3) The immobilization may not be adequate which delays the healing.

4) IMF prevent the normal jaw function and affecting on feeding (restrict the diet to a liquid or semi-solid consistency, weight loss is common) and on speech.

5) Oral hygiene is difficult to maintain.

6) In many patients there is also a significant reduction of ventilatory volume.

Contraindications include some conditions, e.g., epilepsy, chronic respiratory diseases, incompliant patient, or chronic alcohol or drug abuse.

B. Open treatment

It consists of **Open Reduction** and **Internal Fixation** (ORIF) or direct skeletal fixation.

ORIF is now considered the main method of treatment of mandibular fractures.

The **main indications** for open treatment:

1. Displaced unfavorable fractures.
2. Multiple fractures of the facial bones
3. Fractures of an edentulous mandible with severe displacement.
4. Delay of treatment and interposition of soft tissue between fracture fragments.
5. Special systemic conditions contraindicating IMF.

Depending on the planned method of internal fixation and the site of the fracture, three different surgical approaches to the mandibular body, with slight modifications, are possible: **intraoral, extraoral, or combined access.**

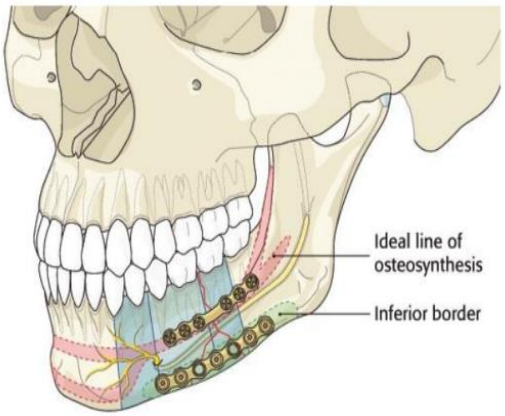
Methods of internal fixation (Osteosynthesis)

I. Interosseous or Transosseous wiring

It is the direct fixation with the aid of wire ligatures pulled through drilled holes. It can be applied on the upper or lower border following reduction, it is considered a **non-rigid fixation method** and IMF is required. Wiring can be in the form of simple ligature, combination of simple ligature and figure-of-eight wiring or in the form of double ligature. The advent of plating techniques has superseded interosseous wiring in most situations especially in developed countries.

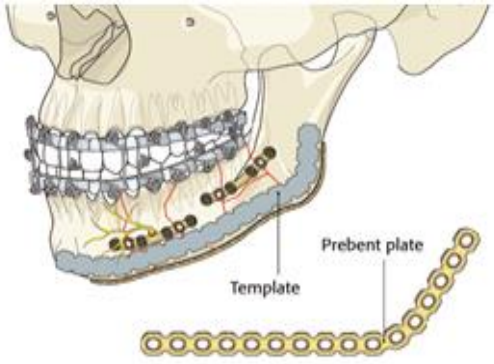
II. Miniplates (miniaturized plates)

- These are the **most common form of internal fixation** used in the management of mandibular fractures. They provide **semi-rigid or load sharing fixation by intra oral approach. Load sharing** means there is sufficient bone to bone contact across the fracture line (the bone share the load with the plate)
- **Champy's (ideal) line of Osteosynthesis** run along the tension line (note that the tension zone lies in the upper border while the compression zone lies in the lower margin) across the fracture in the body of the mandible from the canine region to the oblique ridge below the apicies of the teeth.
- Two point fixation (two plates) give good stability;it is preferable to place one plate in champy's line and the other in inferior border below the course of mandibular canal. The plate can be anchored using only the outer cortical bone with so-called "**monocortical**" screws. Two plates **at least 5 mm apart** are required for the body and anterior mandible.
- The overwhelming advantage of plating techniques is that they are all sufficiently rigid to obviate the need for IMF in most cases.
- Any method that does not rely on IMF must ensure the precise restoration of the occlusion. That's why about 25% of cases treated with plates need occlusal adjustment postoperatively.



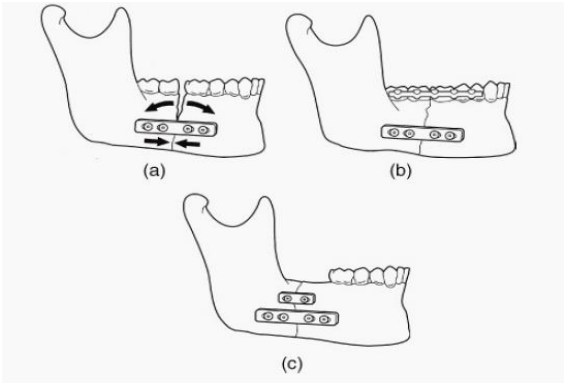
III. Non compression Rigid plates (Reconstruction plates)

- These plates provide **rigid** or **load bearing fixation**. **Load bearing** means the plate bears the load alone, as in lost segment across the fracture line or in comminuted cases.
- These are not used for routine mandibular fracture management
- They are mainly **used in the management of severely comminuted fractures, in fractures where there are continuity defects.**
- Adaptation of the plates is technically more difficult and they are longer than miniplates that **require an extra-oral approach** for accurate placement.
- They require **bicortical screws** (engagement of buccal and lingual corticies) and are fixed in place at or near the lower border of the mandible in order to avoid damage to the inferior alveolar nerve and the dental roots.
- Some modern designs of plates employ **locking screws** that lock into the plate at the completion of insertion in order to avoid any micro-movement between the plate and the screw.



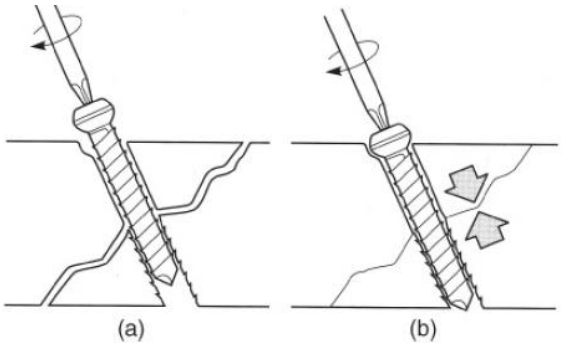
IV. Compression plates

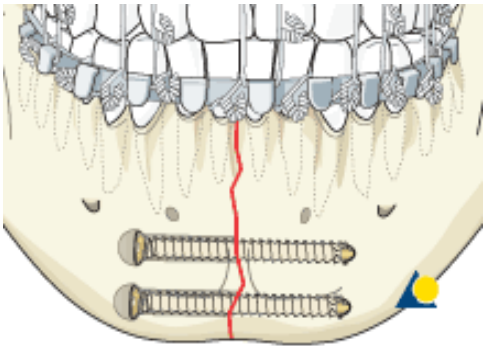
- These plates provide **rigid fixation**.The principle of compression plating is by transforming the downward force of screw insertion into compressive force, this displaces the screw and the fractured fragment in the direction of the opposite fragment, resulting in compression between the bone ends.
- **These plates were abandoned** Because of the difficulty in application and multiple complications (include the **tendency for the fracture line to open**), also they do not offer much advantage to the treatment.



V. **Lag screws**

- In **oblique fractures**, **compression lag screws** are placed perpendicularly across the fracture line.
- To produce compression, the proximal bone hole is oversized so that only the distal fragment is engaged by the screw. Tightening applies sufficient compression and consequently fixation of the fracture site.
- It is an effective method, which can be employed transorally in a number of cases. This technique appears to be ideal for **parasymphyseal and symphyseal fractures**, but it becomes technically more difficult in body or angle fractures because the risk of damage to the alveolar inferior nerve increases.





Disadvantages of bone plates:

1. Fracturing of the roots of the teeth

2. Metal fatigue fracture of the plate

3. Fracture of the small fragments of bone ends at the point of screw insertion

4. Scar

5. Infection and bone necrosis

Fractures of the Condyle

- **Trauma to the TMJ results in one of the following:**

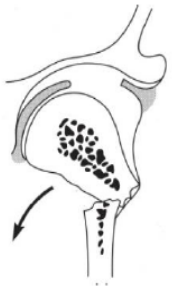
1.Contusion: may be accompanied by a synovial effusion, hemarthrosis (bleeding in the joint space) or tearing of the meniscus.

2.Traumatic dislocation: irreducible displacement of the condyle from the glenoidfossa is usually anterior and/or medial. Lateral, posterior or central dislocations rarely occur.

3.Fracture: includes any fracture above the level of the sigmoid notch.

- Fractures involving the mandibular condyle are the only facial bone fractures that involve a synovial joint.
- These are the **most common fractures of the mandible** and are the most commonly missed on clinical examination.
- Fractures of the neck of the condyle can be regarded as a safety mechanism that protects the patient from the serious consequences of a middle cranial fossa fracture.
- When a fracture of the condylar neck occurs; the condylar head is frequently displaced within the articular fossa.The most frequent direction of displacement is **medially and forward** under the influence of the **lateral pterygoid muscle**.

Condylar displacement forward medially



- Despite much recent interest in open reduction techniques, there are still no definitive guidelines for the treatment of fractures of the mandibular condyle and this remains a controversial topic.
- **The type of Condylar fractures may be**
  - **Unilateral or**
  - **Bilateral**
  - **May involves either the joint compartment (intracapsular fractures) or**
  - **The condylar neck (extracapsular fractures- the most common) with or without dislocation.**
- **Signs and Symptoms of Condylar Fracture:**

  1) Swelling and tenderness over the TMJ area and there may be hemorrhage from the ear. Bruises in the region and should not be mistaken with Battle's sign associated with cranial base #.

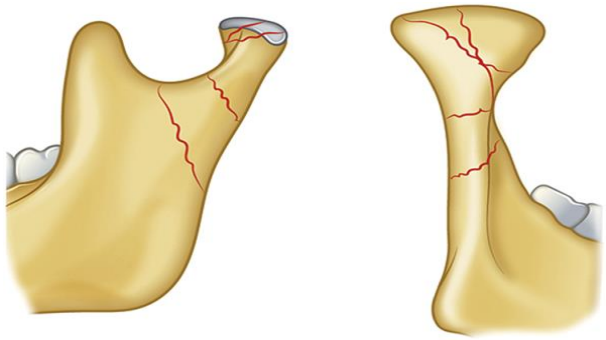
  2) limitation of mandibular protrusion

  3) On inspection intraorally there may **deviation of occlusion** towards the fracture side. Also **deviation of the mandible during opening to the affected side**.

  This is due to displacement of the condyle by the lateral pterygoid and the masseter pull of the ramus cause cover-riding of the fractures **('telescoping'),** shortens the ramus on the affected side and produces premature contact of the occlusion on the ipsilateral molar teeth

  4) In bilateral condylar fractures; the signs and symptoms are the same as in the unilateral but present on both sides and there is **anterior open bite** due to bilateral shortening of the rami.

- An intracapsular fracture of the condylar head will frequently cause a **haemarthrosis** (hemorrhage within the joint). If this occurs in a young child it can **predispose to fibrous or bony ankylosis** of the temporomandibular articulation and interference with the growth potential of the condyle.



- The **meniscus** is an important component of the temporomandibular joint. Routine radiographs do not delineate this structure although it can be **visualized by magnetic resonance imaging**. Tearing of the meniscus along with haemarthrosis predisposes to late fibrous or bony ankylosis.
- In children: all intracapsular fractures and all fractures in growing children should be treated conservatively. Immediate or early mobilization should be encouraged. If the occlusion is disturbed IMF is applied and maintained until stable union can be expected to be present, the period of immobilization should not exceed 10-21 days.

- **There are 3 Treatment Options:**

1. **Functional (conservative)**
2. **Indirect immobilization(IMF)**
3. **Osteosynthesis(ORIF)**

	Intracapsular (condylar head)		**Extracapsular (condylar neck)**	
	Unilateral	**Bilateral**	**Unilateral**	**Bilateral**
Children under 10 years	- Entirely functional where possible. - Indirect immobilization by IMF for control of pain but should be released after 7–10 days. - With intracapsular #: careful follow-up and monitoring of growth, any sign of ankylosis will require surgical intervention.			
Adolescent 10-17 years	- The same principles above with less capacity of spontaneous correction - Malocclusion indicate: IMF 2-3 weeks - Argument for ORIF major displacement of condyle in severe fracture dislocation			
	Stable Occlusion:	**Malocclusion is usual**:	**No or minimal displacement:** no active treatment is necessary	**# usually unstable and displaced**: ORIF at least

Adults	conservatively No IMF **Malocclusion:** IMF 2-3 weeks	IMF for 3-4 weeks followed by post IMF physiotherapy and jaw exercise to avoid chronic limitation (i.e. prolonged IMF can result in capsular contraction and limitation of mouth opening)	**With displacement**: **a-low condylar neck #** managed by ORIF **b-High cond. Neck #:** either ORIF or IMF for 3-4 weeks followed by intrermittent night elastics to avoid relapse, selective grinding may be required	for one side to restore ramus height **In very high condylar neck #:** ORIF but if not possible IMF for 6 weeks If associated with major midface #: bilateral ORIF is desirable Retromandibular and transparotid approaches used for difficult cases

Indications for open reduction and fixation of condylar neck fractures:

Absolute indications:

-Displacement of condyle into middle cranial fossa

-Impossibility of restoring occlusion without ORIF

-Lateral extra-capsular displacement

-Invasion by foreign body (e.g. missile)

Relative indications:

-Bilateral fracture with associated mid-face fracture

-Bilateral fracture with severe open bite deformity

-Unilateral fracture with dislocation.

-When IMF is contraindicated for medical reasons

Complications

- Malocclusion.
- Limitation of range of movement.

- **Ankylosis of the TMJ**; fractures that involve the joint space, particularly in pediatric patients, seem most prone to result in this complication. Ankylosis can be fibrous or bony. Predisposing factors include:
  1. **Age:** the major incidence is below the age of 10 years.
  2. **Type of injury**: intracapsular trauma with crushing of the condyle.
  3. **Damage to the disc**: disruption of the disc is likely to occur in two particular types of fracture: a severe intracapsular compression injury or a fracture dislocation.

Angle Fracture

This is the most common fracture after condylar neck fracture.

The angle is a weak area since:

-It is the junction of the ramus and the body of the mandible

-The presence of an impacted mandibular third molar

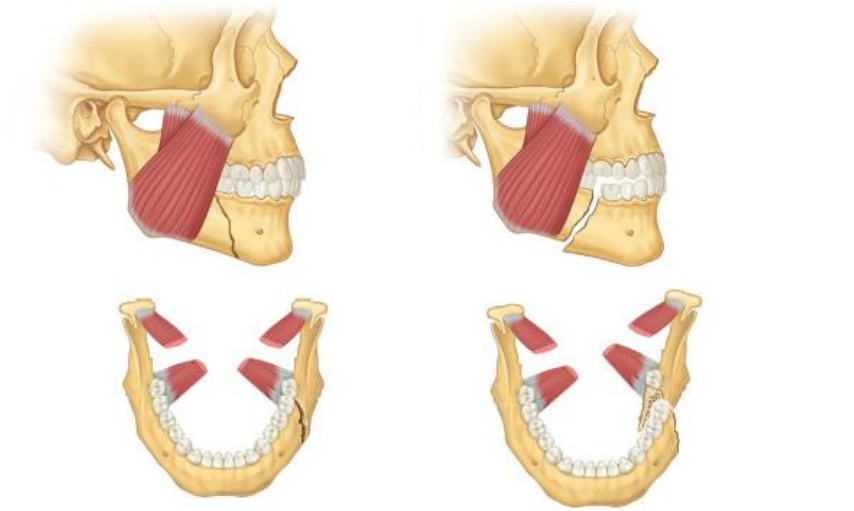
The fracture may be classified as ***favorable*** or ***unfavorable*** depending on the severity of posterior fragment displacement.

The displacement depends on:

-the pull direction of the masseter and medial pterygoidmuscles

-the direction of the fracture line vertically and horizontally

Favorable when the muscles tend to pull the fragments together (minimizing displacement) and **unfavorable** when they are significantly displaced by the muscles. These are further considered as **vertically** or **horizontally** favourable or unfavourable, depending on the direction of displacement.



Mand. Angle fractures - above: Masseter pull, Horizontally Favorable and unfavorable # - below: Medial Pterygoid Pull, Vertically Favorable and unfavorable angle #

Body fracture

Little displacement of the fragments occurs in a unilateral # in the premolar and molar areas. Fibers of the mylohyoid on either side of the # line probably play an important part in minimizing the displacement.

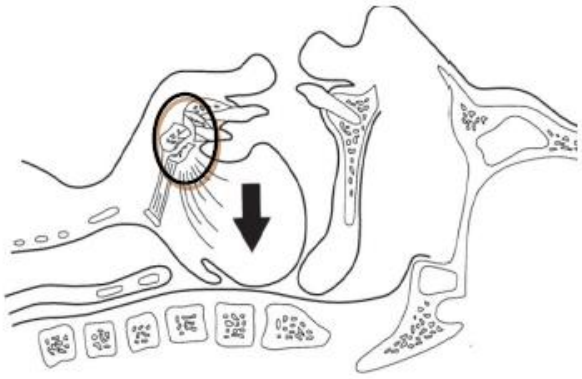
Symphysis (Midline)

This fracture cause minimal displacement as the fracture line runs between the genial tubercles, and the pull of the geniohyoid and the genioglossus muscles tends to impact the bone. Mostly associated with bilateral condylar fracture.

Parasymphyseal (Canine) Fracture

The fracture line running to one side of the genial tubercles and the displacement depend on the pull of the geniohyoid and genioglossus muscles which pull the greater fragment lingual to the lesser fragment.

When a bilateral parasymphyseal fracture occurs it is usually displaced posteriorly under the influence of the **genioglossus muscle** (which forms the bulk of the tongue and inserted at the genial tubercles). If consciousness is not impaired, considerable disorganization of the anterior mandible and the adjacent soft tissue can take place without any significant loss of voluntary control of the tongue, but there is a risk of airway obstruction if the level of consciousness is impaired.



Coronoid Process Fracture

This is a rare fracture. If the tip of the coronoid process is detached, the fragment is pulled upward towards the infratemporal fossa by the pull action of the temporalis muscle.

Clinical features:

1. Intra oral ecchymosis on the coronoid process region.

2. Tenderness on palpation over the region of the coronoid process.

3. Pain and limitation of mandibular movement especially on protrusion.

Ramus Fracture

The fracture are splinted between the masseter and the medial pterygoidmuscles and little displacement occurs. Swelling, ecchymosis and tenderness on palpation over the ramus extra and intra-orally and painful mandibular movements.

Complications of Mandibular Fracture:

1. Paraesthesiaor anesthesia
2. Skin scar
3. Derangement of occlusion
4. Ankylosisof TMJ

Follow up and Rehabilitation

The postoperative care of a patient with mandibular fracture may be divided into three phases:

1. The immediate post operative phase; when the patient is recovering from the general anesthesia until about one week*:*

* If MMF has been carried out, bedside instruments such as scissors, wire cutter, screw driver necessary to remove the fixation should be available in emergencies.

* The patient should be returned from the theatre with nasopharyngeal tubes in position and should be left in situ until the patient recovers consciousness.

The patient should be nursed lying on his side during recovery.

* The patient should be given Antibiotics and IV fluids

2. The intermediate postoperative phase, from 2ndweek to 4thweek; when IMF is still in position:--

-Postoperative radiographs

-Fixation must be checked to see if the splints become loose

-The patient should eat semi-solid or liquid diet and passing the diet by rubber tube through a gap in the fixation or round the back of the lower teeth in the retromolarregion.

-Instructions and motivations for good oral hygiene

3. The late postoperative phase, from 4THweek to 6THweek:* About 4 weeks after immobilization:

-The fracture site should be examined by gentle movement across the fracture line after loosening of fixation, if the union is rigid, the fixation apparatus is removed by cutting the dental wires. While bone-plating or transosseouswires left in situ unless causing complications.

-Selective grinding of teeth cusps or selective tooth extraction if there is traumatic occlusion.

-The vitality test of teeth should be checked to do R.C.T for non vital tooth.

-Reassurance of the patient if there is paraesthesiaor anesthesia of the lower

Considerations in Pediatric Fractures

Fractures of the mandible are uncommon in children and some modifications to the principles of treatment are necessary when the fracture occurs in a child. The main characteristics of mandibular # in children are:

- ✓ The bone in young children is resilient and greenstick fracture is more likely to occur.
- ✓ There is a risk of damage to developing teeth. Direct osteosynthesis should be avoided if possible. However, plating (resorbable) or wiring the lower border may occasionally be indicated in severe displacement.
- ✓ Mandibular fractures in young children heal very rapidly and some fractures are stable within a week, and firmly united within 3 weeks.
- ✓ **Treatment of mandibular fractures in children is generally of a conservative nature**.
- ✓ Accurate reduction is less important as further growth will often compensate for occlusal discrepancies.
- ✓ A prolonged period of follow-up is important
- ✓ Fractures of the condyle require special consideration; because the condyle is a growth center and such fractures may disturb the growth of the mandible.
- ✓ In **very young with unerupted** or **very few deciduous teeth** a **Gunning-type splint** (the same one that is used for edentulous patients) for the lower jaw alone may be used. This is constructed as a simple acrylic and retained by two light circumandibular wires.
- ✓ When **sufficient** firm **erupted deciduous and permanent** teeth are present, **eyelet wires or arch bars can be used.**

Considerations in Fractures of the Edentulous Mandible

The physical characteristics of the mandible are altered considerably following the loss of the teeth:

- ✓ The alveolar process undergoes resorption and the mandible becomes atrophic and thin.
- ✓ The resistance of the bone to trauma is further reduced by changes in the structure of the bone associated with the process of ageing.
- ✓ The blood supply of the edentulous mandible is more periosteal due to the diminished endosteal blood supply of the mandible.
- ✓ The healing potential of the bone is reduced and the healing of the fracture is a slow process and the complications such as nonunion are more likely to occur.
- ✓ The absence of teeth means that precise anatomical reduction is not necessary as any inaccuracy is easily compensated by adjustment of dentures.

Treatment

- Undisplaced fractures require no active treatment.
- The edentulous mandibular fractures can be treated by closed reduction using the **Gunning type** splints or if the patient is a denture wearer, the **dentures** can be modified to allow IMF, which can be used as a splint.
- When ORIF is required, reduction should be made with minimum exposure of the fracture site to minimize interference with the periosteal blood supply. Fixation methods include; **transosseous** wiring and **bone plates.**
- Very thin mandible may not unite satisfactorily with conventional methods of reduction and fixation and in these cases autogenous bone grafting should be used to stabilize and augment the fracture where the patient's general condition permits.

This is the End of the Lecture, Good Luck