**Dr. Sireen Ortho Sheet #2 8/10/2015**

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Last time we talked about the features of malocclusion. Today we are going to talk about the problems that we may face**.** The main problem is crowding in the dental arches**.** Problems are classified into *transverse* and *vertical* problems. Other classification related to the etiology*; dental* or *skeletal*.

Starting with the transverse problems; buccal (posterior) cross bites.

Definition of crossbite: a condition where one or more teeth maybe abnormally malposed buccally, lingually or labially with reference to opposing teeth.

*The causes of the posterior cross bites;
dental;*
- deflection to the path of eruption which mostly defect for one or more teeth
- prolong retention of primary teeth
- ectopic eruption of permanent first molar
- prolong thumb or finger sucking or cleft palate cases.

- Might be *skeletal* due to arch discrepancies
- *soft tissue*

***Thumb sucking***

It's all about the balance between forces, normally we have balanced forces between the lips & the cheeks and the tongue so the teeth stay in balance. When the patient sucks his thumb the tongue will be in a lower position than where it normally lies so it won't exert any force on the upper posterior teeth, and also while sucking , there will be extra force from the cheeks due to the activity of the buccinator muscle so the teeth will move lingually.

The effect depends on the intensity of thumb sucking, frequency, duration and the way the digit is sucked. Most children do not have their thumb in their mouth for 24 hrs. It's only during night or for a limited time, so what happens is typically anterior open bite which is asymmetrical because usually the child puts his thumb on one side of the arch. What happens posteriorly? There will be symmetrical constriction of the maxilla (it has nothing to do whether the child puts one or both thumbs in the mouth!) ***[we're talking in a Transverse plane]*** when the patient occludes his/her teeth there will be cusp to cusp occlusion and when the patient wants to bite the cusp-to-cusp is not a comfortable occlusion so in order for the patient to achieve the cusp-to-fossa occlusion the patient is going to shift the mandible toward one side either right or left side, so in this case the patient *displaces* the mandible toward one side (unilateral crossbite – asymmetrical).

The severity of malocclusion because of thumb sucking varies depending on the intensity and duration. Since the patient doesn’t have this habit 24hrs/day so the intensity and duration are **not enough** to cause bilateral cross bites.

Clinically, when we examine the patient, we see that when he/she occludes and then displacement occurs, there will be a unilateral cross-bite; this is because we have symmetrical constriction and the patient shifted the mandible to one-side to achieve the cusp-to-fossa occlusion. So when you examine a patient and see that he/she has a unilateral cross-bite, you have to tell whether it is with mandibular displacement or without, if it is with displacement then it is a functional problem because it might affect the TMJ causing TMD, it causes tooth wear, and if it is in the mixed dentition and not treated it might be transferred to the permanent dentition and cause true asymmetry (skeletal!), also, it might cause periodontal problems and mobility in the tooth where we have the cross-bite and we might lose that tooth.

***Mouth breathing***

Normally, it is presented with **bilateral cross bites.** Why? Because the patient is always with opened mouth, no effect of tongue on the upper teeth which leads to constriction of the upper arch and extrusion of posterior teeth.

During mouth breathing the tongue is lowered so the forces all the time (24hrs) are greater from the cheeks than from the tongue, so there will be constriction of the upper arch because there is no effect from the tongue on the upper teeth, the constriction in this case is more severe (the duration of mouth breathing is greater) so the result will be constricted maxilla with bilateral cross-bite, also because the patient has their mouth open all the time; there will be over-eruption of the posterior teeth and the patient will have posterior growth rotation, increased lower facial height and anterior open-bite.

* Digit sucking features:
* Prevents the eruption of one of the incisors
* Localized asymmetrical anterior open-bite and excessive eruption of posteriors
* Proclination of the upper incisors
* Retroclination of lower incisors
* Increased over-jet (continues to class II div.1 incisal relationship)
* Unilateral cross-bite with displacement of the mandible and narrowing the maxilla

**What do we do?**

First we have to stop the habit; explain what it causes using the adult approach. If the patient is compliant, reward him. Try to strengthen the patient confidence making him stop the habit by himself. If it doesn’t work we can get the help of *habit-breaking appliance*, it is preferable to have fixed appliance.

The unilateral cross-bite should be corrected, also the anterior open-bite, if the habit was broken early enough around the age of 8 (still eruption of the incisors); the anterior open-bite might resolve by itself, but the buccal cross bite does not resolve spontaneously and has to be treated.

Try to fix early during the mix-dentition period.

So to differentiate between skeletal or dental cross bite we have to look at the palate shape and inclination of upper premolars; if they inclined inward –dental- we can just tip them to achieve stability. But if the cause is skeletal and the teeth are inclined outward, it doesn’t work just to tip them because it won't be stable – it will relapse because we need to move the roots and bone as well.

In the case of skeletal cross bite; we need to skip the suture – to open the mid-palatal suture we need hemi –forceps (the expansion has to be rapid). So we need fixed appliance (ex. ***Borax screw*** appliance) with a screw that is opened twice daily (0.5 mm per day – once in the morning (0.25mm) and other in the evening) which causes *rapid expansion*. Some people do it slowly; it depends on the age of the patient; if the patient is young (12-15 yrs old), it has to be done slowly. ***Borax screw*** appliance – you ask the *patient to activate* it.

Another fixed appliance is used to correct the skeletal posterior cross bite – ***Quad Helix*** appliance- using this appliance needs the help of the *orthodontist in order to activate* it by opening the coils. In this type you can manipulate the amount of expansion. By this appliance we can achieve slow expansion and if it is used with young patients it can cause splitting of the mid-palatal suture as well –but this causes *rapid expansion*.

***The removable appliances*** with screws (the active component) that are used for the upper arch can cause *slow expansion* but dental movements. It is opened once or twice a week - (*For dental cross bites*). So for correcting buccal cross bite as early as possible we can use the removable appliance with the mid palatal screw with posterior retentive components on molars or 2nd premolars or the D's, in addition to capping the posterior teeth to prevent interfering with the lower arch or any secondary expansion of lower arch. The *patient opens* the screw once or twice a week, quarter of a turn each time.

***Anterior cross bites***

*Dental causes:*
- Traumatic injury to primary dentition that causes lingual displacement of permanent tooth bud.
- Super numerary tooth.
- A habit of biting the upper lip.
- Cleft lip repair cases.
- Arch length inadequacy.

*Skeletal causes:*
- Genetics.
- Due deficient anterior growth of maxilla.
- Excessive abnormal mandibular growth in anteriorly.

We have to treat these cases as early as we spot them because it may have an aggressive effect on the form of the maxillary alveolar growth and it also causes occlusal interference –mainly anterior shift of the mandible- ***pseudo class III*** - if it is involving more than one tooth.

It may disclose a tempo-mandibular disorder. Obviously it causes displacement of the lower incisors labially and eventually it will cause gingival recession and mobility of the tooth. Therefore, the labial surface of the upper incisors will have wear.

To prevent all these consequences to happen we have to correct anterior cross bite and it is very easy to do it. By using upper removable appliance, it pushes those teeth forward. The active component is ***Z-spring***, the retentive components (we need 4 components). If there is no enough space, we have to provide space first then to correct the cross bite.

*Note:* In a case with posterior cross bite and anterior open bite, we can correct the posterior one in order to provide space for proclining the anterior teeth.

As we said; always think about retention. Normally, correction of cross bite buccally or anteriorly, if there is a good inter-cuspation with buccal cross bite it is going to be stable. In the anterior cross bite, if there is enough overbite (the lower is behind the upper) it will prevent it from going back and this is going to be stable. Otherwise we have to think about alternative retention.

Now we finished the transverse problems.

***Vertical problem***

Anterior open bite is usually the access of the vertical overlap. Sometimes the etiology is skeletal which is increased vertical growth and increased anterior lower facial height. Other etiology is soft tissue; tongue thrust swallow or endogenous tongue thrust (rarely).

If the etiology is the habit, you have to stop it. Sometimes it can be a localized failure of the development in the region – ex. Cleft lip and palate patients. Other times it may be over eruption of the buccal segment resulting in symmetrical open bite anteriorly – however the habit results in asymmetrical open anterior bite.

If the anterior open bite extends *beyond the canine region*, it is caused by *skeletal* etiology. If the anterior open-bite involves *only the anterior teeth* then it is *dental*.

**How to manage the anterior open bite?**

First of all we have to stop the habit. It can be acceptable if it is mild without functional problems or it can be corrected with certain appliances. *Buccal intrusion splint* - splint like posterior bite plane and apply force with that to intrude the posterior teeth. Once you intrude the posterior teeth correction of anterior teeth will be achieved. Sometimes posterior bite planes are used with magnet (intrusion for upper and lower) to correct the anterior open bite. Or **functional appliances** can be used (mainly used with **class II** cases but it can be used to adapt open bites) - we can use the head gear and face bow to direct the force upward leading to intrusion in the posterior segment. Sometime we can use only the posterior bite plane with the head gear. If the problem is *skeletal, surgery* is the choice, and also with surgery the relapse is high.

***Posterior open bite***

Normally early extraction of premolars will result in open bite or submerged primary tooth. Or sometimes there is failure/arrest in the eruption of teeth posteriorly that will cause posterior open bite.

***Spacing***

Generalized – localized

*Generalized*; normally has small teeth on large arches. If it is mild you can close these spaces or the patient accept it or referred to operative dentistry , if it is more severe and you think that closing the space is not enough teeth can be enlarged.

You have to confirm the patient that closing the spaces with fixed appliances is not going to be stable, so we have to think about permanent retention after the fixed appliance otherwise spaces will open again. Sometimes the patient has severe spacing between the teeth, the suitable treatment can be distribution of the spaces posteriorly (by using fixed appliance, spaces can be closed anteriorly and leave the spaces posteriorly then can be closed by implant). So sometimes we have to add an extra tooth to the arch.

As I said you have to tell the patient and keep in mind that the spaces tend to open after the orthodontics treatment and permanent retention is a must.

Sometimes the patient has small tooth (esp. lateral incisors), you can just simply close the spaces around it and enlarge that lateral incisor.

*Localized;* missing tooth in that area, reopen that space and replace it (esp. missing upper lateral incisor or lower 2nd premolar). When do we open a space in a case of a missing lateral incisor? In crowded arches we tend to close (utilize) that space. If there is an *excessive overjet class II incisal relationship*, instead of extracting the premolar utilizes the space of the lateral incisor, then reshape the canine to manipulate the lateral and the premolar to look like a canine. If it is *class III*, we open the space because we cannot retract the upper incisors more (class III incisal relationship). If the buccal segment is in class I molar relationship and the anterior teeth are in class I incisal relationship and there is no missing teeth in lower arch, then you open the space. If there is more than half unit class II molar relationship and the space is small, the easier way is to move the posterior segment more forward into full unit class II and close the space.

Other factor than the space; the canine shape, is it suitable to reshape it to look like lateral or not (shape, color and size).

There are many factors that affect the treatment in cases of missing lateral and we have to take them all into consideration.

Same thing for missing 2nd premolar; if you find crowding in the posterior segment, utilize the space to release the crowding.

***Median diastema***

It might be physiological state (8-10 years of age) – ugly duckly stage. In this case no need for intervene, just confirm the patient that it is a *transient stage* and it will be corrected spontaneously.

It might be due to super numerary tooth.

It might be due to missing/small lateral incisors.

It might be because of frenal attachment. The frenum attaches to the incisal papillae in the deciduous dentition and when teeth erupt and come together, it should migrate. In some patients the migration doesn’t happen and there is persistence attachment of frenum with the incisal papillae leading to persistence of diastema. *How to diagnose it?*

Clinically; blanching – pull the upper lip and watch the incisive papillae it should be blanching.

Radiographically; you notice a notch between the central incisors.

*What is the management?* There are two views; some (orthodontists) like to close the space first and then do the frenectomy. Others (surgeons) prefer to do the frenectomy first then close the space.

Why?

Orthodontists believe that if the frenectomy is done first, it will increase the stability; the scar after the frenectomy will hold the teeth together. However, surgeons think it is much easier to perform frenectomy before closing the space because it provides more visibility and accessibility.

The doctor explained a case with pictures;

What is the active component that is used with URA to close the space?

***Palatal finger spring*** (2 in number).

What about anchorage? ***Reciprocal anchorage***.

In this case we can't use the removable appliance, we have to use the fixed appliance because the root has to be moved as well ( bodily movement).

Any median diastema or any spaces in general need permanent retention.

In cases of space due to skeletal problems, we need to open the space.
In cases of class 3 incisal relationship, we need to open the space.
If there is a space in the upper arch already you try to open the space but if the upper arch is crowded we tend to close the space.
It's much easier if the teeth are tipped toward the space so we can tip then back.
However, it is more difficult to move the tooth bodily.
If there is half unit class2 or less, it is preferred to distalize the posterior segment.
But if it is full unit class2, it is preferred to close that space.

*Crowding;* mainly tooth or arch size discrepancy.
We can deal with it by expansion (screw, head gear) if it is indicated OR extraction. When do we choose to extract the 5? if there is mild crowding, and this will increase the need for anterior anchorage.

If we need half of the space or less we do extract posteriorly, but if we need half of the space or more we do extract anteriorly (in this case you need to think about anchorage mainly).

Anchorage can be achieved by using head gear, NANCE or lingual arch for the lower.

***Unerupted maxillary incisor***

When do we consider a tooth delayed eruption?
Disturbances in the normal eruption sequence and if the contralateral has been erupted for more than 6 months.

Etiology could be hereditary or environmental; trauma causes dilacerations of that tooth - if it occurred at 5 yrs of age it results in dilacerations which prevent eruption.

Other etiological factor is a super numerary tooth; barrel shaped super numrary (tuberculate). If there is a retained primary tooth, it has to be extracted and then provide a space for the permanent incisor to erupt. If not, take an anterior occlusal radiograph. Normally spontaneous eruption takes 1year to 16 month to occur. If eruption didn't occur, expose the tooth and trap that tooth. If there is severely dilacerated incisor, it has to be extracted.

***Soft Tissue And Incisor Stability:***

 Soft tissue is important for stability in class II division 1 cases.

 If you have competent lips or you bring the upper incisors back to their normal position and the lips become competent and the lower incisors are covered/overlapped by the uppers, here we have stability. But if you have short, incompetent lips, even if you corrected the over-jet the teeth won't be stable because we don’t have the balance between the lips and the tongue.

 If you have incomplete over-bite with no digit sucking habit, then the lower incisors are held in their position by soft tissue balance. If you tried to procline the lower incisors they won't be stable. If you decided to procline them you should use bonded retainer (permanent retention).

 If you have a complete over-bite with the lower incisors touching the palate and the patient has anterior growth rotation, the lower incisors are not going to move forward with the mandible because they are held back behind the uppers. In this case if you proclined the lower incisors they would be stable.

* ***Occlusal Features of Class II Division 2:***
* Increased over-jet
* Class II incisal relationship
* Proclined or normally inclined upper incisors
* Over-bite is usually deep
* Class II molar relationship unless there is premature loss of certain teeth

There might be bimaxillary proclination in class II division 1 cases but it is usually more common in class I malocclusion. Stability is always questionable while treating bimaxillary proclination cases, so you should always hink of permanent retention. And you always need fixed appliance to treat these cases. Or you may think about extraction in upper teeth and retroclining uppers. And then looking for soft tissue factors for stability.

Why should we treat class II division 1 cases? Because there is increased risk of trauma to the upper incisors when the over-jet is greater than 6mm.

Good Luck Seniors ☺

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