



Retention after orthodontic treatments: a systematic review

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Corresponding Author:

Dr. Debora Loli,
DDS, Sapienza University of Rome - Department of Oral and MaxilloFacial Sciences - Italy

Submitting Author:

Dr. Debora Loli,
DDS, Sapienza University of Rome - Department of Oral and MaxilloFacial Sciences - Italy

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Author(s): Loli D

Abstract

Orthodontists should work to achieve an occlusion that is functionally efficient, esthetic, and healthy. Long-term retention helps to ensure stability of the dentition.

Introduction

Relapse is the change in tooth position toward the former location following active orthodontic treatment. Teeth have a stable position due to the equilibrium of forces of chewing, swallowing, tongue and cheek movements. There is a balance between the internal and external oral musculature. If a tooth is moved, there is an alteration in equilibrium that must be restored to prevent relapse. New fiber and hard tissue formation is dependent on retention. The gingival fiber networks must reorganize to accommodate the new tooth positions. Immediately after removal of orthodontic appliances, the teeth are unstable because of occlusal and soft tissue pressures¹. For this reason, an orthodontic retainer must be worn by every patient for a minimum of 6 months to reestablish the equilibrium.

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Methods

The aim of this review is to analyze the concept of post- orthodontic treatment stability orthodontic and retention. Pub Med and Scopus were used.

Used keywords were "stability", "relapse", "retention", "orthodontic retainer".

Review

Little² stated that the only way to have a good long-term alignment after treatment is to use a fixed or removable lifetime retention.

Interdigitation of the posterior occlusion plays a very important role for the control of anteroposterior and vertical facial growth and is a fundamental factor in jaw

relationship³. Numerous authors stated that good intercuspitation and occlusal contacts are the key to a stable orthodontic result⁴⁻⁵.

Most of the current concepts in occlusion are derived from study by Andrews⁶ to determine the keys to normal occlusion, that are the goal to achieve a normal occlusion with a good esthetics and good occlusal function: molar relationships, crown angulation, crown inclination, no rotations, no spaces, flat occlusal plane.

Many factors have been discussed concerning stability of the orthodontic treatment results⁷. In particular, most important factors are the time needed for the gingival and periodontal ligament fibers to reorganize, the growth, especially of the jaw, and the soft -tissue pressure from the oral musculature.

Growth produces occlusal changes in all three skeletal dimensions. The transverse dimension is completed before and has less occlusal effects than the vertical and anteroposterior dimensions. However, if a patient has had transverse expansion, there is a degree of rebound even in the transverse dimension.

Retention is the last phase of orthodontic treatment but it's also one of the most important, because it's fundamental to maintain the stability of the occlusion and the esthetic and functional results

Retention should be continued until craniofacial growth is essentially completed in the early 20s.⁹ As most of the relapses occur in the first 6 months, following bracket removal, the maxillary retainer is worn fulltime for 6 months. After, the patient can go to night wear only and gradually reduce.

Johnston CD¹⁰ et al suggested the role of the general dental practitioner in orthodontic retention, informing potential orthodontic patients that wearing retainers after orthodontics is an essential part of orthodontic treatment, reinforcing the need for patients to wear their retainers as advised and how to look after them, ensuring that patients are adhering to their retention regime, adjusting, repairing or replacing removable retainers and ensuring that they still fit well (responsibility for the replacement or repair may depend on whether the patient remains under care of the orthodontist who completed the treatment) and, for patients wearing bonded retainers, checking that retainers are still intact, bonded and that the patient is

maintaining good oral hygiene around them. Fractured or de-bonded retainers must be repaired (with appropriate advice if required). Removable plates such as Hawley's and Begg plate, vacuum-formed retainer and positioner and fixed retainers bonded on mandibular canine-to-canine region are available.

Vacuum formed retainers (VFRs) are discreet and are well accepted by patients from an aesthetic and comfort perspective¹¹⁻¹⁴. VFRs are more cost-effective and better in order to retain the alignment of the anterior teeth than Hawley-type retainers although the magnitudes of the differences are small. Full posterior occlusal coverage, including the most distal molars, is advisable in order to reduce the risk of over-eruption of these teeth during retention. It's important to remind patients not to eat or drink with the vacuum formed retainers in place. This is a particular concern if the patient drinks cariogenic beverages with the vacuum-formed retainer in place.

Begg and Hawley retainers are robust and, unlike VFRs, can be worn when eating without becoming damaged. The advantage of Hawley retainers is the facilitation of posterior occlusal settling during retention¹⁵. However, this action loses importance if good posterior intercuspation has been achieved by the time of appliance removal. The labial bow can be modified to accomplish simple active tooth movements if required and an anterior bite plane can be incorporated to help retain corrected deep overbites.

Fixed retainers are also effective and reduce the need of patient compliance. However, they are associated with a significant long-term failure rate. A third of patients underwent to retainer failure within 30 months¹⁶ with de-bonding from at least one tooth in 22% of patients and 17% having total retainer loss. Fracture of the retainer wire was uncommon, with less than 1% of patients having this type of failure. Particular care is required when placing upper bonded retainers to minimize the occlusal contacts with the opposing lower teeth as such contacts have been shown to increase failure rates. A composite with high filler content is preferred to improve resistance to wear. Calculus and plaque deposition¹⁷ is greater than with removable retainers and concerns exist about the impact of fixed bonded retainers on long-term dental health. However, a review reported that studies completed up to 8.5 years after fixed retainers were placed have found no deleterious effect on the adjacent hard and soft tissues¹⁸. Nevertheless, meticulous attention to detail is required when placing fixed retainers to avoid contact with the gingival tissues by the bonding material. Any excess of composite should be removed with a tungsten carbide

bur. It is important to show patients how to look after their bonded retainers and to maintain excellent oral hygiene around them. The use of small inter-dental brushes or superfloss may be a useful adjunct to tooth brushing to help maintain excellent oral hygiene around bonded retainers, since some patients wearing fixed retainers will be required to wear them indefinitely.

Al-Jewair TS¹⁹ et al said that Hawley's plate in the maxilla, and fixed lingual in the mandible were the most common retention protocols prescribed. Lifetime retention was the most common choice for participants who used removable retainers, especially when extractions were carried out.

Pratt²⁰ et al indicated that retention protocols of the surveyed population showed predominant use of Hawley or vacuum-formed retainers in the maxillary arch and fixed retention in the mandibular arch.

Singh P²¹ et al stated that vacuum retainers are popular in NHS, hospital and private practice. Bonded retainers are more commonly used in private practice than in other settings

Mai W et al²² suggested that additional high-quality, randomized, controlled trials concerning these retainers are necessary to determine which retainer is better for orthodontic procedures.

Littlewood SJ^{23,24}, How Kau C²⁵ and Al-Moghrabi D²⁶. et al evidenced that the effectiveness of different retention strategies used to stabilize a tooth position after orthodontic treatment is not determined because there are insufficient research data on which to base our clinical practice on retention at present. There is an urgent need for high quality randomized controlled trials in this crucial area of orthodontic practice.

Tynelius GE²⁷ indicated that the most appropriate retention method should be selected on an individual, case to case basis, taking into account such variables as orthodontic diagnosis, the expected level of patient compliance, patient preferences and financial considerations.

Conclusions

Orthodontic therapy's goals are to achieve a good esthetics, a good occlusal function with stable results over the years. Retention of the corrected malocclusion is important as the diagnosis and treatment plan. The type of retention should be determined at the beginning of treatment as well as any procedures to help retain the final functional and esthetic occlusion.

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