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Review Article

Orthodontic Retainer: A Review Study

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ABSTRACT:
One of the most challenging phase for an orthodontist is to retain the corrections achieved during the course of orthodontic treatment. Orthodontic Retainer are very important part of fixed orthodontic treatment . Retainers are passive orthodontic appliances that help in maintaining and stabilizing the position of teeth long enough to permit reorganization of supporting structures after the active phase of orthodontic therapy. This article provides a comprehensive review about the various types of orthodontic retainers available today.
Keywords: Orthodontic retainers, Removable retainers, Bonded retainer.

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INTRODUCTION

Orthodontic treatment in general accomplish well-aligned teeth and a good occlusion. After the teeth have been orthodontically moved into the new position, it takes approximately a year for the surrounding tissues to adapt[1]. If the teeth are not retained during this period a relapse usually occurs, meaning that the teeth return towards their original position. Studies have demonstrated that most of the irregularities appear during the first two years post treatment[2,3].

Teeth have a tendency to return towards their initial positions due to tension in periodontal fibres, particularly those around the necks of the teeth (inter-dental and dento-gingival fibres). The quality of the final occlusion will also affect the stability of the orthodontic outcome, with unwanted displacing occlusal contacts potentially leading to unfavourable changes in tooth position. Sound orthodontic treatment planning and the achievement of appropriate occlusal and soft tissue treatment goals can help to minimise orthodontic relapse[4].

Unwanted tooth movements after treatment can also occur as a result of normal age changes, even in patients who have not had orthodontic treatment. This deterioration in the alignment of their teeth is due to changes in the soft tissue pressures and skeletal structures around the dentition. These soft tissue changes and minor ongoing growth can be regarded as a part of the normal ageing process and are unpredictable. Retainers are therefore indicated not only to resist the tendency of teeth to return to their pre-treatment positions following orthodontic tooth movement, but also to resist unwanted long-term age changes. In most orthodontic cases, retainers are therefore an essential part of orthodontic treatment. There is no evidence to suggest that the retention regimen for adults should differ from that used for adolescent patients, providing the periodontal supporting tissues are normal. Post-retention outcomes in adults have been shown to be at least as stable as those in adolescents in relation to midline alignment, overjet, overbite, molar relationship and incisor alignment[5]. Two main categories of fixed retainers, fibres and multistranded wires are most popular in modern clinical practice[13].

The major causes of relapse after orthodontic treatment include the[6]

- Elasticity of gingivall fibers
- Cheek/lip/tongue pressures,
- Jaw growth.
- Gingival fibers and soft tissue pressures are especially potent in the first few months after

treatment ends, before PDL reorganization has been completed.
- Unfavourable growth is the major contributor to changes in occlusal relationships.

Orthodontic retainers resist the tendency of teeth to return to their pre-treatment positions under the influence of periodontal, occlusal and soft tissue forces, and continuing dentofacial growth[6].

The road to an eternal, perpetual straight smile begins and ends with an orthodontic retainer. Retainers are defined as orthodontic appliances used to prevent relapse/return following correction, of features of the original malocclusion

CLASSIFICATION OF RETAINER[7]

1) According to their force application
a) Active retainers
i) Retainers which apply force Ni–Ti retainers Positioners
b) Passive retainers
ii) Retainers which do not apply force
2) According to their usability by the patient
a) Removable retainers
i) Hawley's retainer
ii) Begg's wraparound retainer
iii) Barrer/Spring retainers
iv) Removable canine to canine retainers
v) Removable molar to molar metal retainers Positioners
vi) Thermoplastic vacuum-formed retainers Essix retainers
b) Fixed retainers
i) Multistranded stainless steel wire
ii) Plain stainless steel wire
iii) Glass fiber-reinforced retainers
iv) Ortho-Flextech retainers
v) V-loop design
vi) Ling-lock retainers
vii) Labial bonded retainers
3) According to their visibility
a) Visible retainers
i) Have a labial wire component
ii) Hawley's retainer
iii) Begg's wraparound retainer
iv) Barrer/Spring retainers
v) Removable canine to canine retainers
vi) Removable molar to molar metal retainers
b) Invisible retainers
i) Have a lingual wire placement or made from transparent thermoplastic sheets
ii) Thermoplastic vacuum-formed retainers
iii) Essix retainers
iv) Multistranded stainless steel wire
v) Plain stainless steel wire
vi) Glass fiber reinforced retainers
vii) Ortho-Flextech retainers
viii) V-loop design
ix) Ling-lock retainers
4) According to their generations
a) First generation
i) Plain round 0.032–0.036″ blue elgiloy wire with a terminal loop
b) Second generation
i) Same as first generation but without terminal loops
c) Third generation
i) Easier to place and conforms more closely than third-generation retainers
5) Adjunctive retention procedures
a) Pericision
b) Frenectomy
c) Interproximal reduction (IPR)

REMOVABLE RETAINER[6]

Removable retainers are the most common retainers because they are patient friendly and can be removed and reinserted by the patient.

1. HAWLEY'S RETAINER

The most common removable retainer is the Hawley retainer, designed in the 1920's by E H Hawley. It incorporates clasps on molar teeth and has a characteristic outer bowwith adjustment loops, from canine to canine. There is an acrylic coverage of the palate, which automatically provides a potential bite plane effect to retain overbite correction and rigid enough to maintain palatal expansion achieved during Orthodontic treatment. Mechanical retention can be a problem in patients with short clinical crowns or exfoliated deciduous teeth. The clasp locations for a Hawley retainer must be selected carefully, since clasp wires crossing the occlusal table can disrupt rather than retain the tooth relationships, established during the treatment. Circumferential clasps on the terminal molar may be preferred over the more effective Adams clasp if the occlusion is tight. When first premolars have been extracted, standard design of Hawley retainer cannot keep the extraction space closed, rather it tends to open up the extraction space aswires of labial bow extends distal to canines, tending to act like a wedge at an extraction site.[8]

2. BEGG'S RETAINER

Consists of a labial wire that extends till the last erupted molar and curves around it to get embeded in acrylic that spans the palate. Advantage: There is no cross over wire that extends between the canine and premolar thereby eliminating the risk of space opening.

3. CLIP – ON RETAINER / SPRING ALIGNER

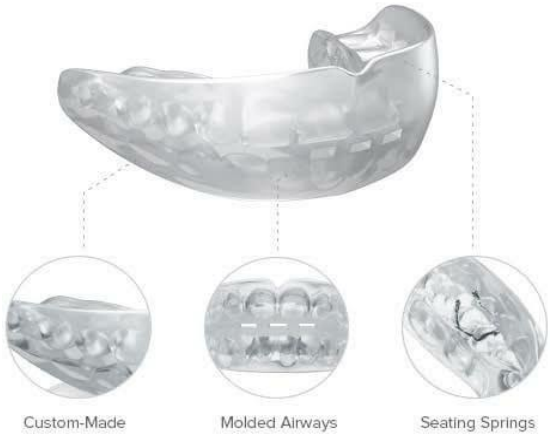
This appliance is made of a wire frame work that runs labially over the incisors and then passes b/w the canine and premolar and is reserved to lie over the lingual surface. Both the labial as well as lingual segments are embedded in a strip of clear acrylic. It brings about corrections of rotations commonly seen in lower anterior region.

4. WRAP AROUND RETAINER

It is a type of spring aligner. It consists of wire that passes along the labial as well as lingual surfaces of all erupted teeth which is embedded in a strip of acrylic. It helps in stabilizing a periodontally weak dentition.

5. KESLING TOOTH POSITIONER

It is made of thermoplastic rubber like material that spans the inter – occlusal space and covers the clinical crowns of the upper and lower teeth and a small portion of the gingiva. It needs no activation at regular intervals and is durable. Drawbacks: - difficulty in speech - risk of TMJ problems.

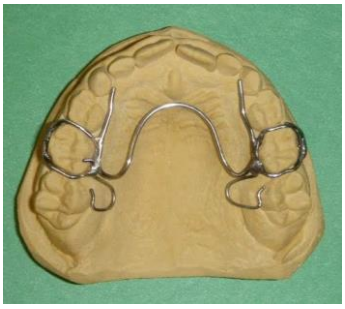


6. INVISIBLE RETAINERS

Fully cover the clinical crowns and a part of the gingival tissue. It is made of ultra thin transparent thermoplastic sheets using a Biostar machine. It is esthetic and highly popular due to its invisible form.

7. CROZAT RETAINER

A 4-4 Crozat appliance has cribs on the first bicuspids, recurved double lapping lingual finger springs and a labial bow. Advantages are firm retention, labiolingual control of anterior teeth, flexible, maintenance of adequate oral hygiene, because it is removable and esthetic. The major disadvantages of the appliance are: It is cost effective and it is breakable.



8. VANDER LINDEN RETAINER

The Vander linden retainer is constructed to offer complete control over the maxillary anterior teeth, with firm fixation provided by clasps on the canines. The continuous 0.028"labial arch and left and right three quarter 0.032"molar clasps are embedded in the palatal acrylic plate. The premolars and molars should be of acrylic, except where there are clasps. This retainer does not usually interfere with the

occlusion, because most maxillary lateral incisors have rounded disto-incisal corners with sufficient space for the retainer wire on the palatal side. Nevertheless the patient's occlusion should be checked to ensure that 0.028" wire can pass between the lateral incisor and canine without causing interference.[8]

9. KANSALS RETAINER

It is a removable tooth borne orthodontic retainer which has acrylic and wire components. The wire components include modified labial bow,Kansals bow and pin head clasps. The main advantage of this retainer is that it is less bulky, low food accumulation and easy to clean.

Fig. 7: Pin-head clasps

Fig. 9: Acrylized and finished appliance

Fig. 8: All the wire components of Kansal's appliance

Fig. 10: Acrylized and finished appliance placed on model

ADVANTAGES OF REMOVABLE APPLIANCE[6]

- It is removable
- Effective for simple malocclusions
- Smaller anchorage requirement
- Uncompromised oral hygiene
- Short chair side time
- Ease of adjustment.
- Less professional training for management.

DISADVANTAGES OF REMOVABLE APPLIANCES[6]

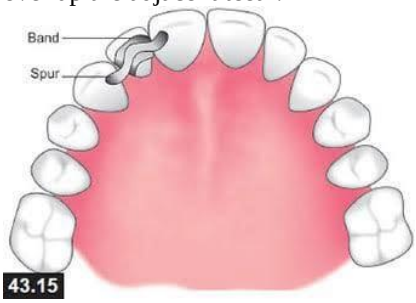
- Dependant on patient compliance
- Unable to perform complex malocclusion
- Difficulty in speech
- Prone to breakage and loss

FIXED RETAINERS[6]

Fixed retainers are a type of invisible retainers which are either banded or bonded to the lingual surface of the teeth,hence it is not visible to the naked eye.It is indicated where prolonged retention is required and involves miminal or no patient cooperation. They are fixed to the teeth and hence cannot be removed by the patient.

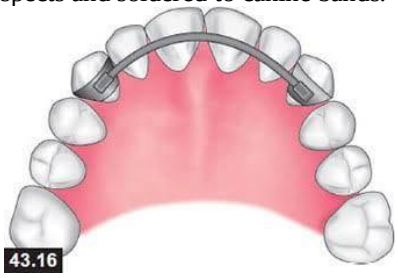
1. BAND AND SPUR RETAINERS

It is indicated where a single tooth has been orthodontically treated for rotation correction or labiolingual displacement. The tooth that has been moved banded and spurs are soldered onto the bands so as to overlap the adjacent teeth.



2. BANDED CANINE TO CANINE RETAINER

It is commonly used in lower anterior region.Canines are banded and a thick wire is contoured over the lingual aspects and soldered to canine bands.



3. BONDED LINGUAL RETAINERS

They are bonded on lingual aspects following anterior curvature. The ends are curved over the canines where it is bonded.

ADVANTAGES OF FIXED RETAINER

- Reduced need for patient co-operation
- Can be used when conventional retainers cannot provide same degreeof stability.
- Bonded retainers are more esthetics
- No tissue irritation unlike what may been seen in tissue bearing areas ofHawley's retainer
- Can be used for permanent and semi permanent retention.
- Do not affect speech.[6]
- Invisible, are well-tolerated by patients

- Virtually compliance-free.
- No damage to the teeth and to the hard and soft tissues adjacent to the wire.[8]

DISADVANTAGES OF FIXED RETAINERS

- More cumbersome to insert
- Increased chair side time
- More expensive
- Loss of healthy tooth material
- Tend to discolour
- Time-consuming [4]
- Technique sensitive
- Difficult to maintain, encouraging plaque and calculus accumulation.[6]
- One of the difficulties faced is bonding the retainer in the second premolar extraction cases.[14]

CONCLUSION

Braces are temporary, but retention is forever. This notion should be explained to the patient clearly before commencing the orthodontic treatment if they wish to maintain their beautiful smile. The type of retainer, the technique of fabrication, different material to bond, and retention protocol should be carefully considered at the beginning of orthodontic treatment.

The selection of appropriate means for providing retention should state from day one of orthodontic treatment planning for attaining optimal result post treatment that lasts for life time.

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