Introduction to the Surgical Planning of Orthognathic Surgery

# Definition

Dentofacial deformities: combined facial abnormalities and dental abnormalities arising from skeletal disproportion.

Affects both function and esthetics

# Etiology

# Genetic pattern.

Family run skeletal disproportion mainly in class 3 skeletal pattern, usually involves maxilla retrognathia , and mandible prognathism .

2-Embryonic disturbance of growth.

It happens in early stages like this patient here with hemifacialmicrosomia. The disturbance is affecting the distribution of the first branchial arch, so muscles of mastication, ears, upper and lower jaws are affected. There are many possible theories for its etiology like disturbance of growth caused by physical trauma, and other causes.

3-Postnatal damage before or after growth has ceased

Ankylosis caused by forceps delivery , trauma or infection .

4-Abnormal regulation of growth after birth.

It can be bilateral like over growth of both condyles, or over activity of one condyle compared to the other side, this case is called condylar hyperplasia. Such a case will most probably lead to facial asymmetry; the face on one side is growing but the other side has stopped growing.

A typical case of condylar hyperplasia; the right side which should have stopped at the age of 18, is still active, but the left side has stopped. As a result, vertical and horizontal growth of mandible on the right side continues and that’s why it’s pushing the mandible down and the chin to the left side leading to uneven occlusion.

# Classification

1. Symmetrical form and positional anomalies.
2. Asymmetrical anomalies.

# Assessment and Planning

1. Communication and psychological assessment.

There’s a condition called body dysmorphic syndrome or “dysmorphophobia”. It’s a condition that contraindicates surgery, for example some patients might think that failure in life and their problems are caused by the position of their chin or an abnormality in their mandible, maxilla or their nose. Those patients become very obsessive, they might end up having severe depression and even commit suicide. So they have to be sent to a psychiatrist for proper assessment, and we don’t really do surgeries for them.

1. Family, social and medical history.
2. Facial esthetics.
3. Extra and intraoral examination.
4. Radiography and surgical orthodontics

xrays like panorama, CT scan, Cone Beam, lateral ceph ..etc .Also , we always put our surgical plan with collaboration with an orthodontist, as he will be doing the decompensation

How can we tell if the condyle is still growing or not?

By bone scanning or “bone scintigraphy”; we inject a radioactive material (Techneciam 99 )which gets taken by active cells, if there was overactivity of the condyle, it will show a hotspot

If the condyle is still active, because in this case we’ll have to do condylectomy or condylotomy to the side that is active.in order to prevent further asymmetry. However, if it’s not active, there will be no need for any surgery, we go directly to corrective surgery for the asymmetry.

1. Study models.

A facebow will give us the location of the maxilla in relation to the TMJ. So if we want to move the maxilla or mandible, we can’t just move them using simple study models, you need to have a reference in the face which usually is the facebow. And then we do mock surgery.

Mock surgery is considered part of the planning. First, we take study models, transfer those models using a facebow to an articulator and mount them. We draw lines with measurements, vertical and horizontal line, and then we cut in the lab and do the movement to the maxilla as planned. After moving the maxilla, we fix it in its place using wax, and then we make what is called an “intermediate wafer”. It’s like a night guard, it transfers the relationship of the new advanced maxilla to the fixed mandible, “the one we have not moved yet.” So here we’re using the mandible as a reference for the movement of maxilla.

Now that we created an intermediate wafer, we put it away and start with the movement of the mandible as planned. We fix it and make a new wafer called “final wafer”. We take those two wafers to the surgery. In the operation, we move the maxilla as planned, and to be more precise, we put the intermediate wafer in between teeth and we measure movement of maxilla.

That’s how we transfer movement of surgical plan from the lab to surgery

# Surgical Planning

1.Avoid incisions on the face.

Unless it’s a condyle surgery access through a periauricular inciosin which is aesthetic as it’s along lines of the ear .

2.Plan the bone and then soft tissues follow.

3.Correct the profile then the occlusion

4.Occlusal asymmetry and function as important as profile.

5- Rigid fixation using plates and screws and intraoral elastics . wires were used but didn’t provide stable results . Also, Intermaxillary fixation was used but had the disadvantage of keeping pt from normal nutrition for 6-8 weeks.

Note : founder of orthognathic surgical techniques is Hugo Obwegesser .

We usually analyze soft tissues in addition to bone planning.

For example a patient with high tonicity in the upper lip, and she complains of a gummy smile, incisal show at rest is normal. If you did maxillary impaction there will be no incisor show and it will affect her appearance at rest so it’s important to diagnose the problem before proceeding.

Diagnosing the problem and its etiology from the start determines your plan, the problem here is muscular not bony.

Possible causes of gummy smile: plastic gums, excess growth of the maxilla, Short crowns, hypertonicity.

So sometimes it’s only a problem of soft tissue and you can give botox, without the need of surgery.

Patients with thick lips, planned for maxillary advancement, the lip response or the profile will be different from those with thin lips.

Chin is responsive to the advancement of the mandible 100%. If you advance the mandible 5mm for example, it will follow the bone and move 5 mm as well. So you have to be careful.

Usually maxillary advancement gives 50% changes in soft tissues, if you advance it 5 mm, it will give 2.5 mm.

(I’m not sure about the last two information, didn’t get them very well)

So you have to assess each soft tissue measurement before surgery to make sure the results are acceptable.

Computer analysis is very important to figure out how the patient will look like.

The doctor started to present surgical cases:

-Case 1: This patient came after treatment, this is a simple case of a class II patient, that can actually be treated by simple orthodontics; extraction of premolars, retroclination of the upper, and her chin was not bad.

The patient undergone bimaxillary surgery.

The result of the surgery was very bad, it was due to improper planning, a classic example of the importance of many factors in planning. Her doctor advanced the maxilla, with no need, the problem was dental not bony. He caused asymmetry of the chin, and the nose. She lost her facial attraction. A simple example of bad planning, not taking every single factor into consideration.

-Case2: Condylar hyperplasia with asymmetry. The plan was to first do a condylectomy. He had an active condyle and from the CT scan he had an increased vertical height of the mandible, so we had to do a condylar shave, along with lower border shaving. We took him into surgery, removed the condylar head. In the lower border we did an extraoral incision.

-Usually in these patient the Inferior dental nerve goes down with growth

-our only approach here, we here have the ID nerve down with the lower border, so we had to remove the outer layer of the mandible, clear the nerve from the way and then remove the inner aspect.

-Case3: This case was a bit more difficult, her problem was not in the face, it’s condylar hyperplasia but different presentation, with occlusal problem and tilted chin. So we did condylectomy and bimax surgeries, we moved the maxilla up on this side, by sagital split osteotomy. mandible will follow and we did a genioplasty. A bit more complicated, but she looked better, asymmetry was corrected, and soft tissues surprisingly followed the maxilla.

-Case4: Another hemifacialmicrosomia, we inserted an internal distractor. Now he’s 18 years old and ready for the final surgery. Ear correction is done by surgery or a prosthetic ear which usually gives better results.

-Case5: Sometimes the case is related to a disorder like the one here. She had a severe fibrous dysplasia, with fibrous tissues and displaced orbits. So you need to be careful about diagnosing, and planning those cases.

Masseter hypertrophy can also cause facial asymmetry.

-Case6: A class III male patient with a severely prognathic mandible. You will be surprised that we didn’t move the mandible back. This guy, was a big one, so it was not really convenient to move his mandible back.So we advanced the maxilla, it was more suitable for him, for his face and his body.So he ended up with a strong chin, better maxilla, his profile was good without setting back the mandible. Also some reports talk about sleep apnea in cases where you set the mandible back a lot.

-Case7: a patient with crouzon syndrome (early fusion of skull bones that prevent normal growing)

Advancement of the maxilla by 11 mm.