Surgery sheet 19   
Mandibular and condylar fractures

Edentulous mandibular fractures

The mandible has certain features that make it **more susceptible** for fractures compared to other facial bones. One of these features is the loss of teeth, and we all know that clearance of teeth is followed by alveolar resorption, so we will have atrophic jaw that is more susceptible for fracture.

the ID blood supply (ID artery, vein, neural bundle) would be lost with the recession, and the only blood supply of the mandible will depend on the periosteum.

For an edentulous fracture, the patient is most likely medically compromised, medical compression

itself is a contraindication for surgery.

 The patient is with a mandibular spaced fracture, but he isn't fit for surgery because of kidney

problems.

 Communicated fracture, but cannot withstand general surgery.

 Anaemic patient with Hb of 7

 Leukemic patient with jaw fracture

So the **risk of surgery in edentulous mandible is higher compared to** **dentate, due to compromised blood supply.** And with surgery and muco-perioseal flaps we will compromise the blood supply further.

Most of these patients are elderly, **and most commonly medically** **compromised**, and that would compromise our treatment, also the patient may not fit for surgery and anesthesia.

We can say that elderly patients are fit for closed reduction rather than open reduction unless there are indications.

Another feature is that **loss of teeth will lead to loss of occlusion**, and **occlusion is important feature in closed reduction**. So if the patient doesn’t have a denture we make him one, or we can use his exciting one, and we ask the prosthe department **to do gunning splint to enhance intermaxillary fixation.**

**Gunning splint** **is something like the denture, that we make when the denture is broken after trauma, its temporary like bite blocks.**

We do **intermaxillary fixation several weeks** prior to closed reduction.

**Without occlusion we can’t do reduction nor fixation**.

**Specially in elderly and very young patients, go for the most conservative choice that works**.

**We have 3 options**, the closed reduction (non-surgical), open reduction, rigid fixation.

If the bone **is very atrophic and weak, we need rigid fixation**.

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we have to **look at the medical assessment and local assessment** of the fracture, and if the whole assessment gives you **indication optimal bone** **healing**, that means we might need load sharing, so we use mini plates.

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But the **mandible is very atrophic, very thin, and medically compromised**, **so no optimal fracture healing condition**, because all **of that we need load** **bearing not load sharing**, so the most type of fixation used when surgery is intended is the reconstructive plate for load bearing.

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specific concern has to be paid for mandibular fractures in children, the mandibular bone in children has specific concern that there is a growing stage in the bone, we have mixed dentition, ***all these features complicate*** **the surgical option**. Arch wires are very heavy on deciduous teeth, the may loosen them.

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So we start with the most conservative option that is the closed reduction, unless its **contraindicated such in epileptic patients**.

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The **best way other than intermaxillary fixation** is using occlusal splint, its **like RPD with wires that go under and around the mandible to provide adequate fitness between the two surfaces of fracture.**

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In **children prolonged intermaxillary fixation** is not preferred, because it can cause TMJ ankyloses, actually it’s the most common cause for TMJ ankyloses, **so its only indicated for 2 weeks in children**, **not any longer than that. In adults its okay up to two months**

The **third important part of mandibular fractures** is the condylar fracture.

The condyle is ***a primary growth center*** and what applies for these fractures doesn’t apply for other fractures.

We might leave a medially displaced condylar fracture or treat it conservatively, expecting that it will be modified with growth

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**condyle is the most common site** for mandibular fractures, other say that the body is the most common, and that varies according to geography, the trauma is most commonly in the symphesial area, and the force is transmitted to the condyle.

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**In accidents high forces** are directly transmitted and cause body and angle fractures, so the etiology determines the type of fracture.

**Intra-capsular fractures account for 14% in adults**, **but in children it’s the most common and accounts for about 40% of all condylar fractures**.

This also depends on the **thickness of condyle and the condylar necks** **height,** in young patient we have **short neck and thick condyle**, so the force is directly transmitted to the condylar head causing fracture.

But in the adults the most common is sub-condylar or condylar neck, because its long, so it’s the weakest point.]

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So the incidence of fracture in the condyle is dependent on the age.

Most condylar fractures are unilateral rather than bilateral and in the left side.

Surgical anatomy of the condyle:

Condyle is **articulated to the glenoid fossa and the articular disk between them, and the lateral pterygoid muscle is attached to the anterior part of the condyle and the articular disk, so in case of fracture there will be anterio-medial displacement, and it’s the most common direction in condylar fracture, but generally displacement could occur in any direction** but the most common is anterio-medial under the action of lateral pterygoid muscle.

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Classifications of condylar fractures   
threre are many classification but the most two beneficial classification are:

I-Kelley's classification (1991) depending on the location of the fracture (surgical site):

1-capsular or intracapsular  
2-condylar neck fracture  
3-subcondylar fracture

This classification is related to the age of the patient that can affects the fracture location

The most complicated one and the one that **most probably need difficult** surgical treatment **is intracapsular fracture** and as you go away from the the condyle the percentage of autoredection increases like in subcondylar fractures

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II- depending on the degree of the displacement occurs to the condyle:  
1-non displaced fracture: the condyle is fractured but remains in it's place without any displacment  
2-displaced fracture: in any direction but the most common direction the condyle to be displaced to is anteriomedial direction but also it's still inside the glenoid fossa  
3-dislocated outside the glenoid fossa   
4-comminuted fracture: when the condyle is fractured into small pieces

-these are the most important in terms of clinical significant and implications  
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Clinical signs and symptoms of condylar fractures Signs and symptoms of condylar fractures:

** Asymmetry (most important sign),**

** Deviation of chin could indicate condylar fracture, to ipsilateral side.**

** Tenderness to palpation of TMJ, could indicate fracture.**

** Limitation of mouth opening**

** Otorrghia (blood in the ear) is an alarming sign, but it doesn't have to be condylar fracture,**

**could be of a basal skull fracture**.

- - in the EM the pt have to be assessed for primary (ABCs) survey and the pt is stable then they refer it to the surgeon, the first step the surgeon has to do is REASSESSMENT of the (ABCs), then he can start the secondary survey which can't be done on the pt if he is not a stable

secondary survey is **taking history from the pt about his medical history** , **his chief complaint**, **the injury and how does it happened, the time of the injury, The direction and magnitude of the force  
-they always say adequate history leads to definitive diagnosis**-medical history like diabetes, bisphospnate, radiotherapy and others can modify the treatment and change your intended treatment

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EXAMINATION:  
always start with systemic palpation from **supraorbital to infraorbital area** **to the condyle to the posterior border of the ramus to the mid line bilaterally until your both hands touch each others**

-if you find any step during palpation it means there is a fracture there   
-but usually **condylar fractures appears clinically as pain or tenderness** in the **condyle area or sometimes it's not a fractures but just heamoarthrosis or diffusion of the blood to the affected area without fracture or what is called (non fracture injury)**

-if diffusion happens it will **cause anterior or lateral open bite** the ipsilateral side and the diffusion prevents the condyle to return to it's position and actually there is to type:  
1- when the occlusion can be obtained  
2- and some times we can't obtain occlusion  
in both the treatment is conservative using intermaxillary fixation or some times arthrocentecis, but in cases of fracture the open bite will happen in the contra lateral side  
-Deviation of the mandible to the same side of the fracture . As the patient unconsciously shifts his mandible to the side of injury to avoid pain stimulation at that side  
- spasms leading to limitation of mouth opening   
- bleeding from the ear ( otorrhagia ): an alarming sign that requires further investigation .  
- inability to palpate the TMJ during movement .  
- abnormal function of the TMJ . Limitation of mouth opening ,deviation of the mandible ,an open bite . Note that an open bite occurs on the contralateral side of the fracture . An anterior open bite is associated with bilateral fractures .

**During your examination look for any signs that can be alarming such as bleeding from the ear .This sign could indicate**:   
1. Base of skull fracture , usually associated with the battle sign(ecchymosis around the mastoid process) .  
2. Laceration of the external auditory meatus .  
3. Displacement of the condyle into the middle cranial fossa .

**After being sure that the patient isn’t suffering from any spinal injury** , tilt the head and look for any dripping fluids .

**If a clear fluid is dripping** , CSF leakage is suspected. This can be confirmed by performing a simple test using a filter paper

Treatment can be controversial with CSF leakage . Some clinicians prescribe antibiotics ( **clindamycin** ) as the dura is torn, while others report no benefit of antibiotics in such cases as they don’t cross the blood brain barrier .

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The best management would be to **reduce the fracture while placing the patient in an upright position and wait for 10 days . If the leakage hadn’t ceased by then , refer to a neurosurgeon .**

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RADIOGRAPHS

Plain radiographs are **sufficient for simple displaced fractures resulting from simple mechanism of injury . Such as PA skull and OPG.**

More specific images such as reverse Town is the preferable projection in condylar fractures and it reveals medial displacement or subcondylar fracture . Lateral oblique could be used but it is not very specific .

In more severe injuries , a CT is warranted . Another indication for a CT is when surgery is intended .

MRI is indicated in cases of rupture or injury to the disc .

TREATMENT:

Goals of condylar fracture repair :

Pain free mouth opening

Good jaw motion in all excursive movements

Restoration of pre-injury occlusion

Stable TMJs

Good facial and jaw symmetry

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Th**e condyle is a very sensitive area . 5-20% of cases of facial asymmetry are attributed to condylar trauma , as it could lead to condylar hypoplasia**.

**Auto-correction is suspected in the condyle , but not necessarily ideally to restore the proper function of the joint , as it could be in the form of ankylosis**

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**Types of treatment**

Conservative management : always start with it especially in simple nondisplaced fractures soft diet and analgesia .

Closed reduction with IMF : to fix the two jaws together in the pre-injury occlusion . The period of IMF is dependent on the age and degree of displacement .

Open reduction and internal fixation .

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 The main factors considered are derangement of occlusion, the age and degree of displacement .

Some general rules or facts were considered :

A patient less than 12 years of age has a high potential for remodeling and occlusal development . Therefore , ***a more conservative approach is considered regardless of the degree of displacement*** .

A patient aged from 12-20 years is within a gray area .**They have some capacity for remodeling but it is not highly predictable . Making the degree of displacement a factor to be considered during treatment planning .**

In a patient more than 20 years of age , the **remodeling is not predictable at all , so we might consider surgical treatment . Certain factors should be considered though .**

So **the main factors to determine a treatment plan a**re the age , degree of displacement and derangement of occlusion .

Age < 12 years

A high potential for remodeling .

The degree of displacement is not very important in terms of treatment .

Age group of younger than 12:

o Occlusal derangement due to high remodeling

o If no displacement, then conservative treatment

o If there is displacement, intermaxillary fixation.

o Surgery is an option, but only in extreme cases and even then you must think very

carefully before submitting the child

. Age group 12-20:

o Both are important, because we are in a gray area and there is not high rate of

remodeling and so we take both into consideration

o No derangement of occlusion and no displacement  conservative treatment

o Minimal fracture displacement, occlusion is shifted  intermaxillary fixation, to guide

the occlusion

o Severely displaced fracture but no occlusal derangement  conservative treatment

o Severely displaced fracture and altered occlusion  closed reduction and if it persist,

you can go for open reduction.

As the age increases, open reduction is safer and vice versa.

The bullet patient was old, low remodeling rate; we went for closed reduction and condyle healed.

Remember that the first choice is conservative, if it doesn't work go for closed, and if necessary and

indicated go for open surgery