

# ARCH EXPANSION

The expansion of the arch has been one of the oldest means of creating space the dental arches. Based on the duration of time taken to achieve the desired expansion, expansion devices can be classified as:

- Rapid maxillary expansion devices.
- Slow expansion devices.

## **Rapid maxillary expansion devices(RME)**

The first reported use of a rapid expansion device, dates back to the year 1860. The RME appliance is essentially a dentofacial orthopedic appliance, which tends to produce its changes by splitting the mid-palatine suture. The rationale being that if extreme forces are applied on to the palatal shelves, the interlying suture splits and results in true skeletal changes. The teeth are generally used for the purpose of transmitting the forces onto the maxillary bone proper.

## **EFFECTS OF THE RME**

### Dental effects

1. Posterior teeth tend to tip buccally.
2. Limited extrusion of posterior teeth.
3. There is distinct appearance of midline diastema which appears within days of initiating RME therapy. The diastema is reported to close simultaneously within 6 months due to the trans-septal fiber traction.



Appearance of midline diastema

### Skeletal Effects

1. The palatine processes separate in a triangular or wedge-shaped manner.
2. The mandible rotates downward and backwards due to the downward movement of the maxillary posterior teeth.
3. The RME tends to increase the intranasal space as the outer walls of the nasal cavity move apart.

### **Indications for RME use**

RME appliances are ideally indicated in growing individuals with severely constricted maxillary arches, involving airway impairment or mouth breathing tendencies. They are also indicated in other cases of:

1. Posterior cross bites with real or relative maxillary deficiency
2. Cleft patients
3. Along with facemask therapy
4. Class III cases with minor maxillary deficiency
5. As part of interceptive orthodontics

### **Types of rapid maxillary expansion appliances**

They can be best classified as:

1. Removable appliances
2. Fixed appliances
  - Tooth-borne
  - Tooth and tissue-borne.

#### **1. Removable appliances**

The efficiency of removable RME appliances is doubtful. The appliance basically consists of a screw in the midline with retentive clasps on the posterior teeth. The acrylic plate is split in the middle and activations of the screw forces the two halves apart to result in the desired expansion.

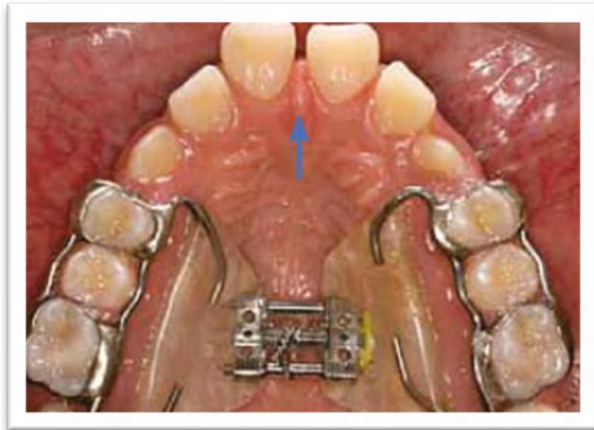
#### **2. Fixed appliances**

- Tooth-borne : best examples are The Isaacson type or the Hyrax type.



Hyrax type

- Tooth and tissue-borne: example, Hass RME Appliance which transmits forces not on to the teeth only but also on to the palatal shelves directly.



Hass RME Appliance

### **Activation of the RME appliance**

The basic principle of the appliance involves the generation of forces that are capable of splitting the mid-palatine suture. Hence, the forces should be definitely more than the usually used orthodontic forces. The forces generated are close to 10 to 20 pounds. An expansion of 0.2 to 0.5 mm should be achieved per day. The screw is activated at between 0.5 to 1mm per day and about 1 cm of expansion can be expected in 2 to 3 weeks.

### **Slow expansion devices**

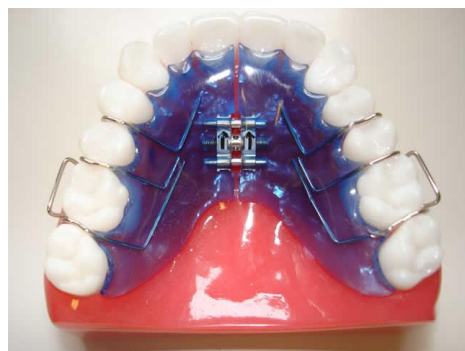
Slow expansion involves the use of relatively lesser forces (2 to 4 pounds) over longer periods (2 to 6 months) to achieve the desired results.

### **Indications of slow expansion**

1. Correction of unilateral cross bites.
2. Correction of 'V' shaped arches as in "thumb-sucking child
3. Preparation for bone grafts in cleft cases.
4. Minimal crowding in the upper arch (1-2 mm).
5. Elimination of a displacement

### **Appliances used for slow expansion**

- 1. Screw Appliances:** Various screws have been used for the expansion of maxillary and the mandibular arches . These screws have a smaller pitch and are activated less frequently as compared to screws used for RME appliances.



**2. Coffin Spring:** This appliance is capable of producing slow expansion, even though it has been shown to split the palate especially when used in patients in the early mixed dentition. It is an ideal appliance to treat unilateral cross bites.



**3. Quad/Tri/ Bi-Helix:** They are all named after the number of helices incorporated in the appliance. The quad helix consists of four helices made of 0.038" diameter wire, soldered to the molar bands. The increased length of wire increases the range of action and flexibility, and decreases the force levels. The tri- and the bi-helix appliances incorporate only three and two helices respectively.

