



Research Paper

A Short-Term Evaluation of Periodontal Effects of Different Orthodontic Retainer Combinations.

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ABSTRACT: This study was performed to evaluate the short-term periodontal effects of two combinations of upper removable and lower fixed retainers. Twenty patients who completed orthodontic treatment with fixed appliances were divided into two groups (A and B) of 10 patients each. Group A patients were given an upper wrap-around retainer and a lower bonded canine to canine retainer. Group B patients were given an upper vacuum formed and a lower bonded canine to canine retainer. Periodontal examination including pocket depth (PD), bleeding on probing (BOP) and plaque index (PI) was performed at insertion (T₁) and 4 weeks after insertion (T₂) of the retainers. PD and BOP scores were obtained at six sites per tooth. A significant increase of PI and BOP on mandibular lingual surfaces was recorded, whereas there were no changes for other parameters on both labial and palatal sites in the maxillary arch and labial sites in the mandibular arch in both groups. In the short term, both plaque accumulation as well as bleeding on probing increased in the areas of mouth where fixed lingual retainer was bonded but there was no increase in the pocket depth. Both Hawley type and vacuum formed retainers were similar in having no significant detrimental effect on periodontal parameters at all sites.

Keywords: Gingival, periodontal, pocket, retainer.

I. INTRODUCTION

Orthodontists use retainers following completion of orthodontics treatment to prevent relapse of corrected tooth positions. Use of fixed lingual retainers has increased steadily, especially in the lower anterior region as well in cases where prolonged retention is desired. One survey reported that use of fixed retainers increased steadily between 2002 and 2011 from one third to 42 % in the lower arch and from 5% to 11% in the upper arch¹. Fixed retainers have been implicated in causing greater calculus accumulation, gingival recession and increased probing pocket depths². This is likely caused by long-term irritation of the tissue induced by the fixed retainer and associated microbial accumulation. Increasing aesthetic concerns have also led to orthodontists switching over from conventional Hawley type removable retainer to vacuum formed retainers. Usually a combination of a removable upper retainer and a lower fixed retainer is used in most patients for desirable results. This study was performed to evaluate the short-term periodontal effects of two different combinations of upper removable and lower fixed retainers.

II. Materials And Methods

Twenty patients (10 female and 10 male; mean age, 17.3 years) who completed orthodontic treatment with fixed appliances at IDS, Jammu were included in this study. One orthodontist performed the de-bonding for all the patients. The remaining adhesive was removed with a tungsten carbide bur in a low-speed hand piece. The tooth surfaces were polished using a polish cup and rubber points. The patients were divided into two groups. Group A consisting of 10 patients (5 female and 5 male; mean age, 17.8 years) were given an upper wrap-around retainer and a lower bonded canine to canine retainer. Group B consisting of 10 patients (5 female and 5 male; mean age, 16.9 years) were given an upper vacuum formed and a lower bonded canine to canine retainer. Exclusion criteria included any systemic illness, smoking, pregnancy, pocket depth greater than 4 mm with radiographic bone loss and extensive dental restorations (crowns or bridges) or removable partial dentures.

At the start of the study, all patients received ultrasonic scaling and oral hygiene instructions. Patients were instructed to brush their teeth at least twice a day and to use interdental toothbrushes. Periodontal examination including pocket depth (PD), bleeding on probing (BOP) and plaque index (PI)³ was performed at de-bonding (T₁) and 4 weeks after de-bonding (T₂). PD and BOP scores were obtained at six sites per tooth. PI was determined for the labial and lingual sites separately. Periodontal evaluation was carried out by the same

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orthodontist in all patients by using a graduated periodontal probe (WHO-DMS probe). PD was measured to the nearest mm.

This study was approved by the Ethics Committee of Institute of Dental Sciences, Jammu. Statistical Package for the Social Sciences, Version 15.0 for Windows (SPSS Inc, Chicago, Ill) was used to evaluate the data. Repeated measurements were performed to ensure the reproducibility of observations (PD). The Kolmogorov-Smirnov test was applied to test for normal distribution. A Wilcoxon test was used to compare the parameters between T₁ and T₂. Significance level of was set at P < 0.05.

III. Results

There were no drop-outs during the study. The results of selected parameters i.e. PD, BOP and PI for group A and Group B are shown in table 1 and 2 respectively.

Table 1 (Group A)

Parameter	Jaw	Site	T ₁	T ₂	p value
Plaque index	Maxilla	Labial	0.2+/-0.3	0.1+/-0.1	0.335
		Palatal	0.2+/-0.1	0.2+/-0.3	0.592
	Mandible	Labial	0.2+/- 0.2	0.1+/-0.2	0.332
		Lingual	0.4+/- 0.2	1.1+/-0.5	0.003*
Bleeding on probing	Maxilla	Labial	18.3+/-13.6	14.1+/-13.6	0.192
		Palatal	22.4+/-18.4	20.3+/-15.8	0.620
	Mandible	Labial	19.1+/-17.2	12.7+/-10.6	0.110
		Lingual	24.0+/-19.2	45.7+/-28.3	0.001*
Pocket depth	Maxilla	Labial	1.9+/-0.3	2.0+/-0.4	0.894
		Palatal	2.0+/-0.1	2.1+/-0.5	0.174
	Mandible	Labial	2.0+/-0.4	2.2+/-0.5	0.730
		Lingual	2.1+/-0.3	2.3+/-0.3	0.284

*p<0.05

Table 2 (Group B)

Parameter	Jaw	Site	T ₁	T ₂	p value
Plaque index	Maxilla	Labial	0.2+/-0.3	0.1+/-0.2	0.219
		Palatal	0.1+/-0.1	0.2+/-0.2	0.600
	Mandible	Labial	0.2+/-0.3	0.1+/-0.1	0.336
		Lingual	0.3+/-0.1	1.1+/-0.6	0.002*
Bleeding on probing	Maxilla	Labial	19.8+/-17.4	13.7+/-12.8	0.195
		Palatal	23.1+/-18.3	20.1+/-13.2	0.612
	Mandible	Labial	18.3+/-17.9	12.3+/-11.8	0.108
		Lingual	27.0+/-20.5	48.6+/-26.5	0.001*
Pocket depth	Maxilla	Labial	2.1+/-0.5	2.0+/-0.3	0.881
		Palatal	2.2+/-0.4	2.3+/-0.6	0.192
	Mandible	Labial	1.9+/-0.2	2.0+/-0.7	0.710
		Lingual	2.0+/-0.4	2.3+/-0.8	0.297

*p<0.05

IV. Discussion

This study evaluated the short-term periodontal effects of two different combinations of upper removable and lower fixed retainers. A significant increase of PI and BOP on mandibular lingual surfaces was recorded, whereas there were no changes for any parameter on both labial and palatal sites in the maxillary arch and labial sites in the mandibular arch in both groups. In a recent study, it was shown that the intraoral location of biomaterials has an influence on intra-oral biofilm formation⁴. Fixed retainers make performing oral hygiene procedures more difficult including the ability to use dental floss^{1,5,6}. Interproximal and areas gingival to the wire are particularly prone to plaque accumulation which may progress to marginal recession as well as pocket formation^{7,8}.

In contrast, the PD remained relatively stable over the study period on all the sites. These results are in

accordance with a previous study which also recorded no significant increase in PD on bonded labial sites during the study period. Previous studies have shown no apparent damage to hard tissues, including bone levels even though soft tissue effects were recorded. A recent study found that periodontal health of subjects was not affected by bonded lingual retainers in spite of increased plaque accumulation in the lower anterior region⁵. Greater plaque accumulation along the wires has also not been found to lead to an increase in caries incidence in patients with fixed retainers⁹⁻¹².

The results for all the parameters for the maxillary arch in groups A and B were similar. This indicates that both Hawley type and vacuum formed retainer do not cause a significant increase in plaque accumulation or worsening of periodontal status. Ability to remove either of the retainers for the purpose of performing oral hygiene procedures is thus a significant advantage. The patient's motivation level is a crucial factor in selecting the retainer, whether removable or fixed, as the ease of appliance maintenance as well as compliance with the oral hygiene instructions is of utmost importance¹⁴. The current demand for aesthetic alternatives to visible appliances also makes a maxillary vacuum formed retainer in combination with lower fixed lingual retainer a viable choice from the periodontal health standpoint.

V. Conclusion

Thus, in the short term both plaque accumulation as well as bleeding on probing increased in the areas of mouth where fixed lingual retainer was bonded but there was no increase in the pocket depth. Both Hawley type and vacuum formed retainers were similar in having no significant detrimental effect on periodontal parameters.

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