



Retainers: A Boon For Prevention Of Relapse

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Abstract

Post-orthodontic retention is one of the most controversial areas in clinical orthodontic practice. Retention is the phase of orthodontic treatment that attempts to maintain teeth in their corrected positions after active tooth movement. Although retention potentially affects every patient, there is minimal agreement as to the most appropriate approach to adopt in an individual case. Without a phase of retention there is a tendency for the teeth to return towards their initial positions. The aetiology of relapse is not fully understood, but relates to a number of factors, including periodontal and occlusal factors, soft tissue pressures and growth.¹ Attitudes to the use of retention have changed over the years, but it has been suggested that there is a shortage of reliable evidence to apply clinically.

Keywords: Retention, Retainer, Orthodontics

Introduction

Retention is that part of orthodontic treatment during which a passive appliance is used to maintain orthodontic correction of dental and skeletal structures and thereby counteract relapse or the tendency for return of characteristics to original malocclusion.¹

Retention was defined by Moyers² as “the holding of teeth followed by orthodontic treatment in the treated position for the period of time necessary for the maintenance of the results.”

It has been stated that correct diagnosis and planning of treatment, followed by a careful stabilization of the final result, would minimize the importance of retention, relapse tendencies still exist in a fairly high percentage of cases treated. Even if these precautions are taken, however, relapse after tooth movement still

remains a complex problem, with a varying number of factors involved.³

Definition

Riedel⁴ defined retention as “the holding of teeth in ideal esthetic and functional position.”

Retainers⁵ are passive orthodontic appliances that help in maintaining and stabilizing the position of teeth long enough to permit reorganization of the supporting structures after the active phase of orthodontic therapy.

Requirements of Retaining Appliances:

According to Graber,⁶ the requirements of a good retaining appliance are: -

- 1) It should restrain each tooth that has been moved into the desired position in directions where there are tendencies toward recurring movements.

- 2) It should permit the forces associated with functional activity to act freely on the retained teeth, permitting them to respond in as nearly a physiologic manner as possible.
- 3) It should be as self – cleansing as possible and should be reasonably easy to maintain in optimal hygienic condition.
- 4) It should be constructed in such a manner as to be as inconspicuous as possible, yet should be strong enough to achieve its objective over the required period of use.

Classification of Retainers:

Retainers can be classified into⁷: -

- 1) Removable retainers.
- 2) Fixed retainers.
- 3) Active retainers.

D) Removable Appliances as Retainers: -

Removable retainers are passive appliances that can be removed by the patient and reinserted at will. Removable appliances can serve effectively for retention against intra-arch stability and are also useful as retainers (in the form of modified functional appliances or part – time headgear) in patients with growth problems.

Advantages of removable appliance⁷

1. It is removable
2. Effective for simple malocclusions
3. Smaller anchorage requirement
4. Uncompromised oral hygiene
5. Short chair side time
6. Ease of adjustment.
7. Less professional training for management.

Disadvantages of removable appliances

1. Dependent on patient compliance
2. Unable to perform complex malocclusion
3. Difficulty in speech X Prone to breakage and loss

Various examples of removable retainers are as follows: -

- 1) Hawley Retainer.
- 2) Removable Wraparound retainers.
- 3) Non – acrylic removable retainer.
- 4) Fitted labial bow.
- 5) Removable plastic Herbst Retainer
- 6) Essix Retainers.
- 7) Esthetic Removable retainer.
- 8) Positioners etc.

1) Hawley Retainers

By far the most common removable retainer is the Hawley retainer, designed in the 1920s by Charles Hawley, used following active orthodontic therapy. The basic appliance incorporates clasps on molar teeth and a characteristic outer bow with adjustment loops, spanning from canine to canine. Because it covers the palate, it automatically provides a potential bite plane to control overbite.⁴

2) Removable Wraparound Retainers: -

A second major type of removable orthodontic retainer is the wraparound or clip-on retainer, which consists of a plastic bar along the labial and lingual surfaces of the teeth. A full-arch wraparound retainer firmly holds each tooth in position.⁷

3) Fitted labial bow: -

Fitted labial bow is also known as continuous labial bow. It is so called because in this type of labial bow the wire is adapted to conform to the contours of the labial surfaces of the anterior teeth. The U loop is usually small. The fitted labial bow cannot be used to bring about active tooth movement. They are used as retainers at the completion of fixed orthodontic therapy.⁵

4) High labial retainer: -

The high labial appliance permits the orthodontist to achieve both objectives, minor tooth movement plus retention, and thus is an excellent device to use during the retention phase of orthodontic treatment.⁸

5) Removable 6-6 metal Retainer: -

Retention in the lower arch sometimes presents us with a dilemma.

Dr. Carl S. Hoffman⁹ have found useful is a metal 6-6 removable retainer.

6) Non –Acrylic Removable Retainer: -

Removable appliances with an acrylic base may cause soft tissue inflammation in patients who tend to accumulate plaque or are hypersensitive to free monomer, especially when cold curing acrylic is used. A non-acrylic removable retainer is a simple, effective alternative.

A special appliance was designed by Dr. I. Brin, Dr. Y. Zilberman, and H. Tennenhaus¹⁰ to resolve the inflammation.

7) Continuous Clear Retainer: -

Wires that cross from labial to lingual in a standard Hawley retainer tend to hold spaces open, and to interfere with the occlusion and the ability to finish with cuspid or group guidance and with anterior guidance. An all–plastic retainer attempted to solve this problem; but tended to interfere with the posterior occlusion, and the plastic would fracture easily when that interference was eliminated. With the continuous clear retainer there are no wires crossing from buccal to lingual and no interference with occlusion and settling. It offers much greater control of the corrected positions due to circumferential retention from the second molar through the central incisor and broad coverage on the labial side. Because the continuous labial portion is made of cold-cure acrylic and finished to a high shine, it does not stain and tends to be extremely accurate.¹¹

8) Retainer Splint: -

The purpose of this retainer is, primarily, to replace the lower fixed cuspid – to – cuspid retainer. It is easy to construct and rarely breaks.

Although it is basically a cuspid – to – cuspid appliance, it can be carried posteriorly to hold buccal expansion. It can also be used effectively to accomplish minor tooth movements. A tooth may be cut off the cast, over-rotated, set in plaster and the retainer made to the new position.

It is only worn at night. It has been used as a nightly check on stability, only being worn if needed. It has also been used over a period of years in less stable circumstances.¹²

09) Removable Plastic Herbst Retainer: -

In an effort to combine the useful properties of both single – and dual – arch retainers, Raymond P. Howe¹³¹ have begun using a Removable Plastic Herbst (RPH) retainer.

Removable Plastic Herbst retainer, with upper and lower occlusal splints connected by the herbst mechanism. Its full upper and lower plastic splints function as conventional single–arch retainers. At the same time, the removable splints are connected on each side by the telescoping Herbst mechanism, which acts as a dual – arch anteroposterior retainer.¹³

10) Essix Retainers: -

When permanent retention is emphasized, the equilibrium is upset. The cornerstone of Essix permanent retention is the complete delegation of responsibility to the patient. Essix retainers¹³² have nothing to adjust; the only thing that could be done on a recall visit would be to check the patient's compliance and listen to any comments.

Essix thermoplastic copolyester retainers change the rules of permanent retention. They are a thinner, but stronger, cuspid-to-cuspid version of full-arch, vacuum –formed devices.¹⁴

11) A New Thermoplastic Retainer: -

Clear thermoplastic appliances have been recommended for use as transitional retainers, finishing appliances, 1) and even permanent retainers. 2) They are easy to fabricate, inexpensive, esthetic, and comfortable, and thus have a high level of patient acceptance. 3) The major drawbacks are their tendency to open the bite and their low durability.¹⁵

12) Positioners as Retainers: -

A tooth positioner⁷ also can be used as a removable retainer, either fabricated for this purpose alone, or more commonly, continued as a retainer after serving initially as a finishing device. Positioners are excellent finishing devices and under special circumstances can be used to an advantage as retainers.

Patients wearing a positioner, as a retainer should be checked carefully to see that there is no separation of the posterior teeth when the incisors are in contact as it is the usual sign of a positioner made to an incorrect hinge axis.

In addition to tooth positioning and enhancing the setting or “fine tuning” of the dentition, these appliances act to stimulate and massage the gingiva during the exercise aspects of their use.

II) Fixed Appliances as Retainers: -

Fixed orthodontic retainers⁷ are normally used in situations where intra-arch instability is anticipated and prolonged retention is planned.

Advantages of fixed retainer⁷

1. Reduced need for patient co-operation
2. Can be used when conventional retainers cannot provide same degree of stability.
3. Bonded retainers are more esthetics
4. No tissue irritation unlike what may be seen in tissue bearing areas of Hawley’s retainer
5. Can be used for permanent and semi permanent retention.
6. Do not affect speech.

Disadvantages of fixed retainers

1. More cumbersome to insert
2. Increased chair side time
3. More expensive
4. Loss of healthy tooth material
5. Tend to discolour

Two different types of bonded retainer are used routinely to prevent vertical anterior relapse and secondary crowding of the lower incisors, and a 0.032-inch wire from canine-to-canine is used as a 3-3 retainer. With the round 0.032 inch multistranded wire, it is no longer necessary to bend loops at the ends because the twists in the spiral wire give undercuts for retention. The other type of retainers is used to prevent space reopening and rotational relapse; it is made of thin, flexible spiral wire of 0.0175 or 0.0215 inch and is bonded to each tooth of the anterior segment.

Knierim (1973)¹⁶ published the first report of a technique of making the lower cuspid-to-cuspid retainer without bands.

Wolfson (1974)¹⁷ gave a step-by-step procedure of Bandless but fixed retention by placing the direct-banded mandibular lingual canine-to-canine retainer.

The retainer has all advantages of a fixed soldered canine-to-canine retainer. In addition, it does not require bands, which in themselves, besides requiring space, compromise upon esthetics. It allows for normal teeth contacts mesial and distal to canines and can be fabricated at the chair in one appointment of approximately 30 minutes.

Reinhardt (1979)¹⁸ presented another technique for retention - a cast metal framework attached with the acid etch technique and composite resins. The method is not indicated for all situations but is an option with the practitioner.

Diamond (1987)¹⁹ developed a direct technique that uses glass fibers from woven fiberglass fabric (sold in boating supply stores) or Fiberbond.

Some other types of fixed orthodontic retainers: -

1) Direct-bonded labial retainers: -

Direct-bonded retainers¹⁸ are usually placed lingually, since one of the chief advantages of such retainers is their invisibility.

2) 4-4 Crozat retainer: -

When a basic Crozat appliance²⁰ is used as retainer, a tooth will sometimes rotate away from the lingual wires, and crowding will return in spite of the appliance.

3) Prefabricated Bonded mandibular retainer: -

Previous report have presented techniques for direct bonded mandibular retainers whose principal drawbacks included lengthy fabrication time, accumulation of plaque on the bonded attachment areas, and potential irritation to the lingual soft tissues due to the bulkiness of the attachment areas. The Prefabricated Lower Retainer²¹ minimizes these deficiencies.

III) Active Retainers: -

“Active retainer”⁷ is a contradiction in terms, since a device cannot be actively moving teeth and serving as a retainer at the same time. It does happen, however, that relapse or growth changes after orthodontic treatment will lead to a need for some tooth movement during retention. This usually is accomplished with a removable appliance that continues as a retainer after it has repositioned the teeth, hence the name.

Spring retainers: -

Recrowding of lower incisors is the major indication for an active retainer to correct incisor position. If late crowding has developed, it often is necessary to reduce the interproximal width of lower incisors before realigning them, so that the crowns do not tip labially into an obviously unstable position. The cause of the problem in these cases usually is late mandibular growth, which has uprighted the incisors, and they must be realigned in their more upright position.⁷

2) Correction of Occlusal Discrepancies: -

Modified Functional Appliances as Active Retainers:

It is possible to describe an Activator as consisting of maxillary and mandibular retainers joined by an interocclusal bite block. A typical use for an activator as an active retainer would be a male adolescent who had slipped back 2 to 3 mm toward a class II relationship after early correction. If he still is experiencing some vertical growth (and almost all adolescents fall into this category, even at age 17 or 18), it may be possible to recover the proper occlusal position of the teeth. Differential anteroposterior growth is not necessary to correct a small occlusal discrepancy - tooth movement is adequate – but some vertical growth is required to prevent downward and backward rotation of the mandible. For all practical purposes, this means that a functional appliance as an active retainer can be used in teenagers but is of no value in adults. Stimulating skeletal growth with a device of this type simply does not happen in adults, at least to a clinically useful extent.⁷

Adjuncts to Retention

At times delivering only a retentive appliance may not be sufficient to prevent post treatment relapse in all the cases. These special cases may require adjuncts to be maintained in stabilized condition post treatment.²²

A number of adjuncts have been proposed that aid in retention. These include: -^{22,23}

- 1) Circumferential Supracrestal Fiberotomy
- 2) Reproximation
- 3) Frenectomy and associated procedures
- 4) Septotomy

5) Corticotomy

6) Immediate torsion

7) Prosthetic retainers

Conclusion

Retention forms an integral part of orthodontic treatment. Compared to removable retainers, fixed retainers have shown to have better treatment stability. However more clinical trials have to be carried out to prove the efficiency of both removable and fixed retainers.

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