

## Orthodontic Retainers-A Review

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### ABSTRACT

Orthodontic retention is defined as the holding of the new position that is functional and aesthetic, achieved after an orthodontic treatment. Maintaining teeth in their original position is extremely challenging. Teeth after an orthodontic treatment tend to move back to their original position as a result of periodontal, gingival, occlusal and growth related factor. However tooth movement can also occur as a result of normal age changes. This elasticity aids in tooth movement during an orthodontic treatment. These also reverse the tooth movement post treatment. This brought the need for the appliance which helps retain the position, called orthodontic retainer.

The removable retainers came into existence way back, whereas the fixed retainers came into existence recently. Removable retainers have the disadvantage of patient dependence to wear the retainer to hold the results of the treatment. The fixed retainers on the other hand have the disadvantage that requires technique and bonding also difficulty to maintain the oral hygiene leads to other dental issues.

This review article aims to compare removable and fixed retainer on the basis of retention achieved, patient compliance and duration for its use.

**Key words:** Orthodontic retention, Tooth stability, Relapse, Fixed retainer, Lifelong retention, Incisor crowding

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### INTRODUCTION

Orthodontic retention is defined as maintaining teeth in optimal aesthetic and functional position after treatment [1]. Removable appliances have been used for many years for retention purposes. In the 1970's fixed retainers were introduced to prevent relapse in the lower incisor area [2]. Although fixed retainers may hinder scrupulous oral hygiene measures; however, it is not known whether this necessarily leads to worsening of periodontal outcomes, particularly in the long term [3]. Vacuum formed retainers are also favoured for both patient ease as well as the aesthetic implications [4]. The Hawley appliance was a predominant removable retainer. The bonded wire from canine to canine was the most frequent fixed retainer [5].

It is apparent that our knowledge of the variables contributing to post treatment relapse remains incomplete, but any attempt at planning the retention phase requires some semblance of rationality in so far as

possible. We consider the following six factors important in the planning of this phase of "treatment":

- Obtaining informed consent,
- The original malocclusion and the patient's growth pattern,
- The type of treatment performed,
- The need for adjunctive procedures to enhance stability,
- The type of retainer and,
- The duration of retention [6].

Also, currently more invisible retainers are used instead of Hawley retainers, and more often lifelong retention is prescribed instead of retention for a limited time [7].

Orthodontic tooth movement disturbs the supporting periodontal and gingival tissues as well as the investing alveolar bone, all of which require time to reorganise following treatment. The tension in the stretched periodontal fibres exerts a propensity to revert to pre-treatment positions [8]. Removable retainers are normally worn part time and should be comfortable, well fitting, routinely reviewed and replaced as required [9]. Removable orthodontic retainers are comparable to lingual bonded retainers with regards to periodontal health but bonded lingual retainers are more attractive option for retention because of its aesthetics [10].

## LITERATURE REVIEW

### Current concept for fixed retainers

In 1965, Newman demonstrated the orthodontic attachments direct bonding technique. Kneirim later presented for the first time, fixed retainers were used for orthodontic retention in 1973. Since their introduction, the wires used in the manufacture of permanent retainers have been divided into generations.

These are the following:

- **First generation:** Round wires made of 0.025 to 0.036 inch stainless steel or blue elgiloy.
- Canines' lingual surfaces are only joined, and loops at each end are twisted to aid retention.
- **Second generation:** These are 0.032 inch triple stranded wires that would be attached to the lingual surfaces of all anterior teeth. Traditional wires were replaced with these multi stranded wires because they have more elasticity, allowing for natural tooth movement.
- **Third generation:** Plain stainless steel or gold coated wires with a diameter of 0.032 inch are available. Their ends are sanded with aluminium oxide to improve mechanic retention.
- **Fourth generation:** These are five stranded wires with a 0.0215 inch diameter that can be bonded to all anterior teeth.
- **Fifth generation:** These are 0.032 inch diameter blue elgiloy plain wires with sandblasted ends and only linked to canines.

There are two ways to employ fixed bonded retainers. To begin, the canines are just connected by thicker 0.032 inch wires. Although stainless steel wires are recommended for this practice Liou, et al. shown that nickel titanium wires was as effective. Second, a retainer consisting of 0.0175–0.0215 inch wires is linked to each tooth, usually from canine to canine. The indications for each of these procedures are different.

Lee outlined the following criteria for bonding fixed retainers to just canines:

- Cases in which the lower incisors have extreme rotations and crowding.
- Cases in which the lower inter canine width have changed.
- For circumstances where lower incisor proclination was used.
- In situations of modest crowding those do not require extractions.
- Instances with a significant overbite.

Zachrisson outlined the following criteria for bonding fixed retainers to all teeth:

- Patients with a closed midline diastema.
- Cases with anterior diastemas.

An adult patient with a high chance of relapse after orthodontic treatment:

- Before treatment, individuals with significant diastemas in the maxilla or tooth loss.
- Several instances in which the mandibular incisors were extracted.
- In situations in which the teeth were excessively rotated prior to treatment.
- Instances in which a palatally impacted canine's posture is corrected.

Patients thought fixed retainers were more enjoyable to wear based on a mean difference on a visual analogue scale. However, failure rates of 9–14 percent have been documented when bonded to six lower incisors.

### Current concept for removable retainer

Thermoplastic removable retainers provided somewhat less stability in the lower arch than multi strand permanent retainers, according to three trials comparing removable and fixed retainers.

There was no evidence of a difference in failure rates when comparing polyethylene ribbon bonded retainer versus multi strand retainer; no evidence of a difference in relapse when comparing upper and lower part time thermoplastic versus full time thermoplastic retainers and no evidence of a difference in relapse when comparing part time and full time wear of lower Hawley retainers. Thermoplastic retainers were shown to be more stable than Hawley retainers in the mandibular arch.

Two investigations indicated thermoplastic full time retainers to be more stable than begg retainers (full time). In one study, people who used Hawley retainers felt more ashamed than people who wore thermoplastic retainers.

Hawley retainers were also more difficult to wear, they discovered. The durability rates of thermoplastic and Hawley retainers have been tested in a variety of ways.

The relapse rate was the same for the maxillary thermoplastic retainer and mandibular canine to canine bonded retainer as it was for the maxillary thermoplastic retainer and lower interproximal stripping without a mandibular retainer. Both of these solutions are inferior than using a positioner as a retainer.

## DISCUSSION

Retention planning and execution are two of the most difficult aspects of clinical orthodontics. There are currently no tools available to assist anticipate relapse or provide objective advise on retention time. More research is needed to ensure that retention efforts include both effective and suitable evidence based practises. The majority of dutch orthodontists suggested bonded retainers for permanent (life time) retention (90 percent for the maxillary arch, while the mandibular arch has a 91 percent of success rate). The number of clinicians who advocate permanent detention has increased since ten years ago and is now even greater than in comparable study. Retention over a long time may

be the most effective way to reduce post-treatment alterations. As a result of the number of patients who require retainer maintenance increases as a result of this new clinical routine, increasing the workload for orthodontic and dental clinics as well as patient costs. Bonded retainers are beneficial in some situations, while they are unsuccessful in others. Orthodontists moved from round to square multi stranded wires in 84.2 percent of cases. In addition, a wire material with more torque resistant has been suggested in the literature to substitute round multi strand wires for bonded retainers, such as a plain single strand wire 0.016 3 0.016 in or a multi strand braided 0.016 3 0.022 in stainless steel wire.

**The retention phase:** The following six criteria are critical in the planning of this "treatment" phase.

- Gaining informed permission.
- The patient's growth pattern and the underlying malocclusion.
- The type of treatment that was carried out.
- The requirement for additional measures to improve stability.
- The retainer's type.
- The length of time spent in custody.

The length of time should be determined in consultation with the informed patient in each instance, taking in consideration future growth to estimates. After the patient turns 21, a fixed retainer can be changed with a detachable retainer, which can then be worn for as long as the patient desires to preserve ideal dental alignment. The most cost effective technique for managing retention is to give each patient two removable retainers and delegate responsibilities. However, if a healthcare reimbursement system only covers a portion of retention phase oversight, the problem becomes more difficult.

Removable, fixed, passive and "active" retainers have all been described. After being used for finishing, a positioner can be worn as a retainer; however it is less effective at retaining incisor rotations and irregularities than a Hawley retainer. In class II or class III, a functional appliance can be utilised to reduce relapse, whereas incisors that are becoming irregular can be corrected with a barrier appliance (typically in conjunction with interproximal stripping) or a variation thereof. Modifying full coverage polycarbonate or clear segmented polyester (essix) retainers, which can thereafter be worn passively, can also produce minor tooth movement. A fixed retainer is required to close a median diastema or extraction space in adults, as well as to open a space or after severe rotation correction. This retainer must be flexible enough to allow for tooth movement on a regular basis.

All orthodontists were familiar with the impact of accidental alterations caused by unintentionally active retainers. To avoid the development of accidentally active retainers, all etiologic elements of unintentional movement of tooth in combination with bonded retainer

must be identified. Retention planning and execution is one of the most difficult aspects of clinical orthodontics. Dental hygiene is more difficult with fixed retainers that are linked to the teeth. With this knowledge, it's crucial to stress the importance of brushing and flossing to your patients. During the retention phase of orthodontic treatment, they should avoid biting hard foods, be encouraged to take care of their dental health and be reminded not to skip their regular check-ups.

## CONCLUSION

Fixed retainers are more favoured due to many reasons. The most important reason being less chances of failure, patient compliance, less patient visit. Although the chair side time increases and it requires a skill. However for certain situations where removable retainer are more preferable do exist.

The compulsion for a fixed retainer exist in conditions with risk of relapse *i.e.* midline diastema, rotation, proclination, spacing. Whereas cross bite, deep bite and open bite, after correction are at low risk for relapse. The removable appliance can successfully retain all the orthodontic treated teeth, but the need for activation play a crucial role. Activation if not done at the correct time can aid in relapse and promote relapse and the retainer then provides no retention.

Thermoplastic retainers are one of the latest retainers and are well accepted by both patient and dentist and have multiple advantages. Not only the retention provided is good but also it provides the accessibility to maintain good oral hygiene and no activation is needed. Although the machine and the technique required make it a less common retainer.

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