WELCOME
POSTERIOR CROSSBITE IN PRIMARY AND MIXED DENTITION: ETIOLOGY AND MANAGEMENT
DEFINITION OF CROSSBITE

According to **Graber**: 

A condition where one or more teeth may be malposed abnormally—buccally or labially or lingually with reference to opposing tooth or teeth.

**Other** definition:

- A deviation of the normal faciolingual relationship of teeth of one arch with those of opposing arch when the two dental arches are brought into centric occlusion

OR

- Abnormal occlusion in the transverse plane

OR

- Reverse overjet of one or more teeth
INTRODUCTION

Under **normal** circumstances- maxillary arch overlaps mandibular arch both labially and buccally.

But when mandibular teeth (single tooth or a segment of teeth) overlap maxillary teeth labially or buccally depending upon their location in the arch a **crossbite** is said to exist.
CLASSIFICATION OF CROSSBITES

(1) According to the location in the arch

- Anterior
- Posterior

(2) According to the nature of crossbite

- Skeletal crossbite
- Dental crossbite
- Functional crossbite
**POSTERIOR CROSSBITE**

- This refers to an abnormal transverse relationship between upper and lower posterior teeth.
- In normal circumstances, mandibular buccal cusps occlude in the central fossae of maxillary posterior teeth.
- In posterior crossbite case, mandibular buccal cusp occlude buccal to maxillary buccal cusp.

**PREVELANCE:**
In a study (By Kutin and Hawes) involving 515 children, 3-9 years of age: the prevalence of posterior crossbite in primary and mixed dentition is 1:13 or 7.7%
CLASSIFICATION OF POSTERIOR CROSSBITES

(1) According to the **number** of teeth involved

- single tooth crossbite
- segmental tooth crossbite

(2) According to existence on **one/both sides** of arch

- unilateral
- bilateral

(3) According to **etiologic** factor

- skeletal
- dental
- functional
(4) According to **extent** of crossbite

- **Simple posterior crossbite**
  - Buccal non occlusion crossbite
  - Lingual non occlusion crossbite

Buccal cusp of one/more teeth occlude lingual to the buccal cusp of mandibular teeth

The maxillary posteriors occlude entirely on buccal aspect of mandibular posteriors. Also known as **SCISSOR BITE**

Maxillary posteriors occlude entirely on lingual aspect of mandibular posteriors
ETIOLOGY

Based on etiologic factors responsible for crossbite:

CROSSBITE

- Dental
- Skeletal
- Functional
Dental crossbites

- Generally, single tooth/segmental crossbite.
- No threat to general health of the patient.
- Problems arising are - periodontal/ esthetic in nature.
- Usually result from faulty eruption pattern with no irregularity in the basal bone.
- Once the teeth erupt - the occlusion locks them into position and drives them even further into a crossbite relationship.
Etiology of dental crossbite are:

1) Anomalies in tooth number
   - supernumerary teeth
   - missing teeth
2) Anomalies in tooth size
   - microdontia
   - macrodontia
3) Anomalies in tooth shape
4) Premature loss of deciduous/permanent teeth
5) Prolonged retention of deciduous teeth
6) Delayed eruption of permanent teeth
7) Abnormal eruption path
8) Ankylosis
SKELETAL CROSSBITE

- It results from discrepancy in structure of maxilla and mandible or malposition of the jaw.
- A basic discrepancy in the width of arches is noted.
- A narrow maxillary arch or a wide mandibular arch often associated with a buccal crossbite.
- They cause appreciable damage to a person’s health and personality.
Etiology of skeletal crossbites

1) Retarded development of maxilla.
2) Narrow upper arch.
3) Forwardly placed mandible.
4) Unilateral hypo/hyperplastic growth of any jaw.
5) Hereditary (Class III skeletal malocclusion).
6) Congenital (Cleft lip and palate).
7) Trauma at birth (forcep injury leading to ankylosis of TMJ.)
8) Trauma during growth (ankylosis of TMJ and retardation of growth in traumatized bone).
9) Trauma after completion of growth (malunion of fracture segments).
10) Habits such as prolonged thumb sucking and mouth breathing. Because they cause lowered tongue position, thus tongue no longer balances the forces exerted by the buccal group of musculature, which leads to narrowing of upper arch leading to posterior crossbite.
11) According to RUTRICK - the use of traditional slender type of pacifiers can cause crossbite.
Functional crossbite

- An acquired muscular reflex pattern during closure of mandible is involved in functional crossbite.
- Presence of occlusal interferences can result in deviation of mandible during jaw closure.
- Other causes are: early loss of deciduous teeth, decayed teeth, ectopically erupted teeth.
- Thus a functional crossbite results from the mandibular shifting into an abnormal but often a more comfortable position.
In normally growing mandible, posterior crossbites should be treated as early as possible to allow the normal growth and development of the dental arches and the TMJ.

Posterior crossbite management

IN PRIMARY DENTITION

IN MIXED DENTITION
In primary dentition

- Posterior crossbite in primary dentition is usually as a result of constriction of the maxillary arch which often results from an active digit or pacifier habit.
- Determine whether there is an associated mandibular shift.

**Mandibular shift**

- Present: Treatment is implemented to correct the crossbite
  - If the first permanent molar erupts into crossbite: Treatment is initiated (if no other malocclusion exists)
  - If the first permanent molar erupts normally: Treatment is not indicated until the permanent premolars erupt

- Not present: Treatment is delayed until the permanent first molars erupt
In mixed dentition

- Posterior crossbite correction in mixed dentition can be difficult and confusing.
- The clinician should rely on a well documented database to determine whether a skeletal/dental correction is necessary.
- And in areas where mandibular shift is present it should be managed as soon as possible to prevent soft tissue and dental compensation.

### Posterior dental crossbite

- **Generalized**
  - Unilateral
  - Bilateral

- **Localized**
The various treatment modalities for posterior crossbite are:

1) Occlusal equilibrium.
2) Coffin spring.
3) Cross elastics.
4) Soldered W-arch (Porter appliance).
5) Quad Helix.
6) Removable appliance.
7) Rapid maxillary expansion (RME).
8) Ni-Ti expanders.
9) Oral screening.
10) Fixed orthodontic appliances.
- A dental, bilateral, lingual crossbite in primary and mixed dentition may be simply corrected by removing the occlusal interferences usually in the cuspid area.

- This may be sometimes needed to be accompanied by some appliance.
COFFIN SPRING

- It was designed by Walter Coffin.
- It is a removable, **omega** shaped wire appliance
- It produces slow and bilaterally symmetrical expansion.
- It consists of omega shaped wire of 1.25 mm diameter placed in *mid palatal* region.
- Free ends of omega are embedded in an *acrylic plate* that covers the slopes of the palate.
- It brings about dento alveolar expansion.
- However, it is capable of skeletal changes when used in mixed dentition with a good retention.
CROSS ELASTICS

- It is used to treat localized crossbites.
- Select, fit and burnish appropriate band to maxillary and mandibular teeth.
- Solder hooks or button to the bands -
  on palatal surface of the maxillary teeth and
  on buccal surface of the mandibular teeth.
- After these bands are welded and cemented rubber elastics is attached on the hooks as shown in fig.

- The rubber elastics used are - heavy rubber elastics,
  0.25 i.e. 3/16 inch and
  6 ounce elastic
- The elastic should be worn full time except while eating.
- Change it at least once per day.
- The elastics are worn until the crossbite is slightly over corrected.
- Crossbites are usually corrected within 3-4 months (with continuous wearing of elastics).
- Major change will be reflected in position of the maxillary molar because of the cancellous nature of the maxillary alveolar bone compared with denser bone around mandibular molar.

- **Advantage** - Usually no need of retentive appliance
- **Disadvantages** - Needs patient’s co-operation and is technically more difficult.
SOLDERED W - ARCH
(PORTER APPLIANCE)

- It is an efficient appliance for the correction of posterior crossbite as well as a reminder appliance in some posterior crossbites associated with thumb sucking.
- Preformed stainless steel bands are adapted to the most distal tooth involved.
- W-arch is constructed of 0.036-0.040 inch steel wire- contoured to the arch.
- Wire is made free of tissue by 1-2 mm.
- Anterior extension of the wire should touch only the teeth that must be moved buccally.
- W-arch is expanded about 4mm wide than its passive width or so that one arm of “W” is resting over central grooves of teeth when the other arm is in proper position.
- The appliance is **cemented** during active treatment.
- **Activate** the appliance by slightly opening the palatal loop with a corresponding adjustment in the molar loop area.
- The appliance activation: - *intra orally*
  
  or  *extra orally.*
- Appliance expands the arch approx **1mm/side/month.**
- Activated every 3-4 weeks until crossbite is slightly over corrected.
- **Retainer** used for additional 3 months.
Modification: UNEQUAL W-ARCH

- Used in case of true **unilateral** crossbites.
- It has long and short arms.
- **Short** arm - touches only the teeth to be moved.
- **Long** arm - touches as many contralateral teeth as possible.
- The idea behind the unequal W-arch is to pit the movement of a large number of teeth against movement of small number of teeth.
- The side with smaller number of teeth - more movement
  - side with larger number of teeth - less movement.
- Introduced by Currier and Austerman, 1993.

- The quad helix is a spring that consists of 4 helices -
  2 helices in the anterior palate and
  2 helices near solder joint in the posterior palate.

- It is capable of dento alveolar as well as skeletal expansion.

**PROCEDURE:**

Fit bands to either primary second molars or the permanent first molars.

Take a complete arch impression.

Remove the bands from teeth and seat them in proper position

Seal in place and make a working cast of stone

Use a 0.032 stainless steel wire,

this stainless steel wire contacts all posterior teeth,

anterior aspect of wire is just distal to primary canines,

the contact is close to, but not touching the soft tissue at cervical margin,

the loops or helixes and palatal portion should be 2-3 mm distal to banded teeth

Secure the wire to working cast, solder the wire to molar bands.
- **Activate** the appliance prior to cementation.
- Activation is done intra orally - using triple beak plier
  extra orally - using hand.
- Activation is done in 2 steps:
  
  **Step 1** - Activate the posterior helical loops, moving the free wires buccally.
  **Step 2** - Activate the anterior helical loops moving the molar bands buccally.
- When the wire has been **activated** the lingual surface of molar bands will be above the **central fossa** of the molars.
- The anterior portion of wires will be above the **canine cusp tip**.
- The appliance produces **slow expansion**
- Crossbite corrected in **4-6 months**.
- **Retain** the same appliance for further **3 months**.
- The quad helix can be used simultaneously with full bonded appliance therapy.

**Modification – UNEQUAL QUAD HELIX**

Same as unequal W- arch
Used to correct unilateral crossbites
- Lateral maxillary expansion is achieved with a parallel expansion screw housed in upper acrylic plate.
- The appliance should have excellent tissue contact and anchorage with clasps on teeth.
- Provide *acrylic relief* - palatal to anterior teeth.
- The labial bow should be passive; when expansion occurs-bow becomes activated.
- A full turn is achieved with 4 turns of a key.
- The conventional expansion schedule- $\frac{1}{4}$ turn every 3-4 days.
- Correction is dental only.
- It causes bilateral expansion.
- Relapse potential is high.
RAPID MAXILLARY EXPANSION

- Rapid maxillary expansion is indicated for severe cases of bilateral crossbites where correction requires **skeletal expansion**.

- It involves the splitting of the mid palatal suture orthopaedic increase in maxillary width.

- It can easily occur in a growing child (< 9 years).

- The appliance uses a **mid-palatal screw** (Hyrax) - soldered to bands on the first permanent molars and primary molars.

RME screw

Banded RME → Cemented RME.
- The screw is **activated** a quarter turn twice each day.
- Patient is monitored once a week.
- It brings about *0.2-0.5 mm/day expansion*.
- The appliance produces a rapid expansion over *3-4 weeks*.
- Crossbite should be over corrected and then retained for atleast 3 months with the same appliance.
NICKEL TITANIUM EXPANDERS

- They bring about slow expansion (dental changes).
- They require less adjustments than conventional stainless steel quad helix appliances.
- Molar bands are cemented to maxillary first permanent molars welding is done.
  Ni-Ti wire shapes are attached to lingual sheath of welded molar band.
- Various sizes are available and need to be selected depending on:
  - the amount of expansion desired
  - pre treatment width of the palate
- Cooling the expander → it gets constricted
  it gets inserted into lingual tubes on the
  maxillary molars.

As it warms to body temperature → it becomes springy
  exerts continuous force on teeth
  arch expansion
ORAL SCREEN/VESTIBULAR SCREEN

- Introduced by Newell in 1912.
- It is a myofunctional appliance – that takes form of a curved acrylic shield placed in labial vestibule.

**PRINCIPLE:**

It works on the principle of

*force application + force limitation.*

i.e. to apply the forces of circumoral musculature to certain teeth

**OR**

to relieve those forces from teeth

therefore allowing them to move due to forces exerted by tongue

It works on principle of “PASSIVE EXPANSION”
**INDICATIONS:**

To intercept habits - mouth breathing

- thumb sucking
- tongue thrusting
- lip/cheek biting

To treat mild disto-occlusions.

To perform muscle exercise to help correction of hypotonic

- lip and cheek muscles.

**CONTRAINDICATIONS:**

In children with nasal obstruction or

- respiratory distress
**PROCEDURE:**
Take upper and lower impressions and pour working models
Casts are occluded in normal intercuspation and sealed
Extend vestibular screen into sulcus-
(where mucosal tissue reflects)
Posteriorly extend the appliance upto distal margin of
the last erupted molar.

*Note*: The material used is **SELF CURE/HEAT CURE** acrylic resin. The patient is made to wear the appliance at **night** and 2-3 hours during the day time and maintain **lip seal**.
MODIFICATIONS:

Hotz modification - made up of additional **metal ring**.

Patient with tongue thrust - additional screen placement on **lingual** aspect

In Mouth breathers - vestibular screen with a number of **holes** which are gradually decreased
- Fixed orthodontic appliances can be used for correction of posterior crossbites.
- The arches can be kept slightly expanded depending upon the movement required.
- **Cross elastics** can be used to bring about correction of individual tooth crossbite in posterior segment.
- Fixed orthodontic appliance are ideal for accurate placement of teeth in a dental arch as they provide a three dimensional control over the tooth.
The early and correct diagnosis of posterior crossbite is essential to prevent the forthcoming occlusal discrepancies in the permanent dentition.

Adequate curative measures and treatment modalities should be advocated to correct the posterior crossbite.
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THANK YOU