

## Retention Procedures And Protocols Which Are Used By The Orthodontists And Assessment of Patient's Compliance with These Retainers.

To cite: Ankita Jangde, Ashish Garg, Rakesh Thukral, Amit Tripathi, Sunita Marothiya

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<sup>1</sup>Ankita Jangde, <sup>2</sup>Ashish Garg, <sup>3</sup>Rakesh Thukral, <sup>4</sup>Amit Tripathi, <sup>5</sup>Sunita Marothiya

<sup>1</sup>Consultant Orthodontist, <sup>2</sup>Professor & Head, <sup>3</sup>Professor, <sup>4-5</sup>Senior lecturer

<sup>1-6</sup>Department of Orthodontics and Dentofacial Orthopedics, Sri Aurobindo College of Dentistry, Indore(M.P.)

### ABSTRACT

**Objective:** To identify the commonly used orthodontic retainers and retention protocols and to assess the patient's compliance and satisfaction with the retainers.

**Method:** A multicentric cross-sectional study was conducted and the study subjects were divided into two groups with the first group consisting of orthodontists of all the Post Graduate institutes of Madhya Pradesh whereas the other group comprised of patients who underwent orthodontic treatment in Post Graduate institutes of Madhya Pradesh. A total of 60 orthodontists and 121 debonded patients under the phase of retention period participated in this questionnaire-based study. A Chi-square test was performed for quantitative variables,  $p \leq 0.05$  was considered statistically significant.

**Result:** Orthodontists recommended lifetime retention for fixed retainers and retention for 1-2 years and lifetime retention for a removable retainer and lifetime retention for fixed lingual appliance after debonding. Orthodontists felt that Hawley type retainer and Thermoplastic Vacuum-formed retainer had an adverse effect on the oral health of the patient. Participants with Hawley's retainer showed maximum satisfaction in the range between 25-75%. The speech was significantly severely affected by Hawley's retainer.

**Conclusion:** A combination of fixed and removable retainers was the most often used in orthodontic retention. Patient's compliance reported with these retainers was good as the majority of patients worn their retainers for full time (24 hours) as instructed by their orthodontist.

**Keywords:** Fixed retainer, Hawley retainer, Retention Protocol, Vacuum formed retainer.

### INTRODUCTION

Retention is a significant part of orthodontic treatment and may impact the long term result of the treatment and the satisfaction level of patients with orthodontic treatment. Retaining the accomplished outcomes is still a challenge for orthodontists regardless of the age of the patient and how the basics of finishing are satisfied.

Orthodontic retention is defined as the phase of treatment that attempts to maintain teeth in their corrected positions after an active orthodontic treatment<sup>1</sup> and it can be separated into retention and post retention stages. The retention stage is considered as a continuation of orthodontic treatment.<sup>2</sup> During the retention stage, the re-organization of periodontal ligament happens over the initial 3 to 4 months<sup>3</sup> whereas the

post retention phase goes until the patient's life during which teeth are exposed to neuromuscular forces, dentoalveolar development, and growth.

Patient compliance may be affected by gender,<sup>4</sup> age,<sup>5</sup> patient satisfaction,<sup>6</sup> appliance comfort, and esthetics<sup>5</sup> and it has been proposed that involving patients in the decision-making process pertaining to retention protocols increases compliance.<sup>6</sup>

Retainers used in orthodontic treatment may be removable such as Hawley type or Essix appliance or fixed to the dentition, such as a bonded wire. To enhance patient compliance with these retainers and stability of treatment results achieved, orthodontists often combine the use of various removable and fixed retainers.<sup>7</sup> A lacuna exists in understanding among the orthodontists, the requirement for any retention, choice of the retainer, or deciding

to what extent retainers ought to be worn after orthodontic treatment. The enormous number of variations in retention methodologies, materials for retention, or individual patient factors can additionally prompt difficulties in deciding the retention system. Retention protocols provide practitioners with recommendations for best practice procedures in orthodontic retention, may reduce variation between practices, and assist with patients' aftercare.<sup>8</sup>

study.

## QUESTIONNAIRE DEVELOPMENT

The development of the questionnaire was carried out to assess the commonly used and most feasible retention procedures and protocols used by the orthodontists. The questionnaire was developed in English and was divided into different domains for both groups with the first part consisting of sociodemographic details. The validation of the questionnaire was done by

**Table 1: Patient satisfaction with the prescribed retainers with respect to appearance**

Type of retainer	How much did you satisfied with the appearance of your retainer?				-value
	25%	5-50%	75%	100%	
Hawley retainer	3		30	8	<b>.001*(s)</b>
Transparent type (Plastic)			10	14	
Fixed Type	1	2	1	13	
Both Fixed + removable	1	0	9	8	

The present study was thus carried out to assess the commonly used and most feasible retention procedures and protocols used by the orthodontists. Additionally, the study also assessed the patient's compliance.

## MATERIALS AND METHOD

The present multicentric cross-sectional study was conducted primarily in the Department of Orthodontics and Dentofacial Orthopedics of our institute with extended 11 other sub-centers of private and government hospitals of Madhya Pradesh.

The study subjects were divided into two groups with the first group consisting of orthodontists of all the Post Graduate institutes of Madhya Pradesh whereas the other group comprised of patients who underwent orthodontic treatment in Post Graduate institutes of Madhya Pradesh. Participants with a master's degree in Orthodontics and currently working as faculty in PG institutes of Madhya Pradesh were included whereas retired or private practitioners were excluded from the first group. Patients aged 15 years and above under the retention phase and underwent fixed orthodontic treatment in PG institute of Madhya Pradesh were included whereas relapse and retreatment cases under the retention period were excluded from the study.

### Sample size estimation:

A list of all the orthodontists working as faculty in postgraduate institutes and patients under the phase of retention of Madhya Pradesh was prepared and the sample size for group A and B comprised of a purposefully selected sample of 60 orthodontists of Madhya Pradesh working as faculty in PG Institutes and 121 debonded patients under the phase of retention. No dropouts were reported in the present

evaluating the content and face validity by presenting the questionnaire to orthodontic experts based on their opinions, the relevant changes were made. The final questionnaire thus comprised 44 questions divided into halves to determine the retention procedures, protocols, and patient's compliance. Reliability was assessed by checking the agreement between the scores at different assessments and no items were deleted.

## DATA COLLECTION

The data collection was carried out by a single investigator by presenting the questionnaire in paper format to all the participants in groups A and B at their respective working and treatment site.

## STATISTICAL ANALYSIS

The data collected was entered in Microsoft Excel and subjected to statistical analysis using Statistical Package for Social Sciences (IBM Corp., Armonk, N.Y., USA Version 20). The level of significance was fixed at 5% and  $p \leq 0.05$  was considered statistically significant. Kolmogorov-Smirnov test and Shapiro-Wilks test were employed to test the normality of data. A Chi-square test was performed for quantitative variables.

## RESULTS

The results are based on an analysis of 60 orthodontists working as faculty in PG institutes and 121 debonded patients under the phase of retention period determining the retention procedures, protocols, and patient's compliance. The mean of the orthodontists in the present study was found to be  $36.18 \pm 6.28$  years whereas the mean of the patients in the present study was found to be  $21.17 \pm 4.27$  years. The majority of the participants in both group A (61.7%) and group B (57%) were females. A greater proportion of the orthodontists was practicing orthodontics for less than 5 years (38.4%) and 5-10 years (33.3%).

Largely (56.7%) orthodontists preferred a combination type of retainer for especially for Class I crowding without extraction

A comparative evaluation of the type of retainers with the satisfaction of appearance revealed a significant difference

**Table 2(a): Patient satisfaction with the prescribed retainers with respect to speech**

Type of retainer	Select one of the following to indicate if your retainer affected your speech?					p-value
	Not at all	Somewhat affected my speech	Severely affected my speech	affected	Do not know if it affected my speech	
Hawley retainer	10	39	12		1	.001*(s)
Transparent type (Plastic)	10	13	1		0	
Fixed Type	13	2	2		0	
Both Fixed + removable	2	13	3		0	

cases (46.7%), Class I crowding with extraction cases (55%), rotation cases (48.3%), anterior open bite cases (53.3%), retaining overjet cases (65%), the intrusion of anterior teeth cases (55%) and extrusion of anterior teeth (48.3%). In cases of expansion of maxillary dental arch Hawley type retainer (46.7%) was preferred whereas in root resorption of anterior teeth Thermoplastic Vacuum-formed retainer (26.7%) and Lingual fixed retainer (26.7%) were equally preferred. Orthodontists recommended lifetime retention for fixed retainers and retention for 1-2 years and lifetime retention for the removable retainer and lifetime retention for fixed lingual appliance after debonding. Orthodontists felt that Hawley type retainer and Thermoplastic Vacuum-formed retainer had an adverse effect on the oral health of the patient.

between the two variables (p-value .001). The majority of participants were fully satisfied with the transparent type of retainers followed by the Fixed Type of retainer. Participants with Hawley's retainer showed maximum satisfaction in the range between 25-75% (Table 1). The speech was significantly severely affected in Hawley's retainer followed by both fixed and removable types of retainers. Participants wearing Hawley's retainer reported significantly higher speech disturbances for a few weeks to few months when compared to other types of retainers (Table 2a,b).

**DISCUSSION**

This cross-sectional study surveyed the opinion of 60 orthodontic faculties working in PG institutes of M.P. regarding

**Table 2(b): Patient satisfaction with the prescribed retainers with respect to speech**

Type of retainer	For how much time you had faced speech problems?				p-value
	Few days	1week	Few weeks to few months	Not at all	
Hawley retainer	18	16	22	6	.001*(s)
Transparent type (Plastic)	14	5	2	3	
Fixed Type	7	0	0	10	
Both Fixed + removable	7	5	5	1	

Hawley retainer (51.2%) was the most common type of retainer provided after the removal of the patient's braces. Patients in the present study were asked to wear the retainer full time (70.2%) for 6- 12 months (40.5%). The majority of the patients in the present study were given a choice of Hawley retainer and the selection of the retainer was based on the doctor's choice. Cost-effectiveness was the second most common reason to choose the appliance. The majority of the patients used to wear the retainers for full time (24 hours) and visited orthodontists only when they faced any problem.

retention protocols followed by them & also surveyed the opinion of 121 posts debonded patients who were under the phase of the retention period and underwent fixed orthodontic treatment in PG institutes of Madhya Pradesh.

The majority of the orthodontic faculties (56.7%) preferred a combination of both removable & fixed type of retainer in most of the treatment cases. Consistent with the results of the present study, a combination of both removable and fixed types of the retainer was most preferred in the United States,<sup>9</sup> Saudi Arab,<sup>10</sup> Lithuania,<sup>11</sup> Dutch.<sup>12</sup> In contrast to our study, the bonded retainer was most preferred in Netherland,<sup>13</sup> Norway,<sup>14</sup> Switzerland,<sup>15</sup> Turkey<sup>16</sup>& Thermoplastic Vacuum-formed retainer was most

preferred in United Kingdom.<sup>17</sup>

Finding from the study conducted in Netherlands<sup>13</sup> correspond to our findings for cases of expansion of maxillary dental arch where Hawley type retainer (46.7%) was most preferred.

The gingival collagen network normally takes 4 months to a half year to rebuild & the supracrestal fibers have a tendency to remain deviated for up to 232 days.<sup>3</sup> So, even when the teeth are held in position post debonding, studies have shown that in the long term, some relapse will take place.<sup>15,18,19</sup> According to the present study lifetime retention as well as retention for one to two years equally preferred for removable retainers and lifetime retention was preferred for fixed lingual retainers after debonding by orthodontists in M.P.

In the present study, orthodontists felt that Hawley type retainer & thermoplastic vacuum formed retainer had an adverse effect on the oral health of patients whereas Hawley's type retainer needed more frequent adjustments, repair, or replacements. Orthodontists in our study felt that lingual fixed retainers helped more in occlusal settling. In contrast to our findings study conducted by Sauget et al<sup>20</sup> and Littlewood et al<sup>1</sup> found that Hawley type retainer allows greater settling of occlusion during the retention period.

Assessment of patient compliance in our study showed that Hawley's retainer being cost-effective was the most common type of retention provided after the removal of braces. 70.2% of patients in the present study were asked to wear the retainers full time for a 6-12 month time period (40.5%). In contrast to our findings studies in Australia and New Zealand, reported more than 2 years time period for retention.<sup>4</sup> Studies in the past have reported no significant difference in the retention of post debonded dentition when the retainer was worn full time or part-time basis.<sup>21</sup>

The majority of the patients (35.5%) in the present study reported some relapse in their maxillary and mandibular teeth after debonding. Previous studies have reported that predominant relapse occurs within the first 5 years post-treatment.<sup>22</sup>

The majority of participants were fully satisfied with the fixed retainer followed by thermoplastic vacuum formed retainer & least satisfied with Hawley type retainer. Kumar & Bansal<sup>23</sup> and Hichens et al<sup>24</sup> also reported that a thermoplastic vacuum formed retainer was more acceptable and caused less embarrassment.

The speech was significantly severely affected in Hawley retainer followed by a combination of removable & fixed retainers. Speech disturbances with Hawley retainer reported higher for few weeks to few months when compared to other

types of retainers. Hichens et al<sup>24</sup> reported also reported interference with speech with the Hawley retainer. Stratton et al<sup>25</sup> explained this interference with speech due to palatal acrylic coverage of the maxillary Hawley retainer & also suggested that reducing the amount of acrylic coverage of the maxillary Hawley retainer on the palate can minimize the interference with speech.

## CONCLUSION

The findings of this study conclude that a combination of fixed & removable retainers was most often used as an orthodontic retainer by orthodontic faculties of Madhya Pradesh in many clinical conditions. Lifetime retention was recommended by most of the orthodontist for both removable and fixed lingual retainer of post debonding. At the retention, period appointments were given at the interval of 2-4 months and less than 50% of patients usually visited for follow up after delivery of retainer. Hawley type and VFR have a more adverse effect on the oral health of patients whereas the most commonly prescribed retainer to the patients after debonding was Hawley type retainer.

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