BOWS & RETRACTORS
REMOVABLE APPLIANCES

Removable appliances are designed to be taken out from the mouth by the patient.

Advantages:

• Malocclusions which require tipping can be efficiently treated by removable appliance.

• Fabrication is easier.

• Less chair side time.

• Doesn’t not require extensive training like fixed appliance.

• When the appliance is damaged, patient can remove the appliance before it causes damage to the tissues.
• Esthetically more pleasing and economically cheaper.
• Used for space maintainance.
• Used for retention appliances.
• Can be easily cleaned by the patient.
Disadvantages:

• Cases which are already tipped cannot be treated with removable appliance.
• Rotation cannot be corrected
• Multiple tooth movements not possible.
• Not suitable for closure of extraction spaces by mesial movement of posterior teeth.
• Difficult to obtain tight proximal contact between teeth with removable appliance.
• Patient tolerance is not good, more specifically in the mandibular appliance.
• Patients with complex problems cannot be treated.
• Patient cooperation is highly important
• Appliances get damaged or broken if they are not worn.

Components:

**Active components:** Bows, retractors, screws, springs,

**Retentive component:** Clasps, bows
LABIAL BOWS

• Labial Bows are the active component of the removable orthodontics appliances

• They are used for lingual or palatal movement of incisors.

• Types:
  - With U Loops
  - Without U Loops
With U Loops:

• Short Labial Bows
• Long Labial Bows
• Split Labial Bows
• Reverse Labial Bows
• Fitted Labial Bows
• Beggs Labial Bow

Without U loops:

• Roberts Retractor
• Mills Retractor
• High Labial Bow With Apron Springs
SHORT LABIAL BOW

Wire used: 0.7mm or 21 gauge Hard SS Wire

Indications:
• Closure of spaces mesial to canines
• Minor overjet reduction
• Component of retention appliance

Parts:
• Two “U” loops.
• Horizontal BOW
• Retention tag
Construction:

- Referral line
- Horizontal Component
- Vertical loops
Activation
LONG LABIAL BOW

• Wire used: 0.7mm or 21 gauge SS wire

Indications:
• Close space distal to canine.
• Minor Overjet reduction
• Retention appliance

Design:
Similar to short labial bow only difference being the crossover wire crosses between first premolar and second premolar
SPLIT LABIAL BOW

- Wire used: 0.7mm or 21 gauge SS wire
- There are two types of split labial bow:
  i) Retraction of incisors.
  ii) Closure of midline Diastema.
Split Labial Bow used for retraction:

• One of the main drawbacks of labial bow is its rigidity.

• The flexibility of the bow can be increased by splitting the bow so that there are two buccal arms.

• They are effective for retraction of incisors.

Drawbacks:

• Rotation or minor irregularities are difficult to control with split labial bow
SPLIT LABIAL BOW FOR MEDIAN DIASTEMA CLOSURE:

• In this type the free ends of labial bow cross over each other.
• The free end of one bow crosses the opposite central incisors and hooked on distal aspect of central incisor
• Arms should be parallel to each other.

Drawbacks:
Effective only for midline diastema closure and not for overjet reduction

Activation: Same as Short Labial Bow
LABIAL BOW WITH REVERSE LOOPS

Indications:

• For minor retraction of incisors
• For minor crowding
• As retention

Design:

• Same as other labial bows except loops are reversed.
• Distal end goes upto interdental area between the two premolars.
• Cross over wires go between canine and premolar.
Activation:

• Only labial bow where it is activated by opening of the loops

  i) Opening of the loop

  ii) Compensatory bend

Drawbacks:

Poor stability and high rigidity
FITTED LABIAL BOW:

**Wire used:** 0.7mm or 21 gauge

**Indication:**
- Used as retention appliance after orthodontic treatment

**Design:**
- Bow is adapted to the contours of the labial surface of the individual teeth.
- Bow is placed in the middle third
- Appliance should be passive.
BEGG’S LABIAL BOW

- Also known as Beggs Wrap Around Retainer / Around the Globe bow.
- Popularized by P.R. Begg.
- It is used as retainer after fixed orthodontic therapy.
- 0.9 mm wire is used.
• Fabrication consists of labial wire that extends till the last erupted molar.

• U-loop is incorporated at the pre molar and molar area to close the band spaces
• Advantage of this bow is that there is no cross-over wire between the canine and premolar thereby eliminating the risk of space opening up

• Allows settling of occlusion
ROBERTS RETRACTOR

Designed by G.H. Roberts

Wire used: 0.6 mm or 23 gauge hard stainless steel wire.

Indication:

• Retraction of four incisors.

• Highly flexible so used in cases where more than 4mm overjet is present.

• Excellent retraction bow.
**Design:**

- Horizontal bow component is same as that of other labial bows but ending at the distal part of the lateral incisors.
- Coils are placed mesial to canine.

**Activation:**

- The bow is adjusted by bending the vertical limb below the coil.
- As the incisor moves palatally, the bow will drop anteriorly and the level of horizontal part should be adjusted.
MILLS RETRACTOR

• Also known as Extended Labial Bow.
• Extensive looping increases the flexibility

Wire used: 0.7 mm or 21 gauge hard stainless steel wire.

Indications:
• Highly flexible and so used for reduction of large overjets.
• Alignment of irregular incisors.
Disadvantage:

Less comfortable to the patient.

Difficult to fabricate.

Activation:

Activated by compressing the extended loop and bending the bow palatally.

Care should be taken to avoid trauma to the mucosa during treatment.
HIGH LABIAL BOW WITH APRON SPRINGS

Consists of two components.

a) Heavy base arch wire

Wire used: 0.9mm or 19 gauge hard stainless steel wire

Design:

• A high labial arch wire with vertical arms incorporated and relived in the areas of labial frenum provides the base arch
• High labial arch should not contact the mucosa and should not extend deep into the full depth of the sulcus.

b) Apron springs.
• They are the active component.
• Are attached to the base arch by winding a few turns in horizontal arms and then two or three turns in the vertical arm.
• Apron springs are bent into shape according to the number of teeth to be moved lingually


**RETRACTORS**

*Ideal Requirements:*

- Should be easy to fabricate
- Should be easily adjustable.
- Should be capable of being seated in the correct position.
- Should not cause discomfort to the patient.
- Should deliver gentle forces
- Should not irritate mucosa
- Should not produce unwanted tooth movements
BASIC PARTS OF A RETRACTOR

• Parts of a retractor: a) Active arm
  b) Coil or helix
  c) Retentive tag

• Force delivered by the appliance is given by the formula

$$ F \propto \frac{E r^4}{L^3} $$
Where,

$L = \text{Wire Length.}$

$R = \text{Radius.}$

$E = \text{Elastic modulus of the material.}$

• Doubling the diameter increases the force or stiffness by 16 times.

• Doubling its length reduces the force by 8 times.

• Incorporation of a coil increases the effective length of the spring and thereby increases the deflection.
Coils:

• The coil diameter should be 2.5mm minimum.
• Incorporation of coil increases the length of the spring and reduces the force
• Increases the range of the appliance.
• For maximum efficiency, coil should be made in such a way that it unwinds as it is activated.
Canine Retractors are of four types:

• Buccal Canine Retractor.
• Helical Loop Canine Retractor.
• U loop Canine Retractor.
• Palatal Canine Retractor.
BUCCAL CANINE RETRACTOR

• Wire used: 0.7mm/0.6 mm.

• Indications:
  
a) Indicated when only distal movement of canine is required.
  
b) Minimal distal movement of canine is achieved with this retractor.
Design:

- One of the few appliances where coil is closed for activation.
- The end of the retractor is bent at right angle to the canine to be moved.
- Then it is shaped to the tooth.
- Coil is placed as high as possible without interfering with the soft tissues.
• Tag should cross over the mesial contact point of second premolar.

• Coil should be placed in between the present and future position of the canine.

• If thinner wire is used, then they are sleeved to prevent distortion.
Activation of Buccal Canine Retractor:

• The coil should be activated by only 1 mm.
• It is activated by closing the coil.
• Activation is done by using “Hollow Chop plier” like Mathews or Andresen’s.
• Activated by bending the anterior arm using these pliers.
Canines can be pushed palatally into the line of the arch as they move distally.
MODIFICATIONS

1) Supported Buccal canine retractor:

- This is similar to buccal canine retractor but made from 0.5 mm wire.
- This wire is supported in a tubing or a sleeve.
- Tubing gives excellent vertical stability to the retractor.
- Flexible mesiodistally.
- Activation of 2mm can be done.
2) Stabilised Canine Retractor:

- The standard buccal canine retractor can be further improved by addition of a stabilizer wire welded to the bridge of the clasp on the back tooth.
- Effect of the stabilizer is to restrict vertical movement without affecting the anteroposterior flexibility of the retractor.
REVERSE LOOP CANINE RETRACTORS

- Also called as Helical Canine Retractor.
- Wire used: 0.7mm or 21 gauge ss wire.
- Indications:
  a) In patients with shallow sulcus depth for retraction of canine.
  b) Mostly used in mandibular arch.
Design:

- Active arm starts from the mesial cervical aspect of canine. It can be made to encircle the mesiolingual aspect of canine.
- Proceeds backwards up to the distal of second premolar.
- From there helix is made with a minimum diameter of 2.5mm.
- The retentive part of the spring crosses the active arm in mesial aspect of second premolar.
- Height of the coil is made according to the depth of the sulcus.
Drawbacks:

- Stiff in horizontal plane.
- Unstable vertically.

Activation:

Method 1: Consists of cutting off 1 mm wire from the free end and reshaping it to engage the mesial surface of canine.

Method 2: by opening the coil by 1 mm.
U-LOOP CANINE RETRACTOR

• Wire used: 0.7mm or 21 gauge.

• Indication:
  
a) Indicated when distal movement of canine is required.

b) very minimal distal movement of canine is achieved with this retractor.
Design:

• Active arm engages the mesial surface of the canine at the cervical level and proceeds posteriorly to form the U loop.

• U loop is made in similar fashion like labial bow. The mesial end of the U loop starts at the premolar bent at right, width of the loop depends on the width of premolar.

• Extends 2 to 3 mm below the cervical margin.

• Finally curved around the interdental area between premolars
Advantages:

• Very easy to fabricate
• Simple in design
• Not bulky

Disadvantages:
This is least efficient of all the canine retractors.

Activation:
Activated by closing the loops by 1 mm.
PALATAL CANINE RETRACTORS

• Wire used: 0.5 mm or 23 gauge hard ss wire.

• Uses:
  a) Distalization of palatally placed canine.
  b) Distal movement of premolar.
Design:

• Active arm contacts tooth surface at right angles to the desired tooth movement.

• Coil should be placed as far as away possible to have a good range of action. It is centered in the line through the midpoint of the tooth and perpendicular to its intended path.

• Coil should be 2.5 mm to 3 mm. for maximum efficiency, coil should be placed on the opposite side of the tooth movement.

• For distal movement, coil is placed on the mesial aspect of the tooth and for mesial movement, coil is placed on the distal aspect of the tooth.

• Active arm, coil and retentive tag lie in the same line.
Activation:

• Method 1: Spring is activated by opening the coil by 2-3mm. Pull the free arm of the spring slightly away from the point of emergence from coil.

• Method 2: Tension can be given to the spring by squeezing the coil with the tip of the pliers.
Thank you for your patience...