



**ORIGINAL RESEARCH PAPER**

**Medical Science**

**CONTAINMENTS USED IN ORTHODONTICS AND THEIR RELATIONSHIP WITH OCCLUSAL STABILITY OVER THE TIME**

**KEY WORDS:** Orthodontics, Retainers, Recycling, Stability, Occlusion

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**ABSTRACT**

One of the great challenges for the orthodontist is to keep the teeth in their correct position after the active phase of the treatment, since it is described that, without retention, there is a tendency for the teeth to return to their initial position, called recurrence. In this document we review the scientific evidence on the function of the different types of post-treatment retainers, in addition to describing their efficacy and results. Publications were searched from 2010 and with a follow-up of at least 6 months. The lack of protocols was observed as to what type of retainer to use and its time of use, and evidence of failure rates was found in all types of retainers. Currently, there is not enough scientific evidence on what is the best type of retention protocol.

**INTRODUCTION**

One of the most important challenges in orthodontics is to keep the teeth in their correct position after the active phase of the treatment (1).

The main objective of orthodontic treatment is to produce an ideal occlusion that is morphologically stable, aesthetic and functional, but despite an adequate diagnosis and carefully planned treatment mechanics, the results achieved at the end of the treatment are not necessarily stable over time (2).

The literature describes, without retention, there is a tendency for teeth to return to their initial position. This unfavorable change of the corrected position is known as recurrence and includes any deviation of the dentition to positions that we can classify as malocclusion. However, a return to the initial malocclusion does not always occur, and recurrence could be considered as any unfavorable change in the position of the tooth after orthodontic treatment (3).

The problem for the orthodontist is that it is impossible to predict which cases will suffer a recurrence, it is also impossible to predict the degree to which the corrected position will be affected or what will be the influence over time of the different retention protocols chosen after treatment (6).

Retention is necessary to allow the reorganization of gingival and periodontal tissues affected by orthodontic treatments. Also to avoid unwanted tooth movements as a result of growth changes and / or the etiological factors already mentioned (7).

**DEVELOPING**

**Etiology of Recurrence**

**Periodontal and gingival factors:**

When the teeth move, the tissues in the periodontal ligament and the gum are remodeled to the new position of the tooth, they have a tendency to move the teeth to their original position. Dento-gingival and interdental fibers may take 8 months or more to reshape (14). Therefore, the teeth should be held in position for long enough to prevent these fibers from regaining their original position.

**Occlusal factors:**

It is claimed that a well interdigitated dentition with a correct occlusal load is more stable; however, there is no substantial agreement or evidence to support this claim.

**Soft tissues, pressures and teething limits:**

It is preferable to place the teeth within the area of the neutral

zone. Although the forces of the tongue are stronger, the activity of a healthy periodontium will resist the movement of the teeth. The further the teeth are from this "neutral" zone, the more likely they are to be unstable (15).

**Physiological recurrence:**

Teething is in a biological environment that is constantly changing. These changes in alignment and occlusal relationships should perhaps be considered as normal age changes.

**Types of retainers**

**Removable retainers:**

Removable retainers have the advantage that they are easier to maintain hygienically and only part-time use is necessary. (16).

The most common examples of removable retainers used throughout the world are Hawley-type retainers, with an acrylic base plate and generally a lip arch and VFR thermoplastic retainers, made of transparent plastic. The disadvantages they present are that they need the cooperation of the patient.

**Fixed retainers:**

Fixed retainers offer the advantage of being permanently in place, and are typically attached to the palatal or lingual surfaces of the lower antero teeth with a multi-stranded wire. Since they cannot be removed for cleaning, they are more prone to plaque and stone accumulation (17).

Orthodontists can often choose to use a combination of fixed and removable retainers in a process called "dual" retention.

**RESULTS**

It was done through an electronic search in three digital databases: EBSCO host, PubMed and Cochrane Library. The keywords used for the search were: ORTHODONTIC, RETAINERS, RELAPSE, STABILITY and OCLUSION with the Boolean terms AND and OR.

477 articles were obtained, which were selected by application of the inclusion and exclusion criteria, obtaining five randomized clinical trials (RCTs) and two to retrospective analytical observational studies.

Seven studies were included, of which two compared the use of removable retainers with fixed retainers, four compared different removable containment systems and one compared a group with retention vs. a group with no orthodontic retention.

Barlin et al. In 2011 he conducted a study comparing the use of removable Hawley type retainer (42 patients) and VFR (40 patients), the protocol for the use of retainers was 24 hrs. for a year without finding significant differences in both groups over time for 12 months.

Lassaire et al. conducted a study with a sample of 30 individuals; 15 used an upper and lower Hawley type retainer for 6 months all day, followed by 6 months of nighttime use and the other 15 also used upper and lower Hawley type retainers but also with upper and lower fixed retention. They found that both improvement and recurrence were greater in the first group.

On the other hand, Edman Tynelius et al., Both in their study of 2013 and 2015, conducted a randomized clinical trial where they compared three study groups; the first group used an upper VFR and lower fixed retention, the second group used a VFR but combined with lower stripping and finally the third group used a soft upper and lower prefabricated positioner. The protocol for the use of the VFR was 24 hours the first two days and later only for night use for 12 months, and group 3 used the positioner for 30 minutes a day and night use for 12 months. At 5 years the three groups showed good stability, but in all there was a tendency to the initial values in relation to the intercanine width, both superior and inferior, being greater in the group with prefabricated positioner as well as the index of Little mandibular.

In the randomized clinical trial of O'Rourke et al. in 2016. The study groups were separated into two, group 1 with a sample of 40 patients used a lower VFR for 24 hours for 6 months and the next 6 months alternate night use. Group 2 of 42 patients used fixed retainers. Finding differences at 6 months of retention in which there was greater change in group 1 in the Little index, intercanine width and arch length. At 12 and 18 months there were no significant differences in any measured parameters.

Al-Moghrabi et al. In 2018 they carried out a continuation of the O'Rourke study, evaluating the results at 4 years of retention. They observed that there was recurrence in the two groups in relation to the irregularity index of Little, being significantly higher in the group with VFR.

Finally, Steinnes et al. in 2017, they compared two groups on average 8 years after active orthodontic treatment, one with its retention either removable or fixed in good condition, and another group without having used its retention for more than one year. They found that according to Little's irregularity index there was a 3-fold higher jaw recurrence in the non-retention group.

It is important to emphasize that only 3 of the studies (Edman Tynelius et al 2015, Steinnes et al. 2017 and Al-Moghrabi 2018) had a follow-up greater than two years after treatment, so more trials on long-term recurrence would be needed term in orthodontically treated patients. In addition, there is no clear definition regarding when an orthodontic treatment is considered successful in relation to time or what is considered as long term.

There is no consensus on what parameters should be measured to assess recurrence, the most common criterion for measuring it is Little's irregularity index, intercanine and intermolar width and arc length. The study by Lassaire et al. used the criteria of the American Board of Orthodontics (ABO), Objective Grading System, and Steinnes et al. They used the PAR index.

Evidence was found, however, of failure rates in both Hawley, thermoplastic and fixed type retainers in all studies over time. That is, there was recurrence in one way or another, although not always significantly.

**CONCLUSIONS**

Recurrence is also unpredictable, so it must be assumed that each patient is exposed to etiological factors over time.

Currently, there is not enough scientific evidence on what is the best type of retention protocol or type of retainer, so the retention approach will depend on each orthodontist and will be affected by personal clinical experience and experience with one or the other retainer. .

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