Oral Surgery II: 19
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Condylar Fractures

In the emergency room, you won't get cases that you've studied; not the ideal cases. You get cases like a 70-year-old patient with a mandibular fracture. Or an edentulous mandibular fracture, you have to study the case in order to select the appropriate treatment, otherwise; there will be a failure of treatment.

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.

Edentulous fracture is a special consideration, there's complicated fracture, most likely complicated medical history and the old age itself hinders the healing of bone fracture. In these cases, we have to go with more conservative procedures if open reduction and general anaesthesia is contraindicated.

In edentulous mandibular fracture, there are no teeth which are very important for intermaxillary fixation. You can fabricate a 'Gunning splint', which takes the shape of a baseplate with a wax rim but it will take a whole day to make, and made more difficult with the difficulty of taking an impression.

Gunning splint

But we are talking about emergency cases, you need an immediate solution.
Here's how it goes, the patient is undergoing a surgery with the orthopaedics, you need to go with them, you cannot wait till you fabricate a wax rim. The patient cannot undergo surgery twice or three times, in a day or two. It's a difficult, very complicated procedure. So we have to go with another option.

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.
When assessing the case 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.

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.

Open Reduction Hand Internal Fixation

It's an external skeletal fixation. So we have no teeth, complicating the procedure, and a decreased blood supply. Because when we lose teeth, the ID blood supply isn't the same. Open reduction surgery will compromise healing because there isn't enough blood supply, thus; compromising the final result. You need to consider all these factors before.

Usually, the body of the mandible is most frequently fractured, because it's most area susceptible to fracture. And the body is susceptible to muscular pull, if you ever noticed an elderly's face, the diagastric muscle show and are usually pulling the body and they facilitate the displacement of the fracture.

Most appropriate osteosynthetic treatment is reconstructive plate, which is an extra-oral approach. Here you might need bone grafting, but the patient may not be fit for surgery.

Always remember, the simpler the treatment, the more is the success of the result.

Another consideration, a child of 6 or 7 years may come to you with a fractured mandible. Where would we place intermaxllary fixation? Not on deciduous teeth for sure, they'll fall with the first push. You need teeth for fixation. Also, in open reduction you have teeth buds which you might compromise when placing screws and plates. Remember that there's rapid healing here, fixation should not be more than 2 or 3 weeks, otherwise; there will be ankylosis in the TMJ if the patient remains closed mouthed for prolonged periods of time. There is a high chance for compensation, the jaw is growing, and we place an intermaxillary fixation, if the patient has malocclusion, step deformity or even poor reduction, it will be corrected with growth due to compensation.

Closed reduction intermaxillary fixation would not provide accurate reduction to symphesial fractures in adults.

Remember condylar fractures too. Most common fracture in children is green stick fracture due to elasticity of bone. We can go for closed reduction which is most common, we can apply teeth wiring or even arch bars over deciduous teeth. And if you can't apply any of these, we can go for circummandibular wiring and it simply goes below the lower border, easily done to fix the splint to fragments of the fracture or to provide reduction.

The third special consideration is the condylar fracture.

When you go for closed reduction and internal fixation, it leads to ankylosis. Or go with open reduction, leading to scar formation, then go inside the TMJ, complicated if it was intracapsular. There is a lot of controversy for condylar fracture management. It is the second, sometimes the first, common place of fracture in the mandible, depending on the geography and aetiology. If accidents, it mostly causes body fractures, but assaults cause condylar fracture.

Intra-capsular fracture is the most common in children, because the condylar head is really small and all the force will be concentrated there leading to fracture. The neck of the condyle is common to be fractured in adults because the neck is long.

Unilateral fractures are usually the commonest.

The anatomy of the TMJ is very important. Condyle is articulated to the glenoid fossa and the articular disk between them, the condyle is connected to the lateral pterygoid muscle. Any fracture in the condyle will lead to most likely anterio-medial displacement, but it depends on the direction of the force. It could be displaced anteriorly, medially, posteriorly, or even laterally depending on the force.

If the force was directed towards the parasymphesial area, contralateral condylar fracture is expected.

There are more than 10 classifications for condylar fractures, but they all lead to the same thing. Classifications ease communication between staff and it has clinical importance in treatment.
First the fracture site, it could be intra-capsular, condylar neck or sub-condylar fractures.

Then displacement (no displacement, displaced to a direction *(anteriorly, posteriorly, medially, laterally)*), or dislocated (*not contact between the condyle the distal segment, no contact between the proximal and distal parts).*

In order to assess the patient, we have to be familiar with the signs and symptoms of condylar fractures. We need to do primary survey then secondary survey. Primary survey sometime, as a result of trauma and head injury, there is a possibility of brain injury so they request a CT-scan, and here it is needed. You have to know the signs and symptoms that would require investigations.

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.

All these could indicate condylar fracture, but what if there are no signs?

For any disease to be diagnosed you have certain criteria, e.g. for RA you have 6 criteria that need to be addressed in order to make a definitive diagnosis.

Blood in the floor of the mandible may indicate mandibular fracture, but not for certain. Parasthesia or anaesthesia following a blow to the face may indicate fracture, but could be due to compression over the nerve.

If you find that there's a possibility of indication of fracture, then go ahead and request investigations. But do not, unnecessarily, put the patient for investigations that they don't need. Ethically it's wrong, and medico-legally, the patient can sue you for making him undergo investigations he doesn't need.

All condylar fractures have a sign of ipsilateral mandibular deviation, except in one case, effusion. The force, direct or indirect, causes blood to pool inside the TMJ. When blood collects near the TMJ, the blood will push the condyle away, making the mandible deviate to the contralateral side.

<u>A case:</u>

Direct injury of the TMJ, a bullet went through the TMJ, causing condylar neck fracture, and comminution of mandible. The bullet was actually small, it fractured the condyle then went straight through the inferior border of the mandible.

If you found blood in the ear, it's a very important sign, but it could be a laceration of the tympanic membrane, or basal skull fracture. So what do you do?

You consult an ENT. If there is an eye injury, you consult an ophthalmologist, if CSF leakage you consult a neurologist and so on. How to make sure it's a CSF leak? You use a filter paper, and to be absolutely positive, you refer the patient to a neurologist or an ENT to do electrophoresis.

Lateral oblique, OPG, reverse town view are all radiographs that might help you gain information. If the fracture line is obvious in the lateral oblique or the reverse town radiograph then it's final, you have a fracture and you don't have to expose the patient for a high dose of radiation that they don't need.

You can ask for a CT-scan in case of a complicated case, a comminuted fracture, a fracture you don't know where it begins and ends. After you've seen the patient clinically, and you suspect facial fracture, and the patient is already undergoing a CT-scan for the brain, ask them to include the facial CT- scan.

If you have a fracture, clinically and radiographically the displacement is clear, you don't need CT-scan, and it's not the gold standard for condylar fractures.

Lateral oblique is taken when we don't have an OPG.

Some articles recommend treatment based on the angle between the distal and the proximal portion.

If the angle was more than 45 °, then the treatment is open reduction and fixation, there's a wide debate for the treatment.

Sometimes the patient cannot open or close his mouth, if you suspect impingement of the disk, between head of the condyle and the glenoid fossa you need to assess the articular disk, the golden standard here is an MRI.

The aim of treatment of condylar fracture is to restore function and esthetics; no deviation, opening and closing without any difficulty and no pain during mastication. These are the goals of treating the condylar fractures, and it has to be achieved with minimal effort.

They say that 5-20% of severe facial asymmetry is attributed to untreated condylar trauma.

Types of treatment:

- Conservative treatment, which includes soft diet and analgesia.
- Closed reduction and intermaxillary fixation
    - Most literature say that it's the ideal treatment, it's minimally invasive surgery, no scars, no nerve injury, but at the same time if a patient has condylar fracture and the condyle is way too displaced to be closely reduced, these are absolute indications for open reduction.
- Open reduction and internal fixation of condylar fractures have hard indications
    - If a patient is 20 years old, you may consider open reduction, but definitely not in a 6-year-old patient where ankylosis is a risk, the condyle is a growth center; if you

manipulate it causes ankylosis. Even the blood itself in TMJ is enough to cause ankylosis.
    - So you have to look at the age, the displacement and the derangement of the occlusion.

Back to our case, the bullet that went through the condyle and went out of the inferior border of the mandible. We have condylar fracture and comminution in the mandible. We have condylar fracture but not a real fracture in the mandible, yes, it's destructed but the superior border of the mandible is intact. A fracture means there are two separate pieces, and that is not in our case. So we only have a unilateral condylar fracture, and the treatment is intermaxillary fixation. Occlusion is easily achieved, midline to midline. The condyle will remodel with time.

A patient with a fracture and cannot open their mouth, or if you cannot reduce the mandible under local or general anaesthesia is an indication for open reduction.

We have different accesses for open reduction, the most popular is retromandibular or transparotid incision, there is an intra oral approach and intra-oral+extra-oral approach.

The Royal college of surgeons initiated a clinical guideline in 1997 regarding the treatment of condylar fractures.

We have to consider the age of the patient, displacement of the fracture, derangement of the occlusion.

- Patients under age of 12 have a high rate of remodeling and occlusal development.
    - You must always think of conservative treatment in such age group.
- Patients of age group 12-20 years have less remodeling potential but still there is remodeling.
    - For this reason, you have to think of conservative and closed reduction first. And you must think carefully before deciding open reduction.
- Patients more than 20 years, remodeling is unlikely and you can go for open reduction easily, but not for all cases.

Which is more important, displacement of fracture or derangement of occlusion?

- Age group of younger than 12:
    - Occlusal derangement due to high remodeling
    - If no displacement, then conservative treatment
    - If there is displacement, intermaxillary fixation.
    - 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:
    - 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
    - No derangement of occlusion and no displacement → conservative treatment
    - Minimal fracture displacement, occlusion is shifted → intermaxillary fixation, to guide the occlusion
    - Severely displaced fracture but no occlusal derangement → conservative treatment
    - 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.