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COMPARISION OF RELAPSE RATE BETWEEN CLEAR RETAINER AND FIXED LINGUAL RETAINER

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ABSTRACT

Retention is an important part of orthodontic management of malocclusion. Retainers can be removable and fixed.

Background And Aim: A clear retainer is a removable retainer that is popular in the present day. Compared with conventional fixed and removable orthodontic retainers, it is a more aesthetic, comfortable, and inexpensive appliance. In recent years, fixed lingual retainers have been gaining importance in relapse prevention. The aim of this prospective, randomized study was to compare clear retainer and fixed retainers with respect to maintaining dental position, occlusion, and retention protocols.

Patients And Method: clear retainer was used in 90 debonded orthodontically treated patients. Fixed, customized canine-to-canine retainers (attached to six teeth) with wire diameters of 0.0215" and 0.0195" were investigated in a total of 90 patients. Some retainers were inserted under dry field conditions using a rubber dam, and the others under relatively dry conditions using cotton rolls. Composite Heliosit® was used for bonding.

Results: Minor relapse occurs in clear retainer due to failure to wear the retainer or the retainer losing its fit during the retention period. However, slightly malaligned teeth can be realigned using the same clear retainer without fixed appliances or another clear retainer. Tooth position with canine-to-canine retainers showed a good degree of stability. The canine-and-canine retainer induced frequent relapse of incisors not bonded to the retainer.

KEYWORDS :

INTRODUCTION

The retention phase is an important phase in keeping teeth in a debonding position and inhibiting the teeth from returning to their original position. [1] Both removable and fixed retainers can be used to provide retention. A clear retainer (Essix® retainer, thermoplastic retainer, or vacuum-formed retainer) is a removable retainer that was introduced in 1993 by Dr. John Sheridan[2] as an aesthetic, comfortable, and inexpensive appliance compared with conventional fixed and removable orthodontic retainers.[3] It is a transparent and thin but strong vacuum-formed appliance. Nowadays, clear retainers are produced by many companies such as Essix®, which is a registered trademark of Raintree Essix, Inc., Zendura®, which is produced by Bay materials LLC and Vivera®, which is produced by Align Technology, Inc.

Advantages of clear retainer:

1. More esthetic and less visible[3,4]
2. Inexpensive[3,4]
3. Ease of fabrication[2]
4. Ability to place on the day the fixed appliance is debonded[2]
5. Decreased chair time[2]
6. Capable of correcting minor tooth discrepancies[4] due to flexibility and positioner effect[2]
7. Provides better oral hygiene than fixed retainer[5]
8. Serves as a temporary bridge or crown for missing teeth[2]
9. Acts as night guard for bruxism.[2]

Disadvantages Of Clear Retainer:

1. Demands good compliance[6]
2. Nonsettling of occlusion due to occlusal surface coverage of clear retainer[7,8]
3. Prone to wear and needs replacement at least annually[4]
4. Easily lost due to transparency[4]
5. Looseness of retainer in case of gingival inflammation or puffy gum.[4]

Fabrication

Steel trays with multiple retention holes and polyvinyl siloxane are recommended for impression to prevent distortion, and polyvinyl siloxane has excellent elastic recovery so the impression does not distort. Alginate is not the material of choice for Essix® impressions because it is not dimensionally stable and accurate enough to provide precise anatomic detail of retentive undercuts below the contact points. Die stone is recommended because it has high compression strength and minimal expansion. After obtaining a dental cast, interproximal areas and gingival borders should be distinct and excessive undercut should be blocked out with compound filling to enable the patient to remove it more easily. Then, plastic thermoforming machines will be used for Essix® retainer construction.[4] A clear retainer must fit on the model and adjustment is not usually needed. However, the area of muscle attachment must be reduced.[9]

Fixed, customized canine-to-canine retainers (attached to six teeth) with wire diameters of 0.0215" and 0.0195" were investigated in a total of 90 patients. Some retainers were inserted under dry field conditions using a rubber dam, and the others under relatively dry conditions using cotton rolls. Composite Heliosit® was used for bonding.

INSERTION AND ADJUSTMENT

A clear retainer can be inserted by seating the retainer with finger pressure. Normally, the retainer should not slip easily over the teeth but should be inserted with a reasonable amount of pressure to press it over interproximal undercuts gingival to the contact points. If it does not seat properly, it is usually because of interproximal ridges that have not been

adequately reduced. This area can be reduced and smoothed at chairside using a blade. During the first insertion, the patient might feel tight during the use of the retainer but the warmth in the mouth will make this sensation disappear.[2] After that, occlusion should be equilibrated using double-sided articulating paper and grinding the high spot with a trimmer bur.[4]

Problems During Insertion And Use Of Essix® Appliances

1. Looseness of appliance During insertion,
2. Too tight appliance: A clear retainer should be flexible when passing through the undercuts.
3. Gingival compression: If a clear retainer presses on surrounding tissue, it leads to a pale tissue colour at the border of the appliance.
4. Minor relapse Failure to wear the retainer leads to the retainer losing its fit during the retention period. However, slightly malaligned teeth can be realigned using the same clear retainer without fixed appliances or another clear retainer.
5. Repair If the appliance has wear, crack, separation, or split areas, it is preferable to make a new appliance instead of repairing. However, heat guns can be used to repair the appliance if necessary.[9]

Effectiveness In Maintaining Dental Position:

Rowland et al. [13] compared the effectiveness of using a Hawley retainer and a clear retainer for 6 months and found that no statistically significant differences in tooth rotation, intercanine width and intermolar width were found in either maxillary or mandibular arches. However, the results found significant changes in the irregularity of incisors with a Hawley retainer and the mandibular labial segment has greater irregularity than the maxillary labial segment. In addition, there was no clinically significant difference unless single-tooth displacement is located in the mandibular arch. Another study also showed more irregularity in both maxillary and mandibular arches in the Hawley group than in the vacuum-formed retainer group, even though no statistically significant difference was found.[3] Moreover, Demir et al.[15] also investigated the clinical effectiveness of clear and Hawley retainers at 1 and 2 years after the treatment phase and showed that clear retainers were more effective for mandibular anterior teeth retention. Thus, they concluded that both types of retainer were successful but the vacuum-formed retainer is more effective at holding the correction of incisors on both arches, especially in the mandible.[3, 13,15] In addition, patients were more compliant with vacuum-formed retainers than Hawley retainers [16] and they have semi-elasticity and shape-memory so minor relapses can be corrected.[2] These factors might be related to irregularity on both arches. Although clear retainer is effective at maintaining the position of incisors, in the case of a patient with severe pretreatment dental rotation, especially in the lower incisors, a fixed retainer was suggested to used combined with an Essix® retainer.[10] With the use of thermoplastic retainers, intercanine and intermolar width was maintained[13,15] and no statistically significant differences were found at any time interval between part-time and full-time wear groups.[17] However, in patients with an expanded arch, the Hawley retainer is the retainer of choice due to its sufficient rigidity.[14]

Occlusion:

Achieving occlusal stability is a goal of retention. Occlusal contacts or centric stops are one of the important factors that have an effect on occlusal stability. Moreover, increasing occlusal contacts in centric occlusion can reduce the force distributed on the teeth. [18] Good occlusal contacts and intercuspation are important factors for stable orthodontic results.[19] Therefore, the ideal retainer should enable occlusal settling.[4] A previous study determined the change of occlusal contact in centric occlusion during retention with a full-coverage Essix® retainer at 9 months and 2.5 years. Regimens for using retainers are 6 months full-time use and 3 months night-time use. The results showed that no significant change was found in the number of posterior teeth occlusal contacts at 9 months whereas posterior occlusal contact significantly increased at 2.5 years. They concluded that occlusal contacts did not increase because Essix® retainers covered occlusal surfaces of the teeth. In addition, after Essix® retainer removal, teeth continued mobility and occluded each other.[8] Moreover, another study also showed that after 3 months of using clear retainers, posterior occlusal settling was significantly less likely to occur than with Hawley retainers. The regimen for using a Hawley retainer was 3 months' full-time use while the clear retainer was 3 days' use and nightly thereafter. Thus, it was concluded that the Hawley retainer enables settling of occlusion whereas the clear retainer holds teeth in a debonding position.[7] Thus, before using a clear retainer for retention, good posterior intercuspation has to be created when debonding. Many studies found that a clear retainer created anterior open bite. Jäderberg et al.[20] found no significant change in overbite during the use of a clear retainer for a 6-month observation phase, which is in line with Lindauer and Shoff.[3] However, Sheridan et al.[2] reported that slight bite opening was detected by clinicians in 2.3% of their patients, but the amount of bite opening was very small so the patients did not notice the change. Furthermore, many clinicians reported that individual cases of anterior open bite after using an Essix® retainer are probably because of disclusion of posterior teeth while anterior teeth are in contact with the Essix® retainer.[3] Moreover, canine to canine Essix® retainers was used on the mandibular arch in the studies of Sheridan et al.[2] and Jäderberg et al.[20] Therefore, a theoretical risk of anterior open bite does exist due to the eruption of posterior teeth.

Retention Regimen:

Although removable retainers have many advantages, a long period of full-time use is required and that is an obstacle for many young patients.[21] Immediate full-time use of an Essix® retainer after debonding is suggested but there are many opinions about the length of time. Although periodontal fibres take a minimum of 232 days for reorganization, [22] previous studies recommended different durations of full-time use. For example, Rowland et al. [13] suggested 1 week whereas Wang [14] recommended 2 months and Lindauer and Shoff [3] showed that 3 months of full-time use is effective. A previous study compared full-time and part-time use of an Essix® retainer by measuring the irregularity index, intercanine width, intermolar width, arch length, overbite and overjet at 6 months and 1 year after debonding. The regimen for the full-time group was 3 months' full-time use and 10 h/day of part-time use. The results showed no statistically significant differences in the irregularity index, intercanine width, intermolar width, arch length and overjet whereas overbite increased statistically significantly in the part-time group. However, the difference was 0.6 mm and it may not be clinically significantly noticeable. Therefore, part-time wearing of an Essix® retainer was suggested.[14] Another study evaluated and compared the stability of Essix® retainer use after 6 months between 3 months' full-time wear and 1 week of full-time wear. After full-time use, night-time use was recommended for both groups. The study found that the 1-week full-time group had higher irregularity but there was no significant difference between the groups. In addition, no significant differences in overjet and overbite were found over a 6-month observation period. Thus, night-time wear after 1 week of full-time wear was sufficient for stabilization after orthodontic treatment.[20] Although many previous studies have investigated the effectiveness and stability of using an Essix® retainer after orthodontic treatment with full-time use, 6 months is a short observation period when studying.

However, it coincides with the reorganization period, which takes around 200 days. [20] It would be more interesting if longitudinal studies with a 1–5-year follow-up period or longer were constructed to evaluate the effectiveness of retention regimens.

CONCLUSION:

Even though many studies have indicated that clear retainers have many advantages,[2-4,12] many factors should be considered before choosing the type of retainer, for example periodontal and occlusal factors, soft tissue pressures and growth,[1] along with the cost, fabrication, risk of breakage, patient compliance, and patient preference or satisfaction.[7] Besides the types of retainer that affect the effectiveness of stabilization, minimizing the chance of relapse is also important. To reduce relapse, the existing arch form, intercanine width and anteroposterior position of the lower incisors should be maintained.[23,24] Circumferential fiberotomy should be carried out after dental derotation.[22] Moreover, interdental stripping of interproximal contacts for triangular lower incisors to increase the size of the contact area can reduce relapse.[25] In addition, frenectomy should be considered for patients with median diastema.[26] Although many previous studies have investigated the effectiveness of maintaining dental position and preventing teeth from relapse, further studies are still needed. However, studies of long-term postorthodontic retention are difficult to undertake as financially demanding and long-term follow-up of patients is difficult.[21] Longitudinal studies with a 1–5 years follow-up period and possibly longer are required.[20] Moreover, few studies have evaluated the suitable thickness of retainers, and thus further studies are necessary.

Minor relapse occurs in clear retainer due to failure to wear the retainer or the retainer losing its fit during the retention period. However, slightly malaligned teeth can be realigned using the same clear retainer without fixed appliances or another clear retainer. Tooth position with canine-to-canine retainers showed a good degree of stability. The canine-and-canine retainer induced frequent relapse of incisors not bonded to the retainer.

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