Previously , we've talked about the skeletal causes of Malocclusion (class 2 , 3 ..) . Today's Lecture is about the Malocclusion of teeth due to Soft tissues

**Lecture's Outline :**

-Defenition of soft tissues .

\_Importance of them

\_Equilibrium theory

\_etiologies & their importance in Malocclusion

\_Malocclusion of teeth can be due to :

Skeletal abnormalities×

Local causes×

Soft tissues×

×Dento-Alveolar causes (the relationship between the size of the tooth & the jaw )

\_Another classification :

Genetic & Environmental causes .

\_**Soft tissues** : All the non-calcified structures which are relevant to tooth position and orthodontic treatment .

They contain : lips , Tongue , cheeks ,floor of the mouth , Muscles of mastication , Muscles of facial expression ,palate , throat , gingival , Periodontal ligaments . Freni ..

**They can :**

1) cause malocclusion (by being the direct cause of it )

2) make the malocclusion worse

3) be helpful (in case Dento-Alveolar compensation)

4) Be important for the stability of orthodontic treatment

**\_Dento-Alveolar compensation** : Natural adaptive changes of dentition , which tends to mask the severity of any skeletal discrepancy that might be present between the maxilla & the mandible .

For example , A patient with class 2 , the Upper centrals are proclined & the lowers are retroclined . So , the soft tissues try to minimize the severity of that malocclusion by bringing the uppers backward (retrocline them) and the lowers more forward (procline them)

The opposite occurs with a patient having class 3 malocclusion .

This compensation doesn’t occur only on the Anterio-Postrior plane , it may also occur at the transverse & vertical planes . For example , in case of having a patient with an open bite , the upper incisors tend to over erupt to reduce the severity of the increased vertical dimension .

**\_Equilibrium Theory** : teeth lie in a narrow zone of equilibrium (neutral zone) affected by many forces that act on them :

1)intrinsic forces : from the lips , cheeks & the tongue

2)extrinsic : habits (digit sucking habit) & orthodontic treatment

3)Occlusal forces : the anterior component of the force !

4)forces from periodontal tissue

Usually, the forces from the tongue are higher than those coming from the lips & cheeks . If we depend only on them (tongue forces) , the teeth will move forward . So , the stabilizing forces in this case are coming from the healthy periodontal tissue .

That’s why flaring in the incisors is seen in elderly patients and in patients with periodontal problems (the equilibrium is shifted more toward the tongue forces because of the unhealthy & defected periodontal tissue )

That’s why the teeth are proclined in the extreme cases of cheeks defects (for example in necrotizing cheeks )

In contrast , patients with scar tissues on the lips (more tender lips, thus retroclined teeth )

Effects of the forces on the teeth (in order to move a tooth by the force , that depends on … ) :

×level of the force ×Duration ×Direction

 A (Light & long-acting) force, is more important than a( heavy & short-acting) force , in considering the etiology of malocclusion

That’s why the forces of mastication , swallowing & speech don't play that important role in causing malocclusion (they're short-acting)

When talking about the duration , 6 hours of continuous force-loading are needed to cause difference in the occlusion

**\*\* Lips :**

Anterior Oral seal

Activity of the lower lip

Contour (activity of the lips)

Lip line

competence

At rest : At function :

***1)lip contour***: showing moderate amount of lip vermilion (everted lips : more amount is shown )

This gives an indication of the activity of the lip

Everted lips activity of the lips more proclined teeth

vertical lips activity of the lips more retroclined or normal teeth

***2)lip line :*** the relation of the lower lip to the upper incisors (inner surface of the lip & the buccal surface of the insicors )

Normally , the lower lip covers the incisal 1\3rd of the upper incisors

-low lip line : covering less than 1\3rd of the incisors , proclined upper incisors & the lip is usually behind them and retroclined lowers .

-high lip line : the lower lip is more toward the gingival 1\3rd of the upper incisors , retroclined uppers .

***3) lip competence :***

Normally , lip seal is maintained with minimal muscular efforts At rest .

So , here we must have 2 things :

 ×minimal muscular effort

 ×the mandible is at rest

For example , people with proclined upper incisors , at rest , muscular activity is well-noticed trying to close their lips , and sometimes they fail ! ending up with opened mouth at rest !

Those patients also have problems in swallowing ; because during swallowing , a proper lip seal is needed to prevent the food from going outside the mouth !

-incompetent lips : when the mandible is at rest , the lips are apart , and muscular effort is required to obtain the lip seal .

In this case , lip seal is achieved by the contraction of both : Orbicularis oris & Mentalis .

-Partially competent lips : (A British concept) lips are long enough to span the space between the jaws , but are prevented from being so by the interposition of upper incisors

for example , the lips are closed and are touching EXCEPT in the area of the left upper central only ; because its proclined more .



***4) Anterior oral seal :***

The Seal that is normally produced by the contact between the lips .

Its important in the swallowing process (lips contact with minimal efforts)

**Infantile swallowing pattern :**

-Tongue--lower lip seal (close

Contact between the Ton & the lower lip \ Closely related )

-little activity of the posterior part of the Tongue (the main activity is in the Anterior part )

-channeling of the milk during breast-feeding (passage of the food)

**Mature \ Adult swallowing pattern :**

-teeth come to occlusion

-lips close together

-The tip of the Tongue comes behind the upper incisors in the Anterior palate

-More reliance on the activity of the Posterior part of the tongue

-Activity of the Muscles of the tongue to push the food in a backward direction (the Tongue does not act as a channel here )

A patient with incompetent lips . Why can't he\she achieve a normal oral seal ??

This can be Due to :

1)Skeletal causes ( skeletal class 2 , Open bite …. So, the distance between the lips increases , making it difficult to close them & to achieve the seal )

2)Dental causes (proclined incisors , thus increased distance between the lips…)

3)Soft tissues causes ( short lips "decreased lip length" )

So , How could he\she Achieve the seal ??

**1)CircumOral muscular activity**

When he\she swallows , *extra* muscular activity is done in order to close the lips together .

**2)Mandibular posture**

Moving the mandible forward . usually seen in *mild* class 2 cases .

**3)The lower lip comes behind the upper incisors**

Seen in *severe* malocclusion cases

**4)Tongue--lower lip seal**

Same as the *infantile swallowing* pattern . usually seen in *Adults* with *open bites* **5)Combination** between more than one of the above-mentioned techniques .

***5) Lip activity :***

If the lower lip was Hyperactive , it would cause retroclination of the lower incisors with No compensation !

**\*\* Tongue**  another factor that may cause malocclusion

Adapted

Primary endogenous

Size

Position

At rest At function thrust

The size & position are very important ; because tongue's activity during swallowing is a short-duration activity , but if the tongue's position is always forward -specially if it is also large in size- this would cause malocclusion & proclination of the uppers .

So , Tongue's **size** & **position** are more important than its **activity** .

-thrust : bringing the tongue forward . **Mostly** its an **adapted** condition , meaning that having a Tongue\_\_lower lip contact in case of having an open bite is an adapted change , and if the bite is corrected , the tongue will go backward to its original & normal position .

The same mechanism occurs in case of presence of certain habits , and once the habit is corrected , the tongue returns to its normal position .

In **rare** cases , there's what is known as : Primary endogenous Tongue thrust . the tongue's Function causes the malocclusion (Hyperactive tongue) by pushing the teeth more forward .

**\*\*Periodontial ligament :**

It is a stabilizing factor that balances the forces between the tongue from one side & the cheeks and lips from the other side . any disturbance in the periodontial ligament support , equilibrium will be affected and spacing between the teeth will occur.

**\*\*Muscles of mastication :**

Increased muscular forces **may** (not that much ) alter the jaw and dental arch ; patients with increased muscular tone have square faces ( small dimensions) . on the other hand , patients with decreased muscular tones have long faces . So , short vertical face dimension / height is associated with greater biting forces.

Note : masticatory muscles strength is not well-known to play an important role in determining the face height ; they might have a role but not that much!

Ok , you got confused ! since we mentioned previously that patients with short face height has higher activity of muscles , and now we are saying that the muscles strength may have a role in determining the face height and might not! It is all about قصة البيضة و الجاجة مين اجا قبل البيضة ولا الجاجة ; we still don`t know what factor of both factors ( the muscles strength and the facial height ) affects the other.

**Digit sucking habit :**

Usually the tongue is in a high position , so , the cheeks & the upper teeth are opposed by forces of the tongue and there is a balance between forces .

When having a sucking habit , the tongue will be in a lower position and the equilibrium in the upper part will be disturbed , the forces from the cheek side become higher than those from the tongue , leading to collapsing of the upper arch which in turn , may lead to a posterior cross bite and an open bite .

usually , this is asymmetrical & localized to anterior teeth and not extending to all posterior teeth .

 As a result of suckig , upper incisors will be proclined & the lower incisors will be either proclined or retroclined.

**Respiratory effect on the dentition ; Adenoids :**

 **(اللحمية)**

What`s the mechanism that affects the dentition by ?

 the adenoid affects breathing ; because it causes nasal obstruction which leads to forced-mouth breathing and opening the mouth when breathing . So :

×the teeth will overerupt

×the lower facial height will increase

×the mandible will rotate backward and downward.

Usually , they have a role partly not strongly ; that`s why it is preferred when having a child with adenoids affecting his respiration to remove it .

-Researches say that chronic nasal obstruction is probably one environmental contributory cause in the long-run , but it is unlikely to be the principal cause ; because the complete nasal blockage is rare.

**Common malocclusion :**

**A-Class 2 division 1**

Upper incisors are proclined .

Etiology : 1- when the lower lip is behind the upper incisors.

 2- Adapted tongue to lower lip behavior.

 3- other types of swallowing behavior.

Stability :

 when class 2 div. 1 is treated , one of the most important factors in stability ( in order not to get back as before ) are :

 1- cessation of the habit ; for example not sucking his thumb anymore.

 2-lip competence ; lips are meeting.

 3-lower lip to upper incisor relationship; the lower lip should cover only the incisal 1\3rd of the upper incisors.

**B-Class 2 division 2**

Upper incisors are retroclined.

Those patients have high lower lip line and a hyperactive lower lip.

-note that a hyperactive lower lip can cause both class 2 div. 1 and class 2 div. 2 ; if it is associated with a low lip line , it will lead to class 2 div. 1

( Hyper active lower lip + low lip line = class2 division 1 )

if it is associated with a high lip line , it will lead to class 2 div. 2.

( Hyper active lower lip + High lip line = class2 division 2 )

**C- Class 3**

Usually in class 3 , the role of soft tissues is not major -unless the patient has a large tongue- that may contribute to class 3.

Soft tissues role in class 3 is to reduce the severity of the malocclusion (dentoalveolar compensation) .

 In severe class 3 cases , we may have tongue--upper lip seal.

**D- Bimaxillary proclination :**

the excessive forward projection of both the maxilla & the mandible in relation to the cranial base.

Patients have :

×class 2 div. 1 skeletal relation

×full and everted lips (reduced activity of lips)

×sometimes , large tongue & proclined incisors ; because of the reduced activity of the lip.

**-Vertical anomalies** as open bite , might be from :

1- digit sucking habit.

2- chronic nasal obstruction.

3- a large tongue in abnormal position.

**-Trasverse problems** might be from :

1- habits.

2- patients with long faces

**-Spacing problems :**

Upper labial frenum in children is attached to the incisive papillae .

With age , it migrates labially . if it stays and doesn`t migrate , interruption of the periodontial ligament joining the teeth will occur leading to median diastema.

How to diagnose such a case?

1. If a peri-apical x-ray is taken ,a radiolucency will be seen at that region.
2. Blanch test : lift the upper lip & pull it outward and look for blanching of the soft tissues lingual to and between the central incisors.

**-Clefts:**

If we treat the cleft palate , a scar tissue will be formed that will prevent maxillary growing and widening , leading to a skeletal narrowing and restriction of mid-face growth.

**Many thanks for ♥Ghada Abdel Hadii♥**