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An overview of current trends in retention

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Abstract

The word “retain” relates to the phrase “to twiddling thumbs or hold secure.” From the earliest days of Orthodontic tooth movement, several schemes were planned to confirm posttreatment stability. The best analysis indicates that there is no answer for this. A posttreatment routine is suggested. Post-treatment stability is one in every of the foremost difficult aspects of treatment and may be a concern to any or all orthodontists. There square measure some necessary post-treatment factors that might influence the result, like normal maturational changes, post-treatment tooth alterations, and persistent imbalance within the neuromuscular environments. Thus, early treatment brings concerning several advantages as well as higher use of the patient’s growth potential, less risk for adverse induced effects, higher patient compliance, and probably higher outcomes, some with and others without retention management. In this article we are going to review the various types of traditional & contemporary retainers and their benefits for the proper management of retention phase.

Keywords: Retention, contemporary

Introduction

Long-term post-treatment stability is one of the most difficult aspects of the whole treatment process and is a difficulty of great concern to any or all orthodontists. There are some important posttreatment factors that could influence the result, such as normal maturational changes, posttreatment tooth alterations, and persistent imbalance in the neuromuscular environments^[1].

“Retention is the most tough drawback in orthodontia; in reality, it's the problem,” was declared by Oppenheim in 1934 still holds true in several cases nowadays^[2].

“The holding of teeth following treatment within the treated position for the amount of your time necessary for the upkeep of the result.” has been outlined by Moyers^[3].

It has been in agreement by most of the clinicians that retention ought to be thought about from starting of diagnosis and treatment coming up with which is able to be useful to think about the potential factors for long run stability and can be unbroken in mind throughout the treatment. Retention is associate integral a part of treatment. It's imperative that patient expectations are established at the outset of treatment.

Retention is important for all post-orthodontic treatment section for 3 major reasons:

1. The gingival and periodontal tissues are affected by orthodontic tooth movement and require time for reorganization when appliances are removed.
2. The teeth may be in an inherently unstable position after the treatment, so that the soft tissue pressures constantly produce a relapse tendency.
3. Changes produced by growth may alter the orthodontic treatment results^[4].

Retainers are the passive orthodontic appliances that facilitate in stabilising and maintaining the position of teeth long enough to allow re-organization of the supporting structures after the active phase of orthodontic therapy.

Orthodontic treatment can produce an attractive smile, however sporting retainers subsequently is what maintains and protects the smile into the longer term. Retainers are key to maintaining the success of treatment over the long run. In fact, wearing retainers is equally as necessary as the treatment itself!

Retainers are of various varieties. Their contribution in maintaining stability has been mentioned during this article.

Removable retainers

These retainers are fitted routinely and are worn by the patients for at least six to twelve months after the treatment completion so that the remodeling of soft and hard tissues takes place around the teeth. The removable retainers function as retention for intra-arch stability and are helpful as retainers in patients with growth problems.⁵

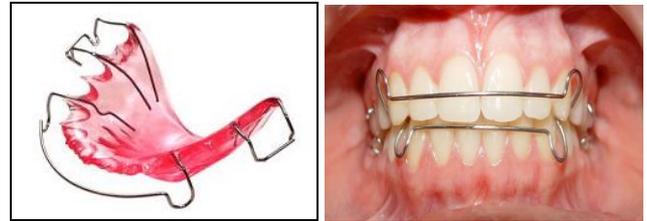


Fig: Hawley's retainer

Hawley's retainer

Designed in 1920's, it's the foremost usually used removable appliance for orthodontic patients post treatment. It incorporates Adam's clasps on molar teeth and a characteristic outer labial bow with adjustment loops, extending from canine to canine.

Removable wrap around retainer

The wrap around or attachable retainer consists of a plastic bar on the labial and lingual surfaces of teeth. A full arch wraparound retainer ought to enable every tooth to maneuver separately, stimulating reorganization of the orthodontic ligament. Additionally, a wraparound retainer is sort of esthetic.



Fig: Removable wrap around retainer

Thermoplastic retainers: (Essix retainers)

Essix thermoplastic co polyester retainers are a thinner, however stronger. Essix retainers may be placed on same day the fixed appliances are removed. Their flexibility and actuator effects facilitate in correcting minor tooth

movements. They'll function a short lived bridge for a missing anterior tooth. They'll additionally act as night guard for action and acts as bite planes to alleviate bracket impingement.



Fig: Essix retainers

4-4 Crozat retainer

A 4-4 Crozat appliance has cribs on the first bicuspids, recurved double imbrication lingual finger springs and a labial bow. Benefits are firm retention, labiolingual management of anterior teeth, flexible, maintenance of adequate oral hygiene, as a result of it is removable and esthetic. The major important disadvantages of the appliance are: it's value effective and it's breakable.

is cheap and it's clear and doesn't impair peech. It will correct individual tooth positions whereas maintaining close adaptation to the remaining teeth.

Osamu active retainer for correction of mild relapse

It is a clear removable appliance that may be worn to correct individual tooth position throughout the retention phase. The retainer is elastic and stable. The Osamu active retainer

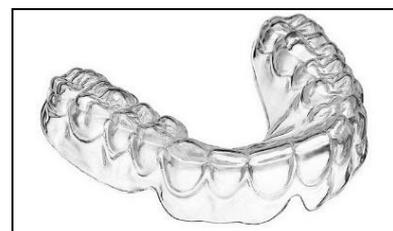


Fig: Osamu active retainer

Vander linden retainer

The Vander linden retainer is built to offer complete control over the jaw anterior teeth, with firm fixation provided

by clasps on the canines. This retainer doesn't interfere with the occlusion more often.



Fig: Vander linden retainer

Fixed retainers

A fixed retainer generally consists of a passively bonded wire to the lingual aspect of the tooth usually in mandibular incisor region, taking in complete analysis of patient's bite. Orthodontists impose mounted retainers, particularly in cases wherever stability is questionable and permanent retention is needed.

Types of mounted retainers

1. Banded Canine to Canine Retainer
2. Bonded Lingual Retainers
3. Band and Spur Retainer.

Banded canine to canine retainer and band spur retainer has been no longer used currently as not a lot of clinical knowledge is accessible to favor its use. Bonded lingual retainer has been used as a hard and fast retainer most ordinarily.

naturally, mandibular arch can be expanded or contracted and rotations can be corrected by ligating the teeth to the lingual arch.



Fig: Molar to molar mandibular retainer

Resin fiberglass bonded retainer

The Resin fiberglass bonded retainer was developed by Michael a direct technique that solves the major problem with cuspid to cuspid retainer and takes very little time for preparation. The system uses glass fiber from woven fiberglass fabric.



Fig: Resin fiberglass bonded retainer

The main benefits of the resin fiberglass retainer have proven rigid and impermeable. Patients appreciate the tooth coloured material and also the comfort that is provided by sleek margins. It is recommended for patients who need only the canines to be retained. In cases of severe tooth rotations, however, this technique is flexible enough to allow the incisors to be bonded as well.

Molar to molar mandibular retainer

The molar to molar mandibular retainer is completed with the significant gauge wire and with the utilization of molar bands. The advantages of molar to molar mandibular retainer over a Hawley's or a cuspid to cuspid retainer include the following, it allows the mandibular canines and molars to settle

Bonded lingual retainer: They are unremarkably employed in things wherever intra-arch stability is questionable and prolonged retention is planned, especially the mandibular incisor region. The following are the indications:

1. In midline diastema cases
2. Spaced anterior teeth
3. Adult cases with potential post orthodontic tooth migration
4. Accelerated loss of maxillary incisors, requiring the closure and retention of large anterior space.
5. Severely rotated tooth.

Lingual retainer wire technology has modified very little over the last forty years. The 2 most generally used retainers stay the thick (0.025 to 0.032 in) spherical stainless-steel wire bonded solely to the canines and also the thin (0.0195 or 0.0215 in) multistranded wire bonded to the incisors and canines. The most preferred bonded retainer is the multi stranded wire retainers as it is bonded to every tooth in lingual segment using acid etch composite bonding.



Bar Retainer

3-3 SS retainer



Mesh pad type retainer

Hygienic retainer

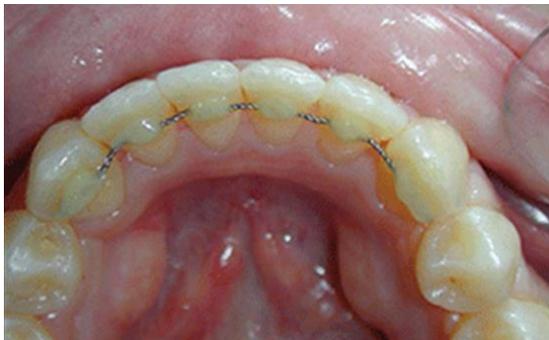


Fig: Fixed Spiral retainer

Memotain

A new CAD/CAM fabricated lingual retainer wire made of custom-cut nickel-titanium—as an alternative to multistranded lingual retainers. Memotain is a CAD/CAM fabricated lingual retainer made of 0.014x0.014-in rectangular nickel-titanium. The wire is very versatile and custom made exactly adapt to the patient's lingual tooth anatomy. It was introduced in 2012 by associate degree dental practitioner, Pascal Schumacher. The name Memotain may be a portmanteau from the mix of “memory” and “retainer” due to the individuality of use nickel-titanium for the lingual wire.



Fig: CAD/CAM set up for Memotain

This retainer may be most advantageous in the maxillary arch, where multistranded wires frequently fail. Maxillary anterior teeth ordinarily have massive large ridges or atypical shapes (ie, peg-shaped lateral incisors, talon cusps, invaginations) that make close adaptation with hand-bent wires challenging. Memotain's tight interproximal wrap is beneficial in common break-point areas, such as the embrasure between the lateral incisor and the canine, or the step between the canine and the premolar. Furthermore, it is digitally positioned to prevent contact with the mandibular teeth.



Fig: Memotain: Close view

Benefits of Memotain

1. No need for wire measuring or bending.
2. Individually optimized placement, greater accuracy of FIT
3. Tighter interproximal adaptation, less tongue irritation
4. Better durability, and resistance to microbial colonization.

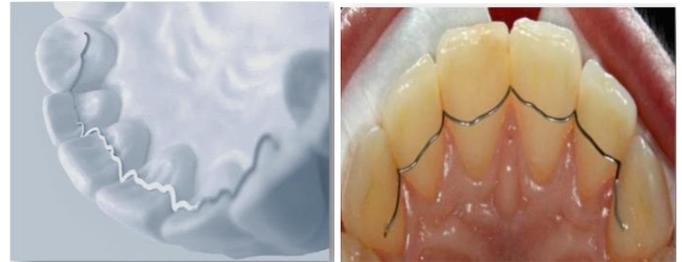


Fig: Memotain: On cast and intraorally

Discussion

In 1997 Sauge *et al* investigated the role of Hawley retainers versus Essix retainer. The results disclosed that those sporting the Hawley retainer showed a bigger increase in occlusal contact resulting in the conclusion that Hawley retainers afford relative vertical movement of teeth (settling) whereas, the Essix retainer maintains tooth position just as it is at the debonding stage.

In a study conducted by Kumar noble metal *et al* to see the effectiveness of Beggs retainer over Essix they all over that additional subjects with Begg retainers thought of that their retainers were acceptable for biting and chewing than the topics sporting Essix retainers.

In 2007, Rowland *et al* enforced a prospective single-center randomized controlled trial to analyze the effectiveness of Hawley and vacuum-formed (aka. Essix) retainers. There was a considerably bigger modification within the Irregularity Index for the Hawley retainer compared to the vacuum-formed retainer. They all over that vacuum-formed retainers are simpler in stabilizing the jaw and mandibular anterior segments.

In another study conducted by Sylvia Jaderberg *et al* they concluded that no significant changes in over jet and overbite was found, more over the retainer was well tolerated by the patients. It was thus all over that the Essix retainer is decent for maintaining the results when treatment which night - time wear is adequate.

Multistranded wires have become more common for their improved aesthetics and control of the mandibular incisors, although these retainers have significant drawbacks. The primary problem of multistranded lingual wires is their high failure rate. Disadvantages embrace issue flossing, plaque accumulation, stretching of the wire causing malalignment or spacing, unraveling, introduction of unwanted torque, irritation to the tongue, and occlusal interference (for the maxillary retainer). As a results of the requirement for frequent repair, many orthodontists are reluctant to provide bonded lingual retainers to their patients.

In a study conducted by Pandis N *et al*. the semipermanent mounted retainer conferred higher calculus accumulation, greater marginal recession, and increased probing depth ($P < 0.05$). However, they additionally all over that tooth natural anatomical position and patients oral hygiene additionally plays role in success of retainer.



Fig: Plaque accumulation and mucosal irritation

But Butler J *et al* disproved stating that the presence of a bonded retainer appears to cause no increase in incidence of caries or periodontal disease. Use of interdental cleansing aids is needed to make sure adequate oral hygiene. Hence to assist patients with higher oral hygiene skinny twisted wires with higher strength will be accustomed forestall plaque accumulation.

In 2001, Watted *et al* investigated the effect of mandibular canine-to-canine lingual retainers bonded to 2 or to 6 teeth on incisor mobility. The study showed that tooth quality minimized with the number of teeth bonded to the retainer.

In 2002, Stirmann *et al* during a prospective randomised study, compared a pair of styles of fixed mandibular retainers with relation to detachment rate, relapse, dental medicine issues, oral hygiene and subjective patient discomfort. Using Little's irregularity index to live relapse over a amount of twenty four months, it absolutely was found that canine-to-canine retainers had a larger degree of stability whereas the canine-and-canine retainers were related to frequent relapse of the incisors not bonded.

In 2006, Naraghi *et al* retrospectively looked at 45 patients to examine the amount of relapse of the maxillary anterior teeth when using a bonded retainer. The results discovered a big decrease within the irregularity index from before to finish of treatment and a big angle for correction throughout identical period. From the top of treatment to one year post-treatment, minor or no relapse was noted.



Breakage of FSW leading to Relapse

Clinical studies indicate that twenty third to fifty eight of jaw retainers and five to thirty seventh of jaw retainers fail throughout retention in some kind, either bond failure or wire breakage.

In 2017, Kravitz *et al*, suggested that Memotain offers potential advantages to the traditional multi-stranded stainless steel wire, including precision fit, avoidance of interferences, corrosion resistance, and even minor tooth movement as an active lingual retainer.

Fixed retention compared to removable retention

In 2009, Kuijpers *et al* conducted a retrospective study involving 222 subjects, all of which were followed for 5 years post-treatment. In the jaw, a bonded retainer on all 6 teeth or a removable retainer was used whereas in the mandible, a bonded lingual retainer either to all 6 teeth or just the canines was used. Along with the degree of wear of the upper and lower incisors/canines, the upper and lower intercanine width

and the lower anterior alignment (Irregularity Index) were measured. It was found that the Irregularity Index diminished considerably from before treatment to the top of treatment and so redoubled considerably once measured five years post treatment. With relation to the intercanine distance, there was a significant increase in both the maxilla and mandible. Anterior tooth wear redoubled through all phases and was a lot of important for those with jaw removable retainers. This study failed to specifically assess whether or not one methodology of retention showed less tooth irregularity.

From the above literature, it is expressed that removable retainers provide the advantage of easy use. Regardless of your retainer schedule, patient are ready to relish your time with no retainer. However, patients will simply be neglect to wear sometimes, and this implies full advantage of teeth retention is compromised. Another potential advantage of a removable retainer is that patients will take away it out and brush and floss their teeth with ease, that is a lot of a challenge with a permanent retainer. Although removable retainers is terribly effective, they don't tend to be as effective as permanent retainers, especially if they are not used as directed.

The above mentioned 4-4 Crozat retainer, Osamu retainer, Vander linden retainer are very rarely used and there is not much of data available to prove its effectiveness.

Permanent retainers area unit the clear selection for patients World Health Organization will show signs of negligence particularly young adults, because teeth begin to shift naturally as we age, a permanent retainer typically offers better long-term results for retaining teeth than a removable one. Temporary retainers drift or area unit forgotten to wear, and often fail to get used as often as they should be.

One drawback to permanent retainers is flossing. Some patients notice it tougher to floss with a permanent retainer Some orthodontists might advocate a mixture of the two; as an example, a removable retainer for the top teeth and a permanent one for the lower ones because the lower teeth are smaller and tend to shift more.

Memotain retainer is a recent advancement and still clinical trials yet to be assed to validate its effectiveness.

Conclusion

From the offered information removable retainer have showed equal significance compared to mounted retainer. However once it involves compare the potency of that retainer is best there don't seem to be a lot of knowledge offered.

Relapse is unpredictable and is a result of post-orthodontic changes in the occlusion, but also normal age changes. The use of long-term retention may be the best approach to reducing this relapse. The patient needs to continue wearing retainers for as long as they want to keep their teeth straight.

A recently updated Cochrane review looking at the best research evidence into retention provides some information to allow a more evidence-based approach to retention.

There is a lack of high quality evidence from research about retention, so our approach to retention will be strongly influenced by our own clinical experience and expertise with different retainers, as well as the patient's values, expectations and circumstances.

But let's face it – stepping into the habit of carrying a retainer properly and keeping it safe is a challenge! Although it can be tempting to neglect this final step, it's important to understand the importance of wearing a retainer once braces are removed. Wearing a retainer and caring for it properly will help ensure you keep the beautiful new smile for the rest of the life!

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