Journal of Contemporary Orthodontics 2024;8(4):438–445

Content available at: https://www.ipinnovative.com/open-access-journals

Journal of Contemporary Orthodontics

Journal homepage: https://www.jco-ios.org/

Original Research Article

Comparison of occlusal settling, patient compliance, and retention ability between hawley's and van der linden retainers – A randomized controlled trial

Parth Adhikari[1], Harshit Naik[1]*, Nikunj Pael[1], Kalpesh Patel[1], Udita Mehta[1]

[1]*Dept. of Orthodontics, Manubhai Patel Dental College & Dental Hospital, Vadodara, Gujarat, India*

ARTICLE INFO

Article history:
Received 12-04-2024
Accepted 30-05-2024
Available online 02-11-2024

Keywords:
Hawley's Retainer
Van Der Linden Retainer
Occlusal Settling
Retention Ability
Patient compliance

ABSTRACT

Objective: To compare occlusal settling, patient compliance, and retention ability between Hawley's and Van Der Linden retainers.

Trial Design: Randomized, Parallel-Group, Active Controlled Trial. Randomization and allocation to the particular trial group was done through a lottery system.

Materials and Methods: A total of 72 subjects were randomly assigned in both the groups- Hawley's retainer group (HL) (n = 36) and Van Der Linden group (VL) (n = 36). Each subject was given a removable maxillary retainer and a fixed bonded lingual mandibular retainer. Impressions were recorded on three different time spans i.e. at the time of retainer delivery (T0), 3 months later (T1), and post 6 months of retention (T2). Bite registration records and questionnaire evaluation were taken at time intervals T1 and T2. Each time assessments were performed from the cast by Little's Irregularity Index (LII), Inter Canine Width (ICW), and Inter Molar Width (IMW). Patient compliance was gauged with the help of a Questionnaire. The occlusal settling, patient compliance, and retention ability were evaluated and compared between the two groups.

Results: Both groups showed a rise in the number of total contacts (5.39 in HL and 2.42 in VL), and true contacts (6.89 in HL and 4.64 in VL), whereas near contacts declined (-1.53 in HL and 2.22 in VL) at T2. Post 6 months, the difference in LII, ICW, and IMW were slightly higher for VL than HL. This proved the better retention ability of the HL group. Patient compliance determined with the questionnaire showed that overall compliance was greater with HL than with VL.

Conclusion: In the course of 6 months of retention, the total near contacts were reduced in both retainers but the total (True + near) contacts elevated, which suggests both retainers facilitated occlusal settling. Changes in values of LII, ICW, and IMW were not significantly different for both groups during T2, which proved the retention ability of both retainers. Patient compliance increased as patients wore either of the retainers, but they were more comfortable with HL.

1. Introduction

The success of orthodontic treatment is determined by facial esthetics, occlusion, and stability. After active orthodontic tooth movement, the teeth might be in an inherently unstable position and have a tendency to return to their pre-treatment position; this is termed as 'Relapse'. "Retention is the toughest drawback in orthodontia; in reality, it's the problem." was declared by Oppenheim;[1] still holds true in several cases.

The post-treatment period can be divided into retention and post-retention phases. During the retention phase, the reorganization of elastic supra-crestal fibers can take up to 232 days.[2] The post-retention phase begins after the retention phase and lasts for the rest of the patient's life.

* *Corresponding author*.
E-mail address: drharshitnaik@gmail.com (H. Naik).

https://doi.org/10.18231/j.jco.2024.066

During this period, teeth bear varied forces- neuromuscular forces, dentoalveolar development, and growth.[3]

Retainers utilized for orthodontic retention may either be fixed or removable. Hawley retainers and Van der Linden retainers fall under the category of removable retainers.[4] The Hawley's retainer is one of the most popular and commonly used removable retainers which was designed by Charles Hawley in 1919 and has been used widely for nearly a century.[5] Due to the plentitude of advantages like occlusal settling, ease of modification and durability Hawley's retainer has stood strongly against the test of time. The Van Der Linden retainer was designed by Van Der Linden in 2003, which offers complete control over the maxillary anterior teeth, with a contoured labial bow and closed loops on canines. Van der Linden has emphasized on good versatility and occlusal settling ability of this retainer.[6]

There is insufficient evidence in terms of clinical effectiveness comparison between Hawley's retainer and Van Der Linden's retainer. In most studies, retainers are compared either for retention ability or occlusal settling, or patient compliance. There is an inadequacy of studies that were intended to consider all these aspects to be studied on the same sample. We have attempted to open new horizons in this direction by comparing both retainers based on retention ability, patient compliance, and occlusal stability. In this study, we checked the hypothesis to compare occlusal settling, patient compliance, and retention ability of maxillary Hawley's and Van Der Linden retainers at the time of retainer delivery, after 3 months and 6 months of retention.

2. Materials and Methods

2.1. Trial design

The study was a randomized, parallel-group, active-controlled trial with a balanced allocation ratio (1:1).

2.2. Sample

96 consecutive patients were scrutinized for eligibility. Patients who had completed their orthodontic treatment were included in this study. None of the patients had a prior experience with the usage of an orthodontic retainer. Prospective participants for the study were informed about the research and treatment protocol and were provided with informed consent about participation in the study.

Patients were then selected based on the following inclusion criteria: Systemically healthy patients who had undergone fixed appliance orthodontic treatment and were in the retention phase of treatment. Removable retainers for the proposed study were given in the maxillary arch whereas fixed lingual retainer was given in the mandibular arch. Exclusion criteria included the following: Non-compliant patients having craniofacial or Dentofacial Syndromes, uncontrolled diabetes, chronic periodontal diseases, or habit of smoking.

2.3. The recruitment process of patients is depicted in Figure 1.

To reduce the risk of bias, randomization was undertaken by a person who had not examined any of the patients. However, blinding was not feasible for the treating doctor due to the nature of the treatment. Hence, data collectors and outcome assessors were blinded for analysis and inference. Also, the Participants were blinded by not stating to them the type of retainer group they were a part of.

2.4. Methodology

Prior approval was obtained from the research and ethical committee to conduct this study. Each patient was thoroughly educated and then they signed an informed consent document. The consent form was available in English as well as Gujarati languages (the local regional language). Retainers were fabricated as described below.

2.5. Fabrication method of each retainer

1. Hawley's Retainer: Hawley's retainer (Figure 2) was constructed with a continuous labial arch (0.028" S.S. wire) and Adam's molar clasps (0.028" S.S. wire) embedded in the palatal acrylic plate. The patient's occlusion was checked to ensure that .028" S.S. wire could pass between the Canine and 1^{st} premolar without causing occlusal interference.
2. Van der Linden Retainer: The Van der Linden retainer (Figure 3) was constructed with a continuous fitted labial arch with closed loops (0.028" S.S. wire) and three-quarter molar clasps (0.028" S.S. wire) embedded in the palatal acrylic plate. The patient's occlusion was examined to ensure that .028" S.S. wire could pass between the lateral incisor and canine without any interference. The premolars and molars were devoid of acrylic, except where there were clasps.

At the time of retainer delivery, the labial bow was so adjusted as to maintain passive contact with each anterior tooth. The mandibular incisors were in light contact with the acrylic, and also lingual to the maxillary incisors when the posterior teeth were in maximum intercuspation. The patients were directed to wear the retainer the whole day for 6 months, except while eating and brushing. All necessary instructions about the wear and keeping of retainers were explained. All the participants were called after a week for a checkup.

Records for observations of the study were taken at the time of retainer Delivery [T_0], at 3 months[T_1], and at 6 months[T_2] (Figure 4). LII, ICW, and IMW were calculated and analyzed each time. A digital caliper was used to measure them. For bite registration and

evaluation of occlusal contacts, we followed the method mentioned by Sauget E. et al.[7] Patients were seated upright in the dental chair and vinyl polysiloxane(Jetbite) bite registration material was applied over the occlusal surfaces of mandibular teeth. The patient was instructed to bite firmly in maximum intercuspation. Second bite registration was made within 15 minutes to check the reproducibility.

For analysis of occlusal contacts, individual registrations accumulated from multiple patients were selected at random. Occlusal contacts were categorized as either True or Near contacts. (Figure 5) True contacts perforated the impression material; near contacts appeared as thin translucencies and were counted only if they were 0.20mm or less measured with an Iwanson Caliper. Observing from the maxillary side, the locations of the contacts were assigned by tooth and then grouped as either anterior (Incisors & Canines) or posteriors (Premolars & molars). All registrations were evaluated and measured by the same individual.

2.6. *Error removal of method*

The registrations were made in 3 different time-lapse periods within 30 minutes of retainer delivery (T0), at 3 months (T1), and at 6 months (T2) of retention. All registrations were made in the afternoon by the same clinician. To test the measurement accuracy, 10 bite registrations were selected at random and the near contacts were measured.

Patient compliance was computed by a Questionnaire that was available in English and a local language. All questions were compulsory to attend for each patient at 3 months and 6 months of retainer delivery. The questionnaire was assessed as shown in Figure 6.

2.7. *Statistical analysis*

The data of the study were analyzed using SPSS version 20, statistics packages. In each case, the level of significance was set at $\alpha = 0.05$. The data were inspected for normality and found to be normally distributed. Descriptive statistics were computed to give the basic features of the data. Independent sample t-test and pair t-test were conducted for comparison between the two groups.

3. Results

Total observations of seventy-two participants [36 in the VL group & 36 in the HL group] were considered for appraisal of results and statistical analysis. The average age of the participants was 27.1 years in both groups.

Epresents the descriptive statistics of the occlusal contacts of the retainer. At T0 the mean total true contacts for HL were above VL. At T2 the mean total true contacts Grew in both groups. On considering total near contacts, it was found that the mean total near contacts for HL dipped

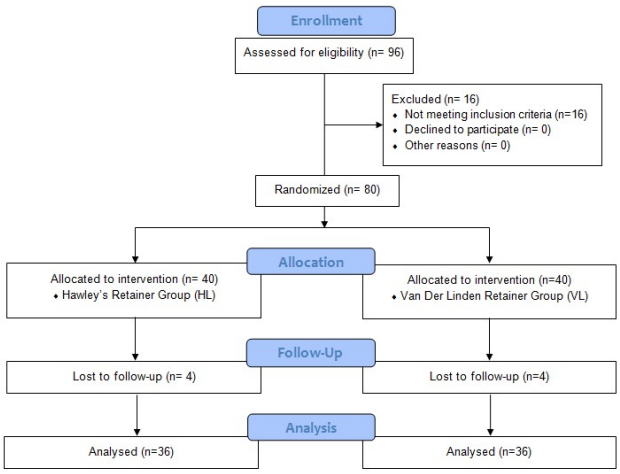

Figure 1: Consort flow chart

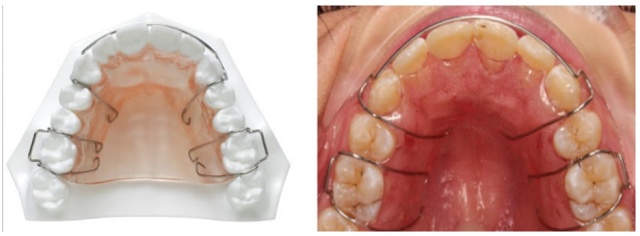

Figure 2: Hawley's retainer

Figure 3: Van der linden retainer

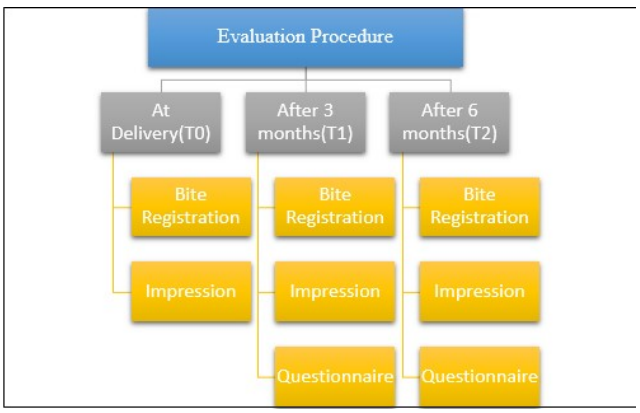

Figure 4:

Table 1: Descriptive statistics of the changes in true and near occlusal contacts of both the retainers at the time of retainer delivery (T0), at 3 months (T1), and at 6 months (T2) of retainer delivery.

Number Of Occlusal Contacts		Mean		Standard deviation		Minimum		Maximum	
		HL	VL	HL	VL	HL	VL	HL	VL
Retainer delivery (T0)	True contacts Ant.	3.28	2.94	0.88	0.86	2.00	2.00	5.00	5.00
	True contacts Post.	8.22	7.69	1.07	0.75	5.00	7.00	10.00	10.00
	Total True contacts	11.50	10.64	1.42	1.22	8.00	9.00	14.00	14.00
	Near contacts Ant.	4.47	4.36	0.61	0.76	3.00	3.00	5.00	6.00
	Near Contacts Post.	11.94	12.39	1.31	1.38	10.00	10.00	15.00	15.00
	Total Near Contacts	16.42	16.75	1.48	1.57	14.00	14.00	20.00	20.00
	Total contacts	27.92	27.39	1.98	2.06	24.00	23.00	34.00	32.00
After 3 months (T1)	True contacts Ant.	3.94	3.42	0.47	0.65	3.00	2.00	5.00	5.00
	True contacts Post.	11.33	10.44	0.96	0.77	10.00	9.00	14.00	13.00
	Total True contacts	15.28	13.86	0.97	1.05	14.00	12.00	18.00	17.00
	Near contacts Ant.	4.42	4.19	0.55	0.47	3.00	3.00	5.00	5.00
	Near Contacts Post.	13.72	11.86	0.66	1.10	13.00	10.00	15.00	15.00
	Total Near Contacts	18.14	16.06	0.99	1.12	17.00	14.00	20.00	19.00
	Total contacts	33.42	29.92	1.44	1.54	31.00	28.00	38.00	33.00
After 6 months (T2)	True contacts Ant.	4.31	3.78	0.52	0.59	3.00	2.00	5.00	5.00
	True contacts Post.	14.06	11.50	0.79	0.65	11.00	10.00	15.00	12.00
	Total True contacts	18.39	15.28	0.96	0.81	16.00	13.00	20.00	17.00
	Near contacts Ant.	4.06	3.39	0.41	0.49	3.00	3.00	5.00	4.00
	Near Contacts Post.	10.89	11.14	0.78	0.59	10.00	10.00	13.00	12.00
	Total Near Contacts	14.89	14.53	0.82	0.74	13.00	13.00	17.00	16.00
	Total contacts	33.31	29.81	1.35	1.01	31.00	27.00	37.00	32.00

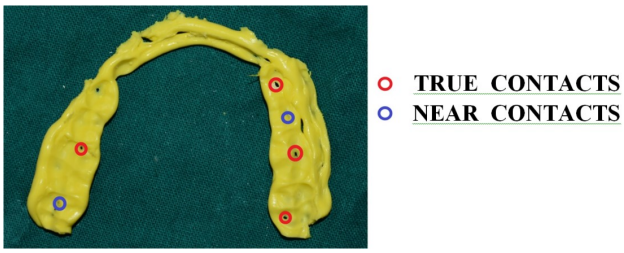

Figure 5: Bite registration with "True" and "Near" contacts.

at T2, whereas the pattern of decline is the same for VL. However, taking into consideration total contacts, results are suggestive of a greater increase for HL than VL.

Table 2 shows the difference between the occlusal contacts of HL and VL respectively. At T1 the average total true contacts and average total contacts differ significantly for HL and VL, where both were slightly in favor of HL. In addition, both at T1 and T2, the mean difference between HL and VL was found to be statistically and significantly different indicating all the contacts were in favor of HL compared to VL. Both at T1 and T2, the average true contacts were almost thrice as higher for HL as compared to that of VL.

The retention ability of retainers was calculated by LII, ICW, and IMW at each time.

Table 3 shows the descriptive statistics of the index of retainer for HL and VL separately. Considering T0, it was found that the average LII, ICW, and IMW were Minutely higher for HL as contrasted to that of VL. Whereas at T2, the pattern changed slightly, indicating the average LII, ICW, and IMW was found to be exceeding in VL.

Table 4 shows the difference between the index of HL and VL respectively. On considering T0 and at T1, it was found that the values of LII, ICW, and IMW were not significantly different for both groups. Whereas at T2 they were statistically and significantly different between HL and VL and were slightly in favor of HL.

Table 2: Statistical significance of the difference in change in occlusal contacts between both groups.

HL vs VL	Contacts	t	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Retainer delivery	True contacts Ant.	1.62	0.11	0.33	-0.08	0.74
	True contacts Post.	2.42	0.22	0.53	0.09	0.96
	Total True contacts	2.75	0.01	0.86	0.24	1.49
	Near contacts Ant.	0.68	0.50	0.11	-0.21	0.44
	Near Contacts Post.	-1.40	0.17	-0.44	-1.08	0.19
	Total Near Contacts	-0.93	0.36	-0.33	-1.05	0.39
	Total contacts	1.11	0.027	0.53	-0.42	1.48
After 3 months	True contacts Ant.	3.94	0.00	0.53	0.26	0.80
	True contacts Post.	4.34	0.00	0.89	0.48	1.30
	Total True contacts	5.95	0.00	1.42	0.94	1.89
	Near contacts Ant.	1.84	0.07	0.22	-0.02	0.46
	Near Contacts Post.	8.71	0.00	1.86	1.43	2.29
	Total Near Contacts	8.36	0.00	2.08	1.59	2.58
	Total contacts	9.96	0.00	3.50	2.80	4.20
After 6 months	True contacts Ant.	4.01	0.00	0.53	0.27	0.79
	True contacts Post.	14.94	0.00	2.56	2.21	2.90
	Total True contacts	14.79	0.00	3.11	2.69	3.53
	Near contacts Ant.	6.23	0.00	0.67	0.45	0.88
	Near Contacts Post.	-1.53	0.12	-0.25	-0.58	0.08
	Total Near Contacts	1.97	0.05	0.36	-0.01	0.73
	Total contacts	12.47	0.00	3.50	2.94	4.06

Table 3: Descriptive statistics of changes in little's irregularity index, inter canine width (ICW), and Inter molar width (IMW) of both the retainers at the time of retainer delivery (T0), at 3 months (T1), and 6 months (T2) of retainer delivery.

	Mean(mm)		Standard deviation(mm)		Minimum(mm)		Maximum(mm)	
Retainer delivery	**HL**	**VL**	**HL**	**VL**	**HL**	**VL**	**HL**	**VL**
LII	0.25	0.22	0.44	0.42	0.00	0.00	1.00	1.00
ICW	26.21	25.22	0.86	0.97	24.24	24.24	28.05	28.05
IMW	35.22	34.31	0.60	0.57	33.69	33.95	36.25	36.26
After 3 months								
LII	0.14	0.33	0.35	0.53	0.00	0.00	1.00	2.00
ICW	26.25	26.30	0.91	0.99	24.46	23.52	28.11	28.11
IMW	35.29	35.32	0.68	0.74	33.71	33.41	36.95	36.81
After 6 months								
LII	0.11	0.28	0.32	0.51	0.00	0.00	1.00	2.00
ICW	26.19	28.48	0.91	0.81	24.31	25.31	28.19	27.96
IMW	35.35	36.41	0.75	0.79	33.67	33.66	36.94	36.72

There were 5 questions in the questionnaire. Participants had to answer in affirmation or in negative for the initial 4 questions whereas in terms of good, bad, or neutral for the last question.

Assessment of patient compliance was done at T1 and T2. Table 5 depicts that in 6 months difficulty or the laboriousness in wearing the retainer diminished in both retainers. This decline was also found to be statistically significant at a 5% level.

Wire components of both retainers hurt during T1, but at T2 it was noticed more in VL. In the case of the Effect of retainer on speech production, VL was more comfortable than HL. With time embracement while wearing a retainer decreased. Most of the respondents had a good overall experience with the retainers, which increased at T2. Participants were feeling comfortable as they started using retainers. So, the ratio of participants replying in "Neutral" and "Bad" abated from T1 to T2.

4. Discussion

There are varied types of retainers available to the orthodontist, including removable and fixed, and it may be onerous to decide on a universal protocol of retention. The recent Cochrane review concluded that there was insufficient evidence on which to base the clinical practice

Table 4: Shows the statistical significance of the difference in change in LII, ICW, and IMW of both retainers.

HL vs VL	t	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
Retainer delivery					
LII	0.27	0.79	0.03	-0.17	0.23
ICW	-0.06	0.95	-0.01	-0.44	0.42
IMW	-0.67	0.51	-0.09	-0.37	0.18
After 3 months					
LII	-1.82	0.07	-0.19	-0.41	0.02
ICW	-0.19	0.85	-0.04	-0.49	0.41
IMW	-0.21	0.84	-0.03	-0.37	0.30
After 6 months					
LII	-1.66	0.01	-0.17	-0.37	0.03
ICW	-1.39	0.04	-0.28	-0.69	0.12
IMW	-0.32	0.03	-0.06	-0.42	0.30

Table 5: Shows descriptive statistics of responses to questions asked to each participant through the questionnaire to assess patient compliance, which was assessed at 3 months and 6 months of retention.

Questions	response	After 3 months HL (n=36)	After 3 months VL(n=36)	HL vs VL (p-value)	After 6 months HL(n=36)	After 6 months VL(n=36)	HL vs VL (p-value
Difficult to insert/remove the retainer	yes	8.3	5.6	0.033	2.8	2.8	0.047
	no	91.7	94.4		97.2	97.2	
Wire components of retainer hurt	yes	7.3	13.9	0.012	5.6	8.3	0.124
	no	92.7	86.1		94.4	91.7	
Retainer affects your speech	yes	2.8	11.1	0.256	5.6	8.3	0.28
	no	97.2	88.9		94.4	91.7	
Feel embarrassed to wear the retainer	yes	9.6	5.6	0.008	8.3	2.8	0.039
	no	90.4	94.4		91.7	97.2	
Overall experience with retainer	good	83.3	75	0.019	88.9	77.8	0.028
	neutral	11.1	22.2		8.3	16.7	
	bad	5.6	2.8		2.8	5.6	

of retention in orthodontics.[7]

With the time of a century, Hawley's retainer has proven its retention ability, efficiency for occlusal settling, and patient compliance. But, in a recently conducted systematic review by Jaber et al. They noticed greater changes in LII, and a greater proportion of maxillary anterior teeth rotation was observed with Hawley's retainers.[8] This led us to search for an alternate removable retainer that can substitute this well-known retainer. Recently introduced Van Der Linden retainer was selected to check for its effectiveness against Hawley's retainer.

Our Inferences showed that total contacts increase with the wearing of retainers. But the ratio of true contacts increased more in comparison with near contacts. This means inter digitations of upper and lower dentition increased as patients wore retainers, although the change was more prominently seen in Hawley's retainer. The same results were obtained in the study done by Sauget et al.7 who compared occlusal contacts with the use of Hawley and clear overlay retainers. He stated that with Hawley's retainer, there was a marked increase in occlusal contacts on posterior teeth but no change on anterior teeth.[9]

We also assessed and compared the retention ability of retainers by measuring the ability of retainers to maintain LII, ICW, and IMW. In our study, we noticed that Hawley's retainer was able to retain the dentition in its position, as there were no significant changes noticed during 3 months and 6 months of follow-up. On the contrary, Van Der Linden showed changes in these parameters. Although, these changes were not so significant they were more than Hawley's retainer. This suggested that Hawley's retainer had more retention ability. In our study, we noticed the change in LII of 0.14mm and 0.06mm in Hawley's and Van Der Linden's retainer respectively during 6 months of retention. LII was changed by 0.25mm in a single-centered randomized controlled trial conducted by H. Rowland[10] who compared the effectiveness of Hawley and vacuum-formed retainers (VFRs).

For the assessment of patient compliance, we had taken the feedback of patients in form of responses to a questionnaire consisting of 5 questions. The questions were based on inconveniences in wearing the retainer, harm

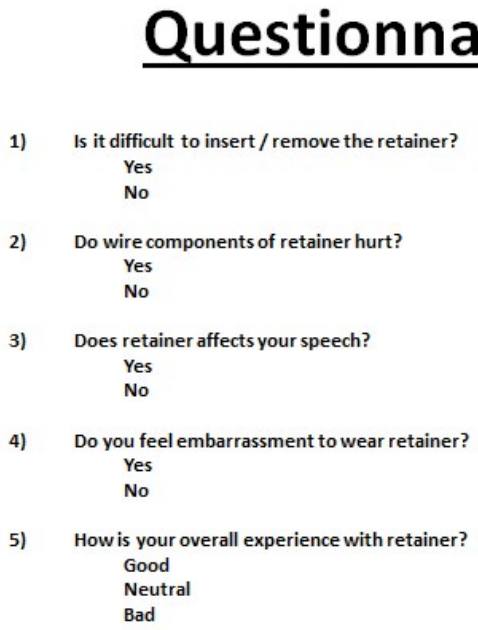

Figure 6: Questionnaire

from wire components, effect on speech as well as social embarrassment while retainer wear, and overall experience. In most of the responses, we noticed that the comfort level of patients increased as they started wearing retainers and got adapted to them. In most of the responses, patients were feeling comfortable with Hawley's retainer, except for feeling embarrassed while wearing the retainer which decreased more with the Van Der Linden retainer during 6 months of retention. In contrast to our study, M. Pratt et al. [11] noticed less patient compliance with Hawley's retainers when they compared it with VFRs in their questionnaire-based study to assess patient compliance with orthodontic retainers.

In the matter of selecting retainers, other factors such as aesthetics, ease of fabrication, and cost should be taken into account. Overall, in the case of retention ability, occlusal settling and patient compliance Hawley's retainer was more effective than Van Der Linden's retainer. But, Van Der Linden's retainer is better than Hawley's retainer in the matter of palatal acrylic coverage Otherwise, Hawley's retainer has given satisfactory results since the last century.

5. Conclusion

1. During 6 months of retention, total near contacts decreased in both retainers, but the total (True + Near) contacts increased, which indicates that both retainers facilitated occlusal settling.
2. After 3 months and 6 months of retention, total contacts increased more in Hawley's retainers than in Van Der Linden's retainer, which means occlusal settling occurs better in Hawley's retainer.
3. Changes in values of Little's Irregularity Index (LII , Inter Canine Width (ICW , and Inter Molar Width (IMW) was significantly different for both groups during 6 months of retention, which proved the retention ability of both retainers.
4. Patient compliance increased as patients wore either of the retainers, but they were more comfortable with Hawley's retainers.
5. Although both retainers showed a significant amount of occlusal settling, retention ability, and patient compliance, Hawley's retainer was more effective than Van Der Linden's retainer.
6. To get more details about retention ability a long-term study should be conducted with a larger sample size.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. Malandkar A, Toshniwal N, Mote N, Das S, Singh N. An overview of current trends in European environmental education. . *J Environ Educ*. 1996;28(1):5–10.
2. Melrose C, Millett DT. Toward a perspective on orthodontic retention? *Am J Orthod Dentofac Orthop*. 1998;113(5):507–21.
3. Pratt MC, Kluemper GT, Hartsfield JK, Fardo D, Nash DA. Evaluation of retention protocols among members of the American Association of Orthodontists in the United States. *Am J Orthod Dentofac Orthop*. 2011;140(4):520–6.
4. Breuning KH. Custom Retention after Orthodontic Treatment. *Dig Planning Custom Orthod Treat*. 2017;2(3):65–73.
5. Hawley CA. A removable retainer. *Int J Orthod Oral Surg*. 1919;5(6):291–305.
6. Van Der Linden F. The Van der Linden retainer. *J Clin Orthod*. 2003;37(5):260–7.
7. Littlewood SJ, Millett DT, Doubleday B, Bearn DR, Worthington HV. Retention procedures for stabilizing tooth position after treatment with orthodontic braces. *Cochrane Database Syst Rev*. 2016;1:CD002283.
8. Jaber W, Rahma A, Kaklamanos EG, Athanasiou AE. Performance of Hawley-type retainers: a systematic review of randomized clinical trials. *Eur J Orthod*. 2018;40(2):115–25.
9. Sauget E, Covell DA, Boero RP, Lieber WS. Comparison of occlusal contacts with the use of Hawley and clear overlay retainers. *Angle Orthod*. 1997;67(3):223–53.
10. Rowland H, Hichens L, Williams A. The effectiveness of Hawley and vacuum-formed retainers: A single-center randomized controlled trial. *Am J Orthod Dentofac Orthop*. 2007;132(6):730–7.
11. Pratt MC, Kluemper GT, Lindstrom AF. Patient compliance with orthodontic retainers in the post-retention phase. *Am J Orthod Dentofac Orthop*. 2011;140(2):196–201.

Author's biography

Parth Adhikari, PG Student

Harshit Naik, Senior Lecturer

Nikunj Pael, Professor

Kalpesh Patel, HOD and Professor

Udita Mehta, Reader https://orcid.org/0000-0002-7896-4753

Cite this article: Adhikari P, Naik H, Pael N, Patel K, Mehta U. Comparison of occlusal settling, patient compliance, and retention ability between hawley's and van der linden retainers – A randomized controlled trial. *J Contemp Orthod* 2024;8(4):438-445.