Occlusion : how the teeth come in contact with each other . الاطباق

Function and Anatomy of the TMJ

Anatomic determinants of occlusion ( it’s very important to deal with ) later on we should know it in filling + analysis to the mandible movement + in ortho .

 \*\* Components of the TMJ

- The mandibular fossa

- The condyloid process

The articular disc -

The joint capsule-

 Muscles-

\*\*Function of the TMJ

 -Condyle disk alignment

 Muscle control of disc alignment -

-Tempro-mandibular ligament , in general and its type and function

- The arterio-venous shunt

 Mandibular positions -

-Mandibular movement , important now and later on (forward ,lateral movement , tooth contact and the contact in the other side ) we learn it for filling , fixed , removable prosthodontic

Occlusion : no escape , anything in dentistry is related directly to occlusion .

\*\* dentist cant ( repair , move , remove ) teeth without being involved in occlusion .

\*\* if we remove one tooth there will be drip , titling in teeth and change in occlusion ,, so when we remove teeth we should what we will do latter on .

\*\* The masticatory system is the functional unit of the body that is responsible for chewing, speaking and swallowing. It also plays a role in tasting and breathing.

>> when we eat we use ( muscle , teeth , TMJ )

>> when we speak " how the sound produce " by the movement like :

(S) sound : mandible move forward and then teeth come in contact with each other and the tong play role in function

\*\* The system is made up of bones ( maxilla , mandible , temporal , zygomatic arch ), joints ( TMJ in both side ) , ligaments, teeth ( what its do in occlusion and mandibular movement ) and muscles ( masseter , temporalis , medial and lateral pterygoid )

\*\*\* There is also a neurological controlling system that regulates and coordinates all these structural components .. ( any thing in the body that function should control by neuron and brain " eventually brain ")

\*\* There are three skeletal components that make up the masticatory system:

- Maxilla :hold the upper teeth

- Mandible : have condyle , coronoid process that articulate with temporal bone that’s its glenoid fossa that attach to skull .

temporal bone -

Components of the TMJ

Articular disc : between condylar head and articular fossa

Lateral pterygoid muscle : attach to articular disc , have two head one attach to articular disc and the other to the condylar head of the mandible

 \*\* in picture notice the : articular fossa , condylar head , coronoid process , articular eminence

Articulaer fossa

Interposed between these surfaces\*

 is the articular disc

Articular eminence

Articular disc

Coronoid process

Condyler head

Movement occur between the condyle of the mandible from one side and its receipt in socket ( the glenoid fossa that fitting in temporal bone ) and the articular imminence of the temporal bone from other side .. so mandible fossa then articular imminences

All the articular surfaces of the condyle, the fossa, and the eminence are covered with avascular layers of dense fibrous connective tissue.

\*\* Avascular is important because its stress bearing side ! , if we have a pain and increase presser we can’t move the joint at all

\*\* dense fibrous connective tissue : to protect articular surface

The absence of blood vessels is a sign that those areas are designed to receive considerable pressure. The avascular areas are devoid of nerves ( it’s survived by synovial fluid that’s in capsule ) as well including the bearing areas of the disc can receive great pressure with no signs of discomfort

\*\*The movement is a combination of gliding movement ( move cross the surface ) and a hinge movement ( rotate around the axis )

\*\*Its change from hinge to gliding because presence of pterygomandibular rligament

\*\*One condyle cannot move in any manner without reciprocal movement on the opposite side , it’s a unique joint because of both joint connect to each other and there's no movement in one without other one

\*\* In opening and closing movements the two condyles form a common axis „= the hinge axis‟

\*\* when the two condyle move they move around the same line ( common hinge axis )

The mandibular fossa

Oval depression in the temporal bone just anterior to the auditory canal. It is bounded anteriorly by the articular eminence externally by the middle root of the zygoma and the auditory process and posteriorly by the tympanic plate of the petrous part of temporal bone.

 The shape of this fossa conforms in part to the superior and posterior surfaces of the condylar process of the mandible , because it set there so the condyle head convex and a accommodate to the shape of the fossa

The condylar process

Part of the mandible, convex surfaces. The condyle is perpendicular to the ascending ramus of the mandible

The Articular Disc

Thin , concavo convex in shape .. Its shape is formed to accommodate the shape of the condyle and the mandibular fossa. Its upper surface is concavoconvex from before backward ( anteriorly to posteriorly " concave ( it’s the articular eminence ) the convex ( shaped against the fossa )"

\*\* under surface contact with condylar head is concave.

\*\* Its circumference is connected to the articular capsule , the disc not swimming in the synovial fluid but :

\_\_ laterally : connect to capsule that connect to TMJ ligament

\_\_ medially : connect to capsule

When the condyle move downward and forward the disc move on the top of condyle downward and forward … if its swimming in synovial fluid it can move latterly !! so the only movement that can make **downward and forward** and also its connect from front side by the superior head of lateral pterygoid and from back it connect to loose connective tissue ( retrodiscal tissue ) .

\*\*\* it’s not swimming in air but the downward and forward controlled by muscle but on the side it’s not move " stable"

Joint Capsule

Usually come from the temporal bone and connected to the neck of the mandible below the condylar head .

The anterolateral part of the capsule may be thickened to form the tempromandibular ligament ( it’s a part of capsule)

 The stylomandibular ligament : between styloid process and posterior neck of the mandible , function : restrict the protrusive movement ..

\*\* ligament don’t help in opening because they are not contract . muscle help in opening and closing but ligament restrict cretin type of movement

The sphenomandibular ligament : from sphenoid process , its connect to medial border of mandible ( lingual ) , Function : restrict lateral movement and opening ..

Vascular supply: maxillary, masseteric and temporal arteries.

Innervation to the capsule from the trigeminal nerve. It contains many free nerve endings

 \*\* There's blood and nerve supply to capsule and throw the synovial fluid nutrient come to articular surface and fossa

Mandibular ligaments

They stabilize the articular system during jaw movement.

The stylomandibular ligament

The sphenomandibular ligament

The tempromandibular ligament

 Otomandibular ligaments

The capsular ligaments.

The collateral discal ligaments " the disc made up of ligament that are circumferential in shape , just to make up the disc and connect the disc to the side of capsule "

\*\* some of the ligament present in the middle ear ( small ligament don’t affect the movement , its only connect and near to the joint ) ,

TMJ disorder : patient with pain in the ear because of these ligament it’s close to the joint they cause pain in the ear when there's problem in TMJ joint ..

TMJ function:

TMJ made up of two compartment

\* upper compartment : between ( temporal bone and disk ) or ( fossa , articulareminence and disc)

\* lower compartment : inter impose between the disk and condylar head .

\*\*\* movement of the joint consist of two type :

\* hinge movement : ( beginning of the movement up to 20 mm because of tighten of tempromandibular ligament that doesn't allow the hinge movement any more and forces the mandible to translation movement / it occur at the beginning of the mouth opening , it's occur at rotation of the condylar head along the inferior surface of the disk / so the first movement of the joint = hinge movement occur in lower compartment ..

it's continuo hinge movement until there are enough tension in temprimandibular ligament ( first 20 mm of mouth opening ) and then the mandible force into translation movement .

\* translation movement: occur in upper compartment between the mandibular fossa and temporal bone and between the upper surface of the disk .

condyle disk disaliment :

mesial and lateral destal ligament ( collateral ligament that are presence in the disc )

\*\* disc in top of the condyle that do not allow to move laterally , it's only allow to move forward and backward

\*\*posterior ligament that hold the disk in position

\*\* Superior elastic stratum

\*\* superior lateral pterygoid muscle

\*\*\* What's the function of collateral distal ligament : they attach the medial and lateral border of the articular disc to the pole of the condyle , and attach through the capsule to pole of the condyle .. so its attach to condyle to make as saddle

\*\* these ligament are responsible for dividing the joint mesiolaterally into a superior and inferior joint capsule , their function is to restrict the movement a way from the condyle so they responsible for the hinging movement of TMJ and they are innervated and disproved information about position of the joint part ( disc to fossa to joint .. etc

Slide (18+19) Muscle Control of Disk Alignment:

During mouth closure :

Articulator disc position it should be in the top and foreword on the condyler head.

Inferior head of lateral pterygoid muscle release

Superior head of lateral pterygoid muscle contraction

During mouth opening:

Inferior head of lateral pterygoid muscle contractio

Superior head of lateral pterygoid muscle release

(why) to allow the disc to move backward and get on the top of the head of condoyle during maximum mouth opening it will be move backward by k

Superior elastic stratum ligament the ligament that attach the back of the disc .

Conclusion : in opening inferior head of lateral pterygoid muscle contract mandible go forward .

Superior head of lateral pterygoid releases mandible go backward .

So two heads of lateral pterygoid muscle they don’t contract SIMULTANEOUSLY . One of them contract and the other one release .

Slide 20: temporomandibular ligament function within the first 20mm where it limits the hinge movement within the first 20mm then forces the mandible into translation movement that’s why firstly we have hinge movement then translation movement.

Slide (21) :( The Arterio-venous shunt) in the posterior part of the condoyle and articulator disc we have blood vessels and innervations.

If the mandible move then condylar head move those vessels become FULL of blood then they fill the space which present behind the head of condoyle and behind the disc.

If the mandible return back to its original position the blood will go out from these small arterioles and go to the main artery (low amount of blood in vessels)

So if we have problem in alignment then we will have problem in these vessels then the patient sense the pain Slide (22): the same

Slide 23:Inter-cuspal position (ICP) = maximum inter cuspation = centric occlusion (CO): when teeth are in contact with each other.

Centric relation (CR): nothing to do with teeth here because it’s ligamental position ,it’s position of TMJ.(no teeth relation) if no separation between teeth because of hyperactive of elevator muscles or stress.

Terming hinge axis =the most posterior position of the mandible.

 Slide (24) : (CR) a little bit posteriorly of the (CO) on the average by **1mm if it more than 1mm mean there will be problem** so CR to

ICP(CO) slide occurs in 90% of population .

CR to ICP(CO) coincidence in 10% of population .

1MM

Rest position :the patient be in upright position because it has relation with gravity .the lips come in contact to each other ,but the teeth separated this separation called free way space(rest vertical dimension) =2-4 mm. the mandible in balance between elevator muscle and depressor muscle .

Slide( 25): Mandibular movement:

1. Bennett movement :occurs on WORKING side , when the mandible moves to one side (working side) e.g. toward left side where the condoyle rotates against fossa and move laterally, it can be immediate and quick or progressive and late.
2. Bennett angle: occurs on NON WORKING side .

Working side do little action comparing with non-working side which do more action because this side separate the teeth from each other but the working side just make rotation and slight shifting.

Slide (26): Tracing of mandiblar movement in the sagittal plane (posselt envelope of movement): all movement occurs through posselt envelope.

Slide (27): Tracing of mandibular movements in the horizontal plane, Bennett movement on working side (1-rotation 2-slightbody shift) Bennett angle on non working side (1-separation 2-downward, inward movement to separate teeth)

Slide (28): numbers to remember (why) >>when we examine a patient we should know what’s normal to know if we have any abnormality

Maximum opening is around 50-60mm=three fingers in between the maxillary and mandibular incisors.

A lower limit for normal is 40mm below the 40mm>>restricted mouth opening

The maximum lateral movement in the absence of TMJ problems is 10-12mm.measur by midline or line on mandibular incisors then asks the patient to move the right or to the left then measure the distance between them.

Centric occlusion



Habitual rest position (FWS)

Maximum mouth opening

End of hinge movement and beginning of transitional movement .

Centric relation

Maximum protrusion

Maximum protrusion: mandibular incisors travel along the lingual surfaces of maxillary incisors and till they reach edge to edge and then move

forward up to a limit what limits the movement? Stylomandibular ligament

You're on the threshold of a wonderful life ,, Good Luck ^^..

Dia'a Badawi & Alaa abokhader