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ORIGINAL RESEARCH

An Innovative Approach to Retention: Thermoplastic Retainer

[1]KA Adam Ozeer, [2]Sumitha A David, [3]Umar Mohamed, [4]PC Sunil, [5]Sam Paul, [6]Parson Paul

ABSTRACT

Aim: The aim of this study was to design and introduce a retainer that overcomes the common shortcomings seen in other retainers.

Materials and methods: Hard thermoplastic sheet of 0.5 mm thickness is vacuum or pressure-molded onto the patient cast. Lingual portion of the retainer is trimmed according to the contours of the anterior teeth. Contact points between the maxillary and mandibular anterior teeth are marked on the retainer and reduced. Punch cut holes are placed on the retainer for the exit of flash and air bubbles while fixation. The retainer is bonded onto the lingual surface of the anterior teeth using composite.

Results: A 1-month review of the retainer showed no patient discomfort, occlusal interference, or bond failure. The aim of the article was found to have been achieved.

Conclusion: Initial evaluation has shown positive findings. Long-term clinical findings will determine the overall success of this new retainer.

Clinical significance: As compared with other retainers, thermoplastic retainer has shown reduced tendency to debond from occlusal forces, decreased patient discomfort, and occlusal interference.

Keywords: Debonding, New bonded lingual retainer, Occlusal interference, Thermoplastic retainer.

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[1-5]Department of Orthodontics and Dentofacial Orthopedics Educare Institute of Dental Sciences, Malappuram, Kerala, India

[6]Department of Orthodontics and Dentofacial Orthopedics Malabar Dental College and Research Center, Malappuram Kerala, India

Corresponding Author: KA Adam Ozeer, Department of Orthodontics and Dentofacial Orthopedics, Educare Institute of Dental Sciences, Malappuram, Kerala, India, e-mail: dr.adamozeer@gmail.com

INTRODUCTION

Retention may be defined as the holding of teeth following orthodontic treatment in the treated position for the period necessary for the maintenance of the result.[1] It is an important factor in the success of any orthodontic treatment. Teeth have the tendency to return to their former position postorthodontic treatment, which results in relapse.[2] Therefore, retention phase is an absolute necessity in overcoming the elastic recoil of the gingival and periodontal supporting fibers of the teeth. Retention thereby also allows for the remodeling of the alveolar bone. The degree of biological changes that occur is variable and to an extent unpredictable.[3] Hence, retention phase can affect the success of the orthodontic treatment.

There are many retention modalities available for orthodontic cases.[4] Most commonly, removable retainers are used, such as Hawley's retainer, Begg's wrap-around retainer, and wraparound clip retainers. Certain cases warrant the necessity of fixed retainers. Bonded lingual retainers are an effective means to retain the aligned teeth on a long-term basis. Rigid mandibular canine-to-canine retainers are effective in maintaining the intercanine width but does not prevent individual tooth rotations as they are attached only to the canines,[5] whereas flexible spiral wire retainers allow physiological movement of the teeth and are effective at preventing individual tooth rotations as they are attached to each tooth.[6] Full tooth coverage clear retainers are another popular modality. This suck-down retainer is highly esthetic and holds the anterior and posterior teeth in their finished position. It does not allow for natural settling to occur between the maxillary and mandibular teeth and is dependent on patient compliance for the retainer wear.[7]

Taking into consideration the pros and cons of different retainers, this article entails a new fixed lingual

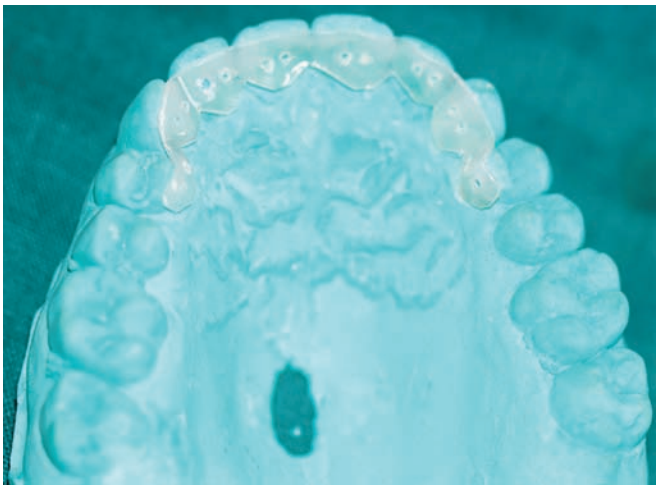

Fig. 1: Preinsertion thermoplastic retainer preparation done on patient cast

Table 1: Comparison between the different retainers

	Hawley's	*Fixed lingual retainer*	*ESSIX*	*New retainer (TPR)*
Risk of debonding	No	Yes	No	No
Chair-side time	Less	More	Less	Less
Preinsertion preparation	More	Less	More	More
Need to monitor gingival condition	Needed	Not needed	Needed	Needed
Natural settling	Present	Limited	Not present	Limited
Cost-effective	More	More	Less	Less
Patient compliance	Needed	Not needed	Needed	Not needed
Patient discomfort	Yes	No	Yes	No

TPR: Thermoplastic retainer

retainer (FLR) combining the design of FLR with the material of ESSIX retainer.

MATERIALS AND METHODS

Patient's impression and wax bite were taken to check bite and contact of lower anterior teeth with the upper anterior teeth. ESSIX retainer was made on patient's cast with 0.5 mm thickness hard thermoforming sheet. It can be vacuum or pressure-molded onto the patient's cast. Retainer was cut along only the palatal surface of the teeth using sharp scissor or Bard-Parker blade, and the rest of the parts were discarded. Using the wax bite, contact points between maxillary and mandibular anterior teeth were marked on the maxillary cast. Marked portions or high points were reduced or removed from the retainer. Tooth-borne surface of the retainer was sandblasted. This made the retainer rough and increased the bond strength. One to two punch holes were made on the retainer with small diameter burs on each tooth to remove flash and air pockets (Fig. 1). Gingival contour should be 1 mm away from the gingival margin and the edge was made smooth. Before bonding, make sure that all the biting portions or contact points with the mandibular teeth on the retainer are removed. Once the preinsertion preparations on the cast were completed, the retainer was bonded to the palatal surface of the teeth, using composite. Incisogingival extensions of the retainer should be checked and corrected. This differs in each patient, based on tooth shape, size, embrasure, and contact points with the mandibular teeth.

RESULTS

Table 1 compares the different retainers.[8-11] A 1-month review of this study group of 11 has shown no gingival adversities. Patients have not reported any discomfort or occlusal interference. There was no bond failure in this study group. Follow-up of this study group in comparison with other retainers' study group is being done, which will be included in the future research.

DISCUSSION

The FLRs most commonly used comprise a wire bonded onto the lingual surface of anterior teeth. The problems faced while using these retainers are the chair-side time for placement, increased debonding risk, and thereby preclusion to relapse. The bulkiness of the new retainer is much less compared with FLR bonded with conventional wire type where composite is placed over the wire, which will fail to withstand the occlusal load. Whereas, in the present retainer, the composite comes between the retainer and tooth surface, which reduces the bulkiness and nullifies the occlusal load (Figs 2 and 3).

Full tooth coverage transparent retainer needs patient compliance. Retention depends on whether the patient wears the retainer or not. Full coverage transparent retainer also has problems with regard to chewing

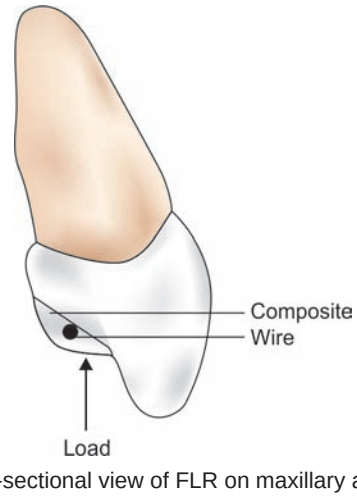

Fig. 2: Cross-sectional view of FLR on maxillary anterior tooth

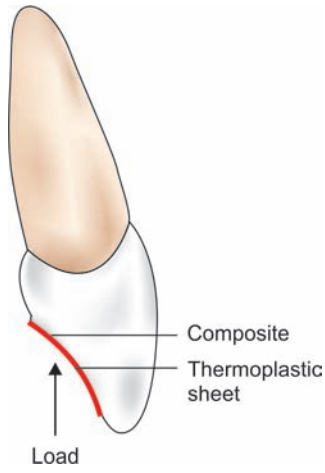

Fig. 3: Cross-sectional view of thermoplastic retainer on maxillary anterior tooth showing reduced overall occlusal thickness, as compared with FLR

Fig. 4: Intraoral occlusal view showing thermoplastic retainer placed on the palatal aspect of maxillary teeth

Fig. 5: Intraoral view showing thermoplastic retainer placed on lingual aspect of mandibular teeth

and possible disocclusion. Since there is no occlusal contact between the maxillary and mandibular teeth due to hinge effect brought about by equal thickness splint, there is an inability for posttreatment natural settling. It can also cause a possible change in the bite and mandibular positioning, which will disturb the intercuspation between maxillary and mandibular teeth in postretention phase.

The retainer used in this article was designed to overcome the abovementioned difficulties. This retainer is bonded to lingual tooth surface and portions that interfere with occlusion is removed; it has more surface area and decreased tendency to debond (Figs 4 and 5).

One of the difficulties faced is bonding the retainer in the second premolar extraction cases. It precludes the need to include the molars in the retainer, which has reduced accessibility as compared with other teeth in the arch, especially in the mandibular arch.

Table 1 depicts an overall comparison between the different retainers available. The problems related to the new design are the initial preinsertion preparation time, the cost, and the need to monitor the patient's gingival status monthly as a precaution. However, overall, the effectiveness and retention are shown to be good in this new retainer.

Critical Appraisal

- Preinsertion preparation
- Cost
- Periodic monitoring of gingival status at the interdental area

CONCLUSION

The tendency to debond, patient discomfort, and chairside time were found to be reduced. This retainer had proved to be successful in patients.

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