Maxillofacial trauma/mandibular fracture

The aim of primary survey is to exclude any life threatening and sight threatening conditions.

Your role as a surgeon is in the secondary survey. Steps of the secondary survey:

1. Reassess the ABC or the “ primary survey”.
2. Management of the trauma/ fracture.

A patient came to the dr. with multifacial fractures, at the time of the operation the dr. checks his investigations and found that his createnin level was high,, which could lead to renal failure and the need of dialysis if he did the operation!

So you must check the primary survey in order to make your treatment plan.

**Mandibular fracture:**

The mandible is the most susceptible bone to fracture in the facial skeleton because of:

1. It is the only bone that is U shaped in the body.
2. Attached to the base of the skull
3. Depend on single artery for blood supply.
4. More cortical bone; 2 times more corticated than maxilla.
5. The only mobile bone in the facial skeleton.

\*the most common site of fracture is the body and at the right side.

\***biomechanical aspect**:

The bone is affected by compression and tension forces🡪 the fracture happened at the tension site.

Ex. If a blow to the face at right mandible the fracture will happen at the lingual aspect (site of tension) of the bone not buccal (site of compression force).

-fractures is more in males M:F 5:1

-fractures classified according to the severity and to the location.

-classification help in: 1-diagnosis 2- communication.

\*according to severity:

1- simple/ closed( not opened to the external)

2-compound/opened

3-comminuted.

4-green stick ( one cortex is involved)

5-pathological.

6-multiple.

-**classification according to the site** :

-body -condyle -sympheseal -parasympheseal…

\*if there is sympheseal fracture you should look at the condyles.

\***favorability of the fracture**:

- if there is displacement of the 2 segments of the fracture then it is un favorable.

-vertically or horizontally ;

Referred to the plane you look at the fracture;

-if you look on PA mandible or PA skull then you look at vertically favorable or unfavorable.

-if you look on OPG then it is horizontally favorable or not.

So:

#vertically favorable fracture: no displacement in medio-lateral plane (( resistance to medial pull)). Seen in PA view.

#horizontally favorable: no displacement in vertical plane (( resistance to upward movement)) seen in OPG.

\*there is 2 strong muscles attached to the ramus which are masseter an medial ptyrigoid muscles,, medial ptyrigoid is stronger so mostly the pull will be in the medial direction.

\*again the patient must be stable in the secondary survey, if the ptn. Wasn’t stable all your treatment will fail.(المعالجة نجحت لكن المريض مات!!)

-**secondary survey**: history, examination and investigations.

1**- history** of the injury:

Every single peace of information is important;

-mechanism of injury.

-previous fracture/ history of facial fracture.

Presences of TMJ disorders.

-past medical history🡪 - epilepsy; contra indicate close reduction and iner maxillary fixation.

 -diabetes, mental retardation, alcoholism..

-pre injury occlusion

 All these are important in order to put atreatment plan that is suitable for the ptn and the fracture site itself in order not to have dehesence or non union or malunion.

So we must select a method of a appropriate reduction and fixation.

If a ptn has bilateral sympheseal fracture and bilateral condylar fracture, there is a concinsance in the literature in the use of “ reko plates”

Ex. A patient came to the dr. 4 years ago, he has bilateral condylae fracture ,, the dr didn’t use reko plate then the ptn came with malunion! So they remake a fracture and put reko plate!!!

2-**examination**

1. Exra orally:

You have to look for any sign of fracture;

1. Eccemosis🡪any Eccemosis could indicate a fracture but not 100%.
2. Bruising 🡪 periorbital bruising could indicate zygomatic fracture or orbital! Fracture.
3. Bilateral periorbital bruising could indicate:
4. Lefort 2 fracture.
5. Lefort 3 fracture.
6. Naso-ethmoidal fracture
7. Frontal sinus fracture.
8. Base of skull fracture.

 4-deviation of nasal septum🡪 nasal fracture.

 5-depression of the root of the nose🡪 could indicate naso-ethmoidal fracture.

 6-step deformity of the supra orbital or infra orbital or the lower border of the mandible🡪 fracture

 7-patress sign 🡪 base of skull fracture

 8-blood from the nose / ears🡪 could indicate a fracture but you should look for CSF leakage.

\*significance of CSF leakage: it could indicate menengial tear.

\*management of CSF leakage:

-A student suggest to give antibiotic to prevent meningitis. –best antibiotic? – rifamycin is the drug of choice. Not sure!

- the best management is to place the ptn in upright position and wait for at least 10 min (not sure), if there is continuous leakage you have to consult the neurosurgery.

-actually the best treatment is reduction of the fracture to promote healing.

1. **Intra oral examination**

\*colman sign: sublingual hematoma, it is highly suggestive of mandibular fracture.

Why the blood accumulate in the floor of the mouth?دوروا عليها

\*anterior open bite: indicate bilateral condylar fractrure or lefort 1 fracture(cause posterior displacement of the mandible🡪anterior open bite).

\*bilateral parasympheseal fractrure: most common fracture can make obstruction of the airway. If the ptn is unconscious the medial segment of the mandible could obstruct the airway under the effect of genioglossus and geniohyoid muscles. So you have to make sure that the airway is clear.

## 3-investigations

Radiographs;

you could reach the definitive diagnosis using simple radiograph- plane opg.

-you don’t have always to take CT image; you expose a patient to high dose of radiation and cost.

-the dr show a radiograph of a fracture and ask about the classification; there is a small opening at the superior border minimal displacement..

-an other radiograph show unfavorable fracture horizontally.

\*look at the continuity of the bone tp find the fracture line.

-lateral oplique is a choice if OPG is not present in the hospital!!

-PA mandible/skull 🡪 you can tell if the fracture vertically favorable or unfavorable in the ramus or the body of the mandible.anterior area is not shown inPA radiograph.

-mediolateral displacement can be seen in occlusal radiograph(vertex occlusal more than oplique occlusal)

-if there is complicated fracture/ comminuted fracture/ fracture that is suspicious, go for advanced images.

**Treatment modalities of facial fractures**:

1. **Conservative treatment**🡪 soft diet and analgesia “” doing nothing””, in green stick fracture.
2. **Closed reduction and external/indirect fixation**: fixation will be external in the form of inter maxillary fixation (IMF), fixing upper jaw with the lower jaw as a reference point to insure they are fixed together to prevent inter fragmental movement.

If movement happen🡪 no healing/ malunion will happen.

-Could be in the form of IMFscrews in upper and lower jaws and tie them together using elastics or wires.

-Or using arch-arch bar.

- if tied with wires🡪 rigid fixation

-if tied with elastics🡪 non rigid/ elastic fixation.

-so here we fix the upper and lower jaws together after doing a good reduction to the fracture.

-the gold standard is the use of the arch bar but if the ptn is young and has deciduous teeth then the deciduous teeth will be taken out when using the bar.

-so you have to look for other modalities of imf like using splints imf screws.

-fixation using a bar need 2 hr under GA in comparison with imf screws which takes 5-10 min, that may be used temporarily during the surgery.

\*IMF works when there is no displacement or minimal displacement, the ptn has to be fit and healthy

-IMF cant be used in a ptn who has epilepsy or respiratory problem.

1. **Open reduction and internal fixation/ direct**

-open an incision, but 2 segments together and then internal fixation.

-it works fastly, no need for imf, after a week the ptn ca eat.

-termed **osteosynthesis :the application of a hard bar over the bone directly.**

-osteosynthesis achieved using:

-mini plates

-screws.

-wires.

Reconstructive plates.

-compression plates…

\***principles of osteosynthesis**:

You can fix the 2 sides of fracture using screws called lag screws

1. Loud sharing osteosynthesis
2. Loud bearing osteosynthesis

Load sharing :the plate (for ex.) will share the load with the 2 segments of bone.

This load sharing could be functionally stable!

2 types:

1-rigid fixation🡪 using 2 mini plates 🡪 no inter fragmental movement.

2-non rigid/ semi rigid🡪 using one screw 🡪 inter fragmental movement present.

-this principle is applicable for single/ non displaced fractures or when there is optimal fracture wound healing and good apposition of 2 segments of fracture.

The most famous person worked in this principle is Champi.

- Champi principle: when the ptn eat, most tortional forces occur in sympheseal, para sympheseal and condyles,, so these areas need rigid fixation.

-Other areas like the body need non rigid fixation.

-Champi principle is not applied if there is no optimum healing, not simple ,diabetic…

-if principles of Champi cant applied then🡪

\*load bearing principle: it will carry all the load like in comminuted fracture.

\*the problem is the need of extra oral incision.

-remodeling of the condyle is high especially in young ptn , so the treatment of choice of condylar fractures is closed reduction and imf.