

Level of satisfaction in the use of the wraparound Hawley and thermoplastic maxillary retainers

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ABSTRACT

Objective: To compare the level of satisfaction in the use of wraparound Hawley and thermoplastic maxillary retainers.

Materials and Methods: The study sample included 70 orthodontic patients (24 males and 46 females), who were in the retention stage (mean age = 20.80 years). All patients wore the two types of maxillary retainer for 1 month each, along with a 3×3 fixed mandibular retainer. After the use of each retainer, the patients responded to a questionnaire evaluating the level of satisfaction with their use of the maxillary retainer. Intergroup comparison was performed by independent *t* tests. Chi-square test was used to evaluate preference for the type of retainer by gender.

Results: The thermoplastic retainer was better for swallowing and the wraparound Hawley appliance was better for hygiene and durability. The other factors evaluated (adaptation, speech, comfort, esthetics, satisfaction, and fitting) did not show significant differences between the retainers. There was also no significant difference in preference for the appliances.

Conclusions: Regarding the overall satisfaction and the preference, there was no difference between the wraparound Hawley and thermoplastic retainers. The wraparound Hawley appliance was better in hygiene and resistance than the thermoplastic retainer; and the thermoplastic appliance was better than the wraparound Hawley for swallowing fluids and saliva. (*Angle Orthod.* 2020;90:63–68.)

KEY WORDS: Orthodontics; Orthodontic retainers; Retention

INTRODUCTION

Retention is the phase of orthodontic treatment that aims to maintain the teeth in the correct position after active treatment and to counteract relapse, which is the natural tendency of the teeth to return to their initial positions, and the normal posttreatment changes that

can also occur as part of a physiologic process of the development of the occlusion.^{1,2} To prevent relapse and these physiological changes, some type of orthodontic retainer is often used. Several forms of retention are mentioned in the literature but, according to systematic reviews, there are no data that scientifically support the clinical choice of one retainer type over another.^{3–5}

The Hawley retainer was originally described by Hawley⁶ in 1919 and is one of the most commonly used retainers after orthodontic treatment. Transparent thermoplastic appliances were recommended for use as temporary retainers, finishing appliances,⁷ and even permanent retention.⁸ They are easy to manufacture, inexpensive, cosmetic, and comfortable and, therefore, have a high level of patient acceptance.⁸ Hawley and thermoplastic retainers are both commonly used after orthodontic treatment. Since the degree of relapse that may occur after fixed appliance therapy will probably not be affected by the choice of retainer, whether thermoplastic or Hawley,^{9,10} it would be interesting to

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Accepted: June 2019. Submitted: March 2019.

Published Online: July 22, 2019

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know which of the two retainers is more widely accepted by patients.

In the initial phase of retention, full-time daily use of appliances is usually indicated.¹¹ Since most maxillary retainers are removable, success in this phase is dependent on the cooperation of the patient. Therefore, the appliance should be as comfortable as possible and the patient must feel satisfied when using it.¹²

A recent randomized controlled trial compared the acceptability of the use of a Hawley retainer and a vacuum-formed retainer and found that both retainers were similar in fitting, biting, and hygiene perception.¹³ According to the patients, the Hawley seemed to be more durable than the vacuum retainer. However, that study compared two different groups of patients and that may have affected the results.

The objective of this study was to compare the level of satisfaction between the use of wraparound Hawley and thermoplastic maxillary retainers in the same group of patients.

MATERIALS AND METHODS

This study was approved by the Ethics in Human Research Committee of the UNINGÁ University Center, Maringá, Brazil (number 71563317.6.0000.5220), and all patients signed informed consent for participation.

The sample size calculation was based on an alpha significance level of 5% (0.05) and a beta of 20% (0.20) to achieve 80% power of the test to detect a minimum difference of 1 degree of satisfaction with standard deviation of 0.78 from a previous pilot study.¹³ The sample size calculation showed the need for 37 individuals. To increase the power, 70 patients were enrolled. The mean age was 20.80 years (standard deviation = 6.57, minimum age = 12.72 years, maximum age = 45.77 years), including 24 males and 46 females.

The sample comprised 70 patients previously treated orthodontically at Dental Office Chagas Ltda ME, Chã Grande, Pernambuco, Brazil, who were in the retention phase. All of them used each of the two types of maxillary retainers evaluated for 1 month each, recommended wear of 24 hours a day and a fixed 3×3 mandibular retainer. To avoid bias, 35 patients first used the wraparound Hawley and then the thermoplastic retainer; and the other 35 patients first used the thermoplastic and then the wraparound Hawley appliance.

All wraparound Hawley appliances were made by the same laboratory technician, who was experienced in this work. The thermoplastic appliances were all made at the Dental Office Chagas Ltda ME, Chã

Grande, Pernambuco, Brazil, by the same operator. The appliances were made according to the following description:

The wraparound Hawley appliance (Figure 1) was first described by Begg¹⁴ in 1965. The retainer is made with 0.7, 0.8, or 0.9 mm stainless steel wire and acrylic resin. In this study, 0.8 mm wire was used. The wire passed along the buccal surfaces of the maxillary incisors and canines halfway vertically on the crowns and there was a simple cervical loop in the region between the canine and the first premolar bilaterally. Posteriorly, the wire continued at a vertical level halfway along the crowns to the first molar and then at the cervical of the second molars until the palatal surface. Acrylic resin retained the wire and covered the palate with approximately 2.5 mm of thickness, covering the cervical of the palatal surfaces of all maxillary teeth up to the second molars.

The thermoplastic retainer appliance (Figure 2) was first described by Ponitz¹⁵ in 1971 and was made of thermoplastic transparent material, 1mm in thickness (Bio-Art, São Carlos, SP, Brazil), vacuum-formed to the arch, covering all the teeth on their buccal, palatal, incisal, and occlusal surfaces.

Questionnaire

During the data collection phase, a closed questionnaire was used to assess the degree of satisfaction of the patient regarding the use of thermoplastic and wraparound Hawley retainers.

The questionnaire was composed of 11 questions as follows:

1. How well were you able to adapt to the appliance?
2. How easy was it to talk with the appliance?
3. How easy was it to swallow fluids and saliva?
4. How was your comfort in use of the appliance, especially related to soft tissues such as gingiva, cheek, and tongue?
5. How easy was it to maintain hygiene of the appliance?
6. What do you think about the esthetics of the appliance?
7. How was your overall satisfaction with use of the appliance?
8. How was the strength and durability of the appliance?
9. How was the fit of the appliance?
10. Which of the two appliances did you prefer?
11. What was the main reason for choosing this appliance?

For questions 1 to 9, the answer was on a scale from 0 to 10, 0 being poor and 10 excellent. For question 10, patients had to choose which of the two retainers was



Figure 1. Wraparound Hawley appliance.

preferred. And in question 11, they explained their choice of appliance, indicating one of the questions from 1 to 9 (questions: 1, adaptation; 2, speech, 3, swallowing, 4, comfort, 5, hygiene, 6, esthetics, 7, satisfaction, 8, durability, 9, fitting).

Statistical Analysis

Normality of data was verified with the Shapiro-Wilk test. For intergroup comparison of the answers to the questionnaire, the independent *t* test was used. Descriptive statistics were calculated and a comparison of proportions was performed to verify if the difference in preference between the appliances was statistically significant. The chi-square test was used to compare the preference of type of retainer between sexes. To determine if age of the patients influenced the level of satisfaction regarding both appliances, a Pearson correlation test was used to evaluate the relationship between the responses to the questionnaire and the age of the patients. The tests were performed with Statistica 7.0 software (StatSoft, Tulsa, Okla, USA) and the results were considered statistically significant at *P* < .05.



Figure 2. Thermoplastic retainer.

Table 1. Results of Intergroup Comparison of the Answers to the Questions (*N* = 70, independent *t* test).

Question	Wraparound Hawley		Thermoplastic		<i>P</i> Value
	Mean	SD	Mean	SD	
1: Adaptation	7.85	2.07	7.97	1.91	.735
2: Speech	7.38	2.05	7.92	2.18	.132
3: Swallowing	7.52	2.32	8.45	1.69	.007*
4: Comfort	8.20	2.22	8.12	2.19	.848
5: Hygiene	9.12	1.41	7.44	2.17	.000*
6: Esthetics	8.50	1.67	8.01	2.33	.159
7: Satisfaction	8.08	2.19	8.17	2.07	.812
8: Durability	8.72	1.70	7.80	1.91	.002*
9: Fitting	8.42	1.74	8.52	1.67	.729

* Statistically significant for *P* < .05.

RESULTS

There were statistically significant differences in the answers to the questions regarding swallowing, hygiene, and durability between the appliances (Table 1). The thermoplastic retainer was better for swallowing than the wraparound Hawley appliance (Table 1). However, the wraparound Hawley appliance was better for hygiene and durability than the thermoplastic retainer (Table 1).

Thirty-seven patients (52.86%) preferred the wrap-around Hawley and 33 (47.14%) patients preferred the thermoplastic appliance. The difference in preference was not statistically significant (*P* = .479). There was no difference in preference regarding the appliance between males and females (Table 2). Of the males, 10 patients (41.67%) preferred the thermoplastic retainer and 14 (58.33%), the wraparound Hawley appliance. Of the females, 27 (58.70%) preferred the wraparound Hawley and 19 (41.30%), the thermoplastic appliance (Table 2). Age of the patients was not correlated to the level of satisfaction in the use of the retainer appliances (Table 3).

For question 11, the motive for choosing one of the appliances, 35.71% answered overall satisfaction, 17.14% comfort, 15.71% esthetics, 10% speech, 8.57% fitting, 5.71% hygiene, 4.28% adaptation, and 1.42% each for durability and swallowing.

DISCUSSION

All of the patients selected for this study used both the wraparound Hawley appliance and the thermoplas-

Table 2. Comparison of the Preference Between Males and Females in Relation to the Types of Retainer (Chi-Square Test)^a

Sex Retention	Males	Females	Total
Wraparound Hawley	10	27	37
Thermoplastic	14	19	33
Total	24	46	70

^a $\chi^2 = 1.83$; *DF* = 1; *P* = .175.

Table 3. Results of Pearson Correlation Test Between the Age of the Patients and the Answers to the Questionnaire

Correlations	r	P Value
Age x question 1	0.164	.173
Age x question 2	0.047	.699
Age x question 3	-0.042	.729
Age x question 4	-0.069	.571
Age x question 5	0.048	.692
Age x question 6	-0.014	.903
Age x question 7	0.048	.689
Age x question 8	0.008	.947
Age x question 9	-0.097	.420
Age x all questions	0.048	.687

tic retainer for a period of 1 month each, as well as a fixed 3×3 mandibular retainer. It was believed that a period of 1 month of use was sufficient for the patient to be able to adapt and evaluate each of the devices in this study with acceptable reliability. It is important for patients to wear comfortable and satisfactory appliances because the retention phase is crucial to the success of treatment.^{16,17}

The fact that both retainers were used by all 70 patients in the sample brings even more reliable results than if two groups were separately evaluated, as was done in a previous study.¹³ The adaptation of the retention appliance in the first two years was shown previously to be better with a vacuum-formed appliance¹⁸ than with a Hawley retainer.¹⁹ However, in this research, there was no significant difference in the adaptation between the thermoplastic and the wrap-around Hawley retainer (Table 1).

Regarding the ease speaking with the appliance in place, there was no statistically significant difference between the thermoplastic and wraparound Hawley appliances (Table 1), in agreement with previous studies.^{20,21} Haydar et al.²⁰ stated that patients display problems in articulation of words with the installation of the retainers but this decreases with time and, on the seventh day, they disappear or reach levels that do not impair speech. However, Wan et al.²¹ stated that, although sound distortion was found in both Hawley and vacuum retainer groups, voice articulation changes were more obvious in the Hawley group.

The thermoplastic retainer was more preferable when swallowing liquids than the wraparound Hawley appliance (Table 1), in agreement with previously published results.¹³

Regarding comfort, the appliances showed similar results (Table 1).²² However, some previous studies found that the thermoplastic retainer was more comfortable than the Hawley and wraparound Hawley appliances.^{13,23} Comfort is extremely important since it was stated by 28% of the patients as the main reason not to wear the retainers.^{18,24} Despite no significant

difference in comfort between the appliances, 17.14% of the patients preferred one of the aforementioned retainer types, based on comfort.

The wraparound Hawley was rated better for maintaining hygiene than the thermoplastic retainer (Table 1). On the other hand, a previous study found similar results for both appliances regarding hygiene.¹³ In that study, Saleh et al.¹³ evaluated two different groups of patients, and that may have influenced the results. Having the same patients evaluating both appliances was likely more reliable than having different subjects due to the individual preferences of each subject.

In terms of esthetics, there are several reports that thermoplastic retainers were considered more esthetic than other removable appliances.^{13,22,23} The present study did not show a statistically significant difference between them (Table 1), in agreement with another study in which the patients did not report much concern with the esthetics of the retainers and the few concerns that were reported were equally distributed between Hawley and thermoplastic appliances.¹⁸

Regarding overall satisfaction and preference for one of the appliances, those outcomes were similar for both of the retainers evaluated in the present study (Table 1). In previous studies, thermoplastic retainers seemed to be the type most preferred by the patients.^{19,22} Despite no significant difference in overall satisfaction between the two retainers, this was the main reason cited by patients (35.71%) for choosing one of the retainers.

Related to durability of the appliances, the wrap-around Hawley showed a greater score than the thermoplastic retainer (Table 1), in agreement with previous studies.^{13,22}

There was no difference in the preference of appliance between the sexes (Table 2) and the age of the patients was not correlated to the level of satisfaction in the use of the retainer appliances (Table 3). Other clinical aspects must be considered in the choice of a removable maxillary retainer.

A previous study evaluating the number of occlusal contacts in centric relation following the use of fixed and removable retainers found that both retention procedures allowed relative vertical movement of the posterior teeth, but the contacts on the posterior segment were increased to a greater extent in the bonded retainer group than in the Hawley and control groups.²⁵ Also, the expected increase in occlusal contacts was not observed in the posttreatment stage with the Essix thermoplastic retainer, since these covered the occlusal surfaces of the teeth.²⁶

The most commonly used retainers reported in the USA among American Association of Orthodontists active members were the maxillary Hawley and

mandibular fixed 3×3.¹¹ Another paper claimed that there is an increased trend for some professionals to favor the thermoplastic retainer.¹⁸ Thermoplastic vacuum-formed retainers have been shown to be more efficient in controlling anterior crowding relapse than the Hawley appliance.²⁷ However, there is not sufficient evidence to support the choice of one of the retainers regarding the ability to prevent relapse.¹⁶ Additional high-quality studies concerning these retainers are necessary to determine which retainer is better for orthodontic use.²⁸

Therefore, in deciding on the type of retainer to be used after treatment with a fixed orthodontic appliance, other factors such as cost, preference of the professional, and patient compliance should play a more important role.⁹ Another factor to be considered in the choice is the release of bisphenol A (BPA) in the saliva coming from these retainers, and thermally-cured retainers such as the Hawley and wraparound Hawley are favorable choices in this case.²⁹

CONCLUSIONS

- The level of overall satisfaction and preference was similar between the wraparound Hawley and thermoplastic retainers.
- The thermoplastic retainer was perceived to be better for swallowing fluids and saliva than the wraparound Hawley appliance.
- The wraparound Hawley appliance was perceived to be better for hygiene and durability than the thermoplastic retainer.

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