Relapse during Retention with Hawley and Clear Overlay Retainers in Iraqi Adults

Rania A. Qanber Agha [a] and Nidhal H. Ghaib [b]

Abstract: Maintaining the treatment results following orthodontic treatment is one of the most important aspects of the entire orthodontic treatment process. The purpose of the present study was to evaluate and compare the uses of Hawley and clear overlay orthodontic retainers relative to changes in overjet, overbite, intermolar width, intercanine width, and arch length measurements. These measurements were quantified in 48 adult patients at the time of insertion and after three months. The patients had pretreatment class I or class II div I relationship and were treated with preadjusted fixed appliance. Cases with open bite or crossbite were excluded from this study. Results showed that with Hawley retainer there was a significant change in the overbite measurements, while with clear overlay retainer there was no significant change during retention. The retentive capacities of the two retainers differ as Hawley retainer allows relative vertical movement of the posterior teeth, while clear overlay retainer holds teeth in their previous debanding position.

Keywords: Orthodontic retention, Hawley retainer, clear overlay retainer (Iraqi Orthod J 2005; 1(2):10-12).

After teeth have been orthodontically repositioned, retention devices are used to maintain arch form and minimize the tendency of teeth to shift. When teeth do shift, changes that are undesirable are considered "Relapse". Orthodontic retainers resist the tendency of teeth to return to their pretreatment position under the influence of periodontal, occlusal and soft tissue forces, and continuing dento facial growth.[1]

MATERIALS AND METHODS

Forty eight adult patients (18-30 years old) were included in the study to avoid growth related changes. They had a Class I or Class II div 1 malocclusion with no anterior open bite or crossbite. They were treated for at least 12 months with Roth Brackets with the same archwire sequence and had a canine class I status after treatment. All cases were extracted cases (upper first premolars in Class II div 1 and upper and lower first premolars in cases with Class I).

After active orthodontic treatment, the overjet and overbite of the patients was measured clinically and should be within the normal value of 2-4mm. Upper and lower alginate impressions were taken to construct the retainers. The patients were divided into two groups, 24 patients wearing Hawley arch retainers and the other 24 wearing clear overlay retainers.

The Hawley retainer consisted of acrylic base plate (2-3mm in thickness) holding the labial arch (gauge 28 or 30 mil) soldered to Adam's clasp (gauge 28 mil) as shown in figure 1. Patients were instructed to wear the Hawley Retainer full-time for the first 3 months and part time (at night) for the remaining three months.

The clear overlay retainer (Figure 2) were made from Imprelon (hard, elastic, transparent polycarbonate material) of 1.0x 125mm size, heated for 30 seconds and cooled in 60 seconds in the pressure molding machine. Excess material was removed from the work model with a sturdy pair of scissors, and the general contours of the invisible retainer are established with a carborundum disc.[2] The patients were instructed to wear their mandibular retainer full time and their maxillary retainer part time for the first month, and both retainer only at night for the remaining 5 months.[3]

Figure 1: Hawley retainers.

Figure 2: Clear overlay retainers.

[a] B.D.S., M.Sc.; Department of Orthodontics, College of Dentistry, University of Baghdad.

[b] B.D.S., M.Sc.; Professor at the Department of Orthodontics, College of Dentistry, University of Baghdad.

After one week from impression taking the retainers were inserted and another set of impressions was taken to obtain the before retention study models. Impressions were redone after three months to evaluate any changes in the following measured variables:

1. Intercanine width, the linear distance between the cusp tips of the right and left canines.
2. Intermolar width, the linear distance from the mesiobuccal cusp tips of first permanent molars.
3. Vertical distance: It is the vertical distance from the incisal point perpendicular to a line joining mesiobuccal cusp tips of the first permanent molars.
4. Arch length: the distance from the mesiobuccal cusp of the first permanent molar around the dental arch to the same point in the opposite side using a brass wire.[4]
5. Overbite and overjet [5]

RESULTS AND DISCUSSION

In this study, 24 males and 24 females were equally divided between the two groups. The study showed no significant difference between male and female measurements during the three months period. Table 1 shows the difference between the measurements taken at the day of insertion and after three months of wearing the retainer for males and females which revealed non-significant gender differences.

There was a significant decrease in the mean overbite measurement after three months for Hawley retainer wearing (Table 2 and Figure 3). This is because of encouraging posterior teeth eruption.[7] Since the Hawley retainers were worn full time during these three months, the acrylic base plate and the labial wire may have held the anterior teeth allowing the posterior teeth to extrude.

Tibbetts [6] compared Hawley retainers, clear overlay retainers, and tooth positioners by analyzing dental casts at debonding and after a 6-month retention period .and found no statistically significant differences in overbite. On the other hand, Sauget [7] did a comparative study between Hawley and Clear overlay retainers and found that the Hawley retainer allows relative vertical movements of the posterior teeth.

The extrusions of the posterior teeth that have been observed in the Hawley retainer group agrees with the findings of Durbin and Sadowsky [8] who compared Hawley retainers with tooth positioners, with Hawley retainer and found that the posterior teeth extruded after the bands are removed.

In the clear overlay group, there was no significant in the measurements (Figure 4). This retainer will not allow over eruption of anterior or posterior teeth due to full coverage of the teeth by the retainer. It is important to always cover at least part of the last molars in each arch to prevent extrusion of these teeth.[2]

In both groups, upper and lower intercanine and intermolar distance, arch length, vertical dimension and overjet showed non-significant differences (Table 3). This was similar to previous findings. [6,7]

This study demonstrates during the first 3 months of retention overbite significantly reduces more with the use of Hawley retainer than clear overlay retainer (Figure 3). These findings suggest that Hawley retainers should be prescribed if one of the objectives of retention is to allow for relative vertical tooth eruption, particularly of posterior teeth. On the other hand, if the desired occlusion is established before retainer fabrication, the clear overlay retainers should function well to maintain the required occlusion.

Table 1: Comparison between males and females for the change in measurement of the variables between the insertion day and after 3 months (in mm).

Variable		Hawley Retainer					Clear overlay Retainer				
		Males		Females		p	Males		Females		p
		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Upper	Vertical distance	0.29	0.03	-0.04	0.01	NS	0.08	0.02	0.04	0.01	NS
	Intercanine	0.00	0.00	-0.29	0.04	NS	0.00	0.00	0.00	0.00	NS
	Intermolar	0.08	0.52	0.30	0.38	NS	0.00	0.00	0.00	0.00	NS
	Arch length	0.75	1.06	0.42	1.57	NS	0.00	0.00	-0.16	0.72	NS
Lower	Vertical distance	-0.21	0.04	-0.17	0.03	NS	0.00	0.00	0.00	0.00	NS
	Intercanine	0.00	0.00	-0.10	0.33	NS	0.00	0.00	0.00	0.00	NS
	Intermolar	0.59	0.07	-0.16	0.06	NS	0.00	0.00	-0.08	0.29	NS
	Arch length	-0.54	0.38	-1.00	0.42	NS	0.00	0.00	-0.17	0.58	NS
Overjet		0.17	0.49	0.20	0.05	NS	0.00	0.00	0.00	0.00	NS
Overbite		-0.75	0.34	-0.50	0.37	NS	0.08	0.19	0.04	0.14	NS

NS= Non-significant ($p<0.05$)

Table 2: Distribution of the patients according to the change in their overbite both retainer groups.

Gender	Retainer type	+0.5 mm	+1 mm	No change	-0.5 mm	-1 mm
Male	Hawley retainer	0	0	1	4	7
	Clear overlay retainer	0	0	10	2	0
Female	Hawley retainer	1	0	0	9	2
	Clear overlay retainer	0	0	11	1	0

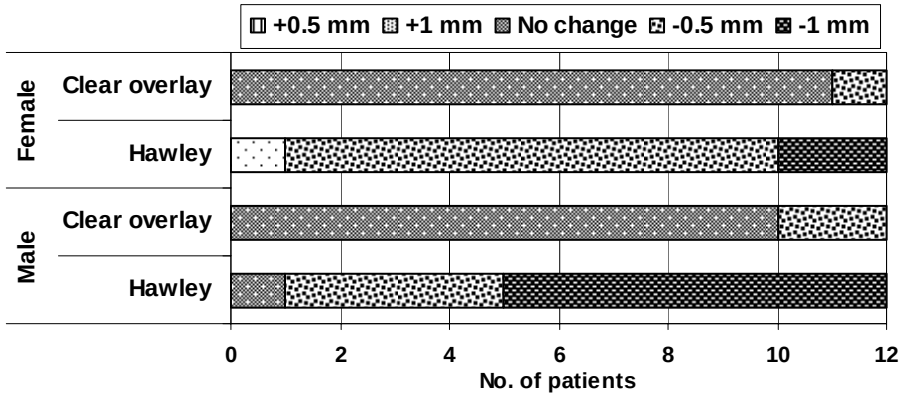

Figure 3: Overbite measurements for Hawley and Clear overlay retainers in both male and female.

Table 3: Comparison of the change in measurement for the variables between the insertion day and after 3 months for the whole sample (in mm).

Variable		Hawley Retainer					Clear overlay Retainer				
		Insertion day		After 3 months		p	Insertion day		After 3 months		p
		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Upper	Vertical dimension	21.04	1.92	21.16	1.93	NS	20.04	1.37	20.04	1.37	NS
	Intercanine	32.15	2.78	32	2.57	NS	30.88	2.03	30.88	2.03	NS
	Intermolar	51.55	12.14	51.94	6.08	NS	51.83	4.86	51.83	4.86	NS
	Arch length	74.63	5.25	75.21	5.01	NS	75.79	4.64	74.91	3.65	NS
Lower	Vertical dimension	17.05	2.07	17.35	2.91	NS	17.69	2.31	17.69	2.31	NS
	Intercanine	26.58	3.02	26.53	2.95	NS	26.83	2.35	26.83	2.35	NS
	Intermolar	47.21	6.19	47.04	7.30	NS	43.04	4.58	43.00	4.65	NS
	Arch length	65.33	5.77	64.56	6.15	NS	67.54	6.18	67.46	6.27	NS
Overjet		2.90	0.98	3.33	1.21	NS	2.79	0.99	2.79	0.99	NS
Overbite		3.79	0.93	3.17	0.81	*	2.69	0.96	2.75	1.00	NS

NS= Non-significant ($p<0.05$), * significant ($p<0.05$)

REFERENCES

1. Proffit WR, Fields HW, Ackerman JL. Contemporary orthodontics. 3rd ed. St. Louis, Mosby-Yearbook Inc, 2000.
2. McNamara JA, Kramer KL, Juenker JP. Invisible retainers. J Clin Orthod 1985; 19(8): 570-8.
3. Lindauer SJ, Shoff RC. Comparison of Essix and Hawley retainers. J Clin Orthod 1998; 32(2): 95-7.
4. Nance HN. Limitation of orthodontics treatment. Am J Orthod Oral Surg 1947; 33(4): 177-223.
5. Wylie WL. Rapid evaluation of facial dysplasia in the vertical plane. Angle Orthod 1952; 22: 165-82.
6. Tibbets JR. The effectiveness of three orthodontic retention systems: A short term clinical study. Am J Orthod Dentofac Orthop 1994; 106: 671.
7. Sauget E, Covell DA, Boero RP, Lieber WS. Comparison of occlusal contacts with use of Hawley and clear overlay retainers. Angle Orthod 1997; 3: 223-30.
8. Durbin DS, Sadowsky C. Changes in tooth contacts following orthodontic treatment. Am J Orthod Dentofac Orthop 1986; 90(5): 375-82.