

Contemporary Perspectives in Orthodontic Retention

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ABSTRACT

Retention and relapse form one of the most important components of successful orthodontic treatment. Orthodontic relapse has remained one of the persistent problems in long-term success of comprehensive orthodontic treatment. Clinical research in contemporary orthodontic scenario has determined the changes taking place several years after orthodontic treatment and its influencing factors. Factors, including growth, periodontium, age, third molars, tooth dimensions, etc., have been held responsible for posttreatment relapse. Many treatment procedures have been devised to ensure stability and prevent or at least avoid posttreatment changes so as to reduce relapse. A proper understanding of the changes and various factors affecting retention and relapse process is important. Newer orthodontic treatment modalities, though might provide an ideal end treatment result, will fail to produce a significant impact for the patient if orthodontic retention and relapse is not considered.

Keywords: Orthodontic retention, Relapse, Retainers.

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INTRODUCTION

Relapse has been one of the most disturbing processes for orthodontists for decades. The important goal of an ideal orthodontic treatment is to create a best balance in occlusal relationship, facial and dental esthetics, stabilization of outcome, and long-term preservation and restoration of dentition.¹ Retention in orthodontics is practiced by a passive appliance after proper orthodontic treatment. The working definition of retention according to Joondeph and Riedel^{1,2} is "the holding of teeth in optimal aesthetic and functional positions." Retention is thus the action or fact of holding, retaining, or keeping the teeth in a fixed place or position, i.e., the condition of being retained. It is cardinal to corroborate that the retention protocol is in physiological harmony with the masticatory system function. The goal of physiological stability seems to be the practical outcome of successful treatment vs a rigid set of parameters that do not ensure long-term stability. Retention is of vital importance for most postorthodontic treatment protocol regarding three key reasons³ such as (1) the gingival and periodontal structures are overblown by orthodontic tooth movement and they require time for reorganizing when the appliances are detached from the oral cavity; (2) the teeth may be in an unstable position post treatment, thus the soft tissue constantly urge to a relapse tendency; (3) growth-related changes posttreatment also change the orthodontic treatment results.⁴

DEFINITION

Retention and relapse were defined by various authors at different times and as "loss of any correction achieved by orthodontic treatment" by Moyers,⁵ "the holding of teeth in ideal esthetic and functional position" by Williams² and in simple term as "return of the corrected malocclusion towards the original condition."

HISTORY

In the earlier years, most of the clinicians disagreed the fact of need for retention and Hellman⁶ in 1945 was the one who emphasized the need for retention. Different schools of thought have been developed, and present-day concepts involve these thoughts in them.

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Occlusion School

Kingsley⁷ in 1880 stated, "Occlusion of the teeth is the most viable factor which determines the stability in a new position."

Apical Base School

In the middle of 1920s, a second school of thought by Lundström⁸ suggested that the apical base school being the vital factor in the treatment of malocclusion and maintenance. McCauley⁹ stated that inter canine width and inter molar width must be maintained in same positions to minimize retention difficulties. Strang and Thompson¹⁰ enhanced their views for this theory.

Mandibular Incisor School

Grieve¹¹ and Tweed¹² enunciated that the mandibular incisors should be positioned upright and over the basal bone.

Musculature School

The need to develop proper functional muscle balance was taken into account by Rogers.¹³ This hypothesis was corroborated by others. Orthodontists have come to understand that retention is not distinct from orthodontic therapy but is part of the therapy itself and must be included in the preparation of treatment. Hellman⁵ described it aptly that in orthodontia, retention is not a separate

problem, but it is a continuation of what we do during treatment. It is not a definite treatment stage requiring a new technique; hence, there is no need for it to be carried out by a separate machinery. Retention is but a letting go of what we did during therapy. The improvements we make in our machinery are to ease the pressures and stresses and wean the tissues away from the effects of all our tinkering so that the appliance can decrease any change that is made. This can be achieved by adjusting either the form of the system or the amount of time it takes to wear it. Until retention is applied, a total outcome must be obtained.

RALEIGH WILLIAMS KEYS TO ELIMINATE LOWER RELAPSE

- Incisal edge of lower incisors should be in an anteroposterior line or 1 mm in front of it.
- All four mandibular incisors must be in the same labiolingual plane.
- Lower incisors apices should be spread distally to the crowns.
- Lower incisors should be slenderized as needed after treatment.
- Apex of lower cuspids should be distal to the crown.
- Apex of lower cuspid should be slightly buccal to the crown apex.

In orthodontic treatment, stability has become a primary target, and without it, ideal function or ideal esthetics or both can be lost. During recovery, retention depends on what is done. Within the limits of normal muscle balance and with particular attention to the apical base or bases available and the relationships of these bases to one, care must be taken to create a proper occlusion.

CURRENT TRENDS IN RETENTION

Conventional Retainers

Removable Retainers

These retainers are passively fitted and are worn by the patients for a period of least 6–12 months after treatment completion therefore the remodeling of surrounding structures of the teeth to take place. These removable retainers (Figs 1 to 3) act as a retention device for intra-arch stabilization and in patients with altered growth conditions.³

Fixed Retainers

A fixed retainer is usually a passive bonded wire to the lingual side of the tooth usually in mandibular anterior region. Mounted retainers are used in cases of questionable stability and permanent retention



Fig. 1: Tooth positioner



Fig. 2: Begg wrap around retainer



Fig. 3: ESSIX (thermoformed) retainer

required cases (Figs 4 and 5).³ There are various types of mounted retainers and are as follows: banded canine to canine retainer, bonded lingual retainers, band and spur retainer.

Newer Retainers

Memotain

The name Memotain is obtained by the mix of “memory” and “retainer” due to the unique usage of Ni-Ti wire for the lingual aspect (Fig. 6). It is a CAD/CAM fabricated lingual retainer made of 0.014 × 0.014 in rectangular nickel–titanium wire which adapts closely to the tooth anatomy and was introduced by Pascal Schumacher in 2012. This tight interproximal adaptation of the retainer 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, and it is digitally positioned to prevent hindrance with the mandibular teeth.¹⁴

Adjunctive Techniques and Methods to Minimize Relapse

Circumferential Supracrestal Fiberotomy

Circumferential supracrestal fiberotomy (CSF) is a surgical periodontal procedure that is performed to detach the free gingiva and



Fig. 4: Fixed lingual retainer



Fig. 5: Resin fiberglass bonded retainer



Fig. 6: Memotain appliance

trans-septal fibers around orthodontically aligned or derotated teeth. This detachment reduces tension taking place from these fibers that pull teeth into their original state, hence preventing relapse.¹⁵

Pharmacological Aids

In retention phase, inhibition of relapse has been carried out by administering drugs to control the relapse condition to an extent.

By administering raloxifene, it decreases RANKL expression, administering aspirin through CD4+ T lymphocytes inhibits relapse, and administration of systemically and locally available drugs such as bisphosphonates, osteoprotegerin, simvastatin, relaxin, etc., also reduce and prevent the amount of relapse postorthodontic treatment and are highly recommended drugs of choice on retention these days.¹⁶⁻²¹

DISCUSSION

Kravitz et al. conferred that Memotain has potential advantages to the traditional multistranded stainless steel wire, including precise adaptation, devoid of interferences, resistance to corrosion, and even minor tooth movement as an active lingual retainer. This retainer is a new clinical appliance, and further more research is needed in the coming years.²² Wegrodzka et al. in their recent randomized control trial involving 133 patients of age between 15 and 50 years compared the survival rates and periodontal health condition in patients with three-stranded round twisted (RT) vs eight-stranded rectangular braided (RB) fixed retainers which were bonded to all six anterior teeth in the mandibular arch. The authors through their research study culminated that the first time failing of the fixed retainer was about 52.3% (56.1% in the RT group and 48.5% in the RB group), which is of high deterioration rate in the retention phase. There was no difference in terms of survival or periodontal health between the examined retainers.²³ Various authors have reported in their studies about the comparison of removable retainers vs fixed retainers, and majority of them concluded that the effectiveness of permanent retainers is way higher than that of removable retainers though they are also relatively effective. Orthodontist nowadays recommend lifelong retention with bonded retainers are increasing over the globe with the phrase "Braces for Life."²⁴

CONCLUSION

Orthodontic treatment goal is to achieve good esthetics and occlusal function with stability over the years, and retention phase is important to achieve posttreatment stability, and it is mandatory to plan the requirements of retention at the time of diagnosis and treatment planning. Therefore, retention of the treated malocclusion is as important as the diagnosis and treatment plan.²⁵ However, as trained orthodontists, it is incumbent on us to take a more proactive approach in dealing with the actions associated with relapse.

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