

Orthodontic retention protocol among Kurdistan Region of Iraq orthodontists

Mahmoud Kanan Mohsin⁽¹⁾, Zana Qadir Omer⁽¹⁾, Rebin Ali Mohammed Amin⁽¹⁾

Background and Objectives: Retention is important stage of orthodontic treatment that preserves teeth in new positions. To make occlusion stable after orthodontic treatment, retention protocol is recommended. There is great variation among orthodontists regarding type, duration and strategies of retention following orthodontic treatment. Therefore, the aim of current survey was to identify the common retention procedures and to evaluate the results with similar studies conducted in different countries.

Patients and methods: thirty five questionnaires in total with 20 questions were sent to all members of the Iraqi Orthodontic Society living in the Kurdistan region- Iraq. 35 orthodontists were responded to questionnaires. The questionnaire represents specific information about socio-demographic status of the respondents, selection of a retention system, details of commonly used retainers, the duration of the retention period, supervision of the retainers, instructions for patients. After receiving of the completed 35 questionnaires, the data were statistically analyzed.

Results: Bonded retainer was the most common retainer for both maxillary (48.57%) and mandibular (65.71%) arches. 28.54% of the orthodontist ended bonded retention within 2 years, while 37% of orthodontists continued retention for more than 2 years. 77.14 % of participants advised to wear the removable appliances on a full-time basis during the first 6 months.

Conclusion: All Orthodontists prescribe retention system. Fixed lingual retainer are the most common retainer among orthodontists. This is comparable to the most common prescribed type of retainers in other countries, but there are differences about duration and follow-up protocols.

Keywords: retention protocols, orthodontic retainers.

⁽¹⁾Department of Pedodontics, Orthodontics and Preventive Dentistry, College of Dentistry, Hawler Medical University, Erbil, Iraqi Kurdistan Region.

Correspondence: Mahmoud Kanan Mohsin, email: mahmoudkanan1987@yahoo.com

Introduction

Orthodontic retention is part of orthodontic treatment that conserves teeth in their new orthodontically improved positions after the end of active orthodontic treatment.¹ The aim of orthodontic retention is to enhance the stability of the dentition following orthodontic treatment.² To reduce or avoid relapse, some kind of retainers is given to every patient who has received orthodontic treatment.³ This is important for effective orthodontic therapy, as it is difficult to predict stability of orthodontically treatment of malocclusion.²

It is a fact that following orthodontic treatment teeth have tendency to move into the previous position.⁴ Relapse have negative effects on patient's time, finances and esthetic concern because it mostly affects anterior teeth and this is undesirable for both the patient and dentist. Orthodontic retainers are prescribed to be worn after orthodontic treatment to hold teeth in their new corrected position.⁵

However, there is no same opinion between the orthodontists regarding the requisite for any retention protocol, selecting the type of retainer or decision about how long retainers should be worn by patient following orthodontic treatment. Wide range of variations in retention strategies, various materials for retention or individual patient factors can make decision about choosing retention protocols more difficult.⁵

Yet, clinical data about preferred retention protocols is inadequate; therefore, the aim of this survey on retention protocols among orthodontists in Kurdistan Region - Iraq, was to identify the common retention procedures and evaluate the results with similar studies conducted in different countries.

Methods

The study was performed through a questionnaire which was sent by paper to the all known orthodontists in Erbil, Duhok and Sulaimanya which are around 42 orthodontists. Among them 35 orthodontists responded to the questionnaires and sent back it. Questionnaire study carried out from July to December 2018 by handing out unnamed paper questionnaires to orthodontists.

The survey questionnaire was established

according to similar studies.^{6,7,8} The questionnaire was divided into three parts. The first part collected information from individual orthodontists. To categorize the respondents into subgroups, several identifiers were included which were age, gender, state of current practice, practical setting and year of graduation of participants to be specialized in orthodontist. The second part included questions about types of retainers that were most popular by participants. The third part involved questions about retention practice, patient's compliance and retention follow up after treatment. Pilot testing of the survey was performed on 10 experienced orthodontists and their comments were reflected in the final edition of the survey.

Statistical Analysis. All statistical analyses were completed using the Statistical Package for Social Sciences (SPSS), version 21.0 (SPSS Inc, Chicago, Illinois, USA). Background information on the individual orthodontist was described in frequencies and the other results in percentages. The level of statistical significance was set at $P < 0.05$.

Results

The majority of the participants were male (80%). More than half of the respondents (54.28%) worked in private clinics and

Table 1: Demographic characteristics of the participants.

Variables	%
Female	20
Male	80
Practice setting	
Private practices	11.42
University practices	11.42
University and private practices	54.28
public practices	2.85
Public + private practices	20
Years in practice	
<10	74.29%
10–20	25.71
>20	No

university, followed by practitioners in private and public clinics (20%). None of respondents had 20 or more years of experience, while 25.71% had an experience of 10–20 years and 74.29% had practiced for 10 years or less (Table 1).

End result status (65.71%), periodontal tissue condition (60%), oral hygiene status (45.71%) and age (40%) were most important factors for decision about selection the type of retention system (Table 2).

Table 2: Percentage of factors affecting decision about type of retainer in percentage.

Factors	%
Pre-treatment situation	37.14
Poor oral hygiene	45.71
Periodontal tissues	60
End result	65.71
Age	40
Gender	14.28
Wish of patient/parents	17.14
Anatomy of teeth	17.14
Myofunctional aspects	37.14
Third molars	14.28
Motivation	31.42
Financial status	14.28

Table 3: Percentages of orthodontists using a special type of retainer in maxilla and mandible .

Appliance Arch	Hawleys and modifications %	Essix retainer %	Bonded retainer %	Essix retainer-bonded retainer %	Hawley-bonded retainer %
Maxilla	25.75	45.71	48.57	34.28	17.42
Mandible	20	34.28	65.71	25.71	11.42

Fixed bonded retainer was most common type of preferred retention system (48.57% in maxilla and 65.71% in mandible), followed by essix retainer (45.71% in maxilla and 34.28% in mandible) (Table 3).

Combination of bonded retainer and Essix retainer was the recommended type of retention by participants following treatment of anterior open bite, posterior crossbite and retreatment cases by (40%, 37.14%, 34.28%) of participants respectively. While bonded retainer alone was the preferred choice for retention in rotation (74.28%), root resorption (71.42%), remaining overjet (65.71%) and removable appliance only was mostly used in extraction cases (45.71%),

adult patient (31.42%) and remaining overjet (31.42%) (Table 4).

Participant's opinion given in regards to the duration of retention for bonded retainers showed a considerable divergence. When bonded retainers were used, 28.57% of the orthodontist ended retention within 2 years, while a greater number of orthodontists (37.14%) continued retention for more than 2 years. 22.85% of orthodontists recommend bonded retainer for life time. The remaining 11.44% of the orthodontists kept the bonded retainer in place until a specific time point, such as extraction of the third molars (2.85%) or end of growth (2.85%) (Table 5).

About 77% of participants advised their patients to wear the removable appliances on a full-time basis during the first 6 months. Between months 6–12 of the retention period, 68.75% of the orthodontists prescribed night time wear with partial

day-time wear, while fewer orthodontists (33.33%) preferred only night-time wear at 6-12 month. After one year of follow-up, 63.63% of the participants recommended only night-time wear (Table 6).

Following debonding, almost two thirds

Table 4: Percentages of orthodontists using a special type of retainer according to different case situation.

Condition	Fixed (%)	Removable (%)	Fixed and removable (%)
Class I crowding without extraction	57.14	20	22.86
Class I crowding with extraction	48.57	45.71	5.71
Closing a diastema in the anterior design	68.57	8.57	22.85
Remaining overjet	65.71	31.42	2.85
Intrusion of the anterior teeth	45.71	28.57	25.71
Extrusion of the anterior teeth	57.14	20	22.86
Posterior cross bite	40	22.86	37.14
Adult patient	54.28	31.42	14.28
Root resorption	71.42	11.42	17.14
Rotations	74.28	5.71	20
Anterior open bite	48.57	11.42	40
Re-treatment	57.14	8.57	34.28

Table 5: Most preferred durations of retention with bonded retainers.

Duration of retainer wear	Fixed retainer (%)
Life time	22.85
Less than 2 years	28.57
2-5 years	37.14
5-10 years	5.74
Until end of growth	2.85
Until the extract of 3rd molars	2.85

Table 6: Percentage of most preferred durations of retention with removable retainers.

Retention time	0-6 months %	6-12 months %	1-3 years %	3< years %
Full time (day and night)	77.14	22.85	0	0
Partial day time- full night time	18.75	68.75	11.42	0
Only night time	0	33.33	63.63	3.03
Certain days of the week	10.34	20.68	17.24	51.72

(42.85%) of the participants reported that they scheduled the first follow-up appointment after 1 to 2 months. With regard to the frequency of the appointments during the retention phase, about 1/5 of the respondents (20%) checked their patients at intervals of 2 to 4 months, whereas fewer orthodontists (11.42%) preferred biannual visits.

77.14% of participants uses canine to canine fixed lingual retainer in upper and 85.71% in lower arch in non-extraction case,

while for extraction case, 60% of orthodontists prefer second premolar to second premolar retention wire in upper and 57.14% in lower followed by 34.28% in upper canine to canine and 40% in lower canine to canine (Table 7).

Also, 42.85% of the orthodontists claimed observing debonding problems due to adhesive problem, 28.57% of respondents reported periodontal disease is main cause for debonding of lingual retainer (Table 8).

Table 7: Percentage of different method of teeth involvement for fixed lingual retainer .

Arch	Maxilla			Mandible		
	Bonding types of fixed retainers	2-2	3-3	4-4	2-2	3-3
Non extraction treatment	8.57%	77.14%	14.28%	2.87%	85.71%	11.42
Extraction treatment	8.42%	34.28%	60%	8.71%	40%	57.14%

Table 8: Percentage of different causes of failure of lingual retainer

Causes of lingual retainer failure	Often	Sometimes	Rarely	Never
Breakage because of wire	26.47	26.47	35.29	5.71
Breakage because of adhesive problem	42.85	45.71	11.42	0
Relapse without a problem of retainer	2.94	32.35	44.11	17.64
Periodontal problem such as gingival problems and dental calculus formation	28.57	40	28.57	2.85

Discussion

The survey shown that end result status, periodontal tissue condition, oral hygiene status and age were most important factors regarding retainer choose. On the other hand, financial support, third molar and gender were merely taken into account. This is compatible with Wong P and Freer TJ⁹, Vandevska-Radunovic et al⁶ and Andriekute et al⁵, but is contrast with Rowland H et al¹⁰, Bibona K et al¹¹ and Lai CS et al.⁶

Regarding role of third molar in selection

of retainer, only 14.28% of orthodontist consider it for choosing retainer, however the presence of third molars was only taken into account by less than 10% of Dutch,³ American,¹² Irish,¹³ and Swiss orthodontists.⁶ It seems most of orthodontist believe that third molar has no important role in re-crowding after orthodontic treatment.

The ideas concerning orthodontic retention system were different. In present study, Bonded retainer was the most commonly

used type of retainer in the maxilla and mandible, closely followed by essix retainer and finally combination of bonded and essix retainer alone. The current study was similar to result of study in Dutch,³ Switzerland⁶ and Turkey.⁷ This is possibly a safety protocol accepted by orthodontists to avoid the workload of retreatment should a bonded retainer fail. While Hawley retainers in the USA¹² and Saudi Arabia¹⁴ and vacuum-formed retainers in the UK,¹⁵ Ireland¹³ and Malaysia¹⁶ were most popular. Also, combination of a fixed and removable retainer (vacuum-formed retainer) was the most common recommended type of retainer in Lithuania⁵ and Norway.⁸

Lifetime retention is reinforced by many literatures representing that some degree of relapse possible even many years after of orthodontic treatment.¹⁷⁻¹⁹ The reason for restricted retention practice for fixed lingual retainer by orthodontists, may be due to the point that patients mostly want for the removing the retainer and note buildup of calculus around retainer wire provided by their general dentist. Also in case of longer retention periods, over time there will be higher number of patients for follow up, so a heavy workload will collect.

Subsequent debonding, near two thirds (42.85%) of the orthodontists informed that they arranged the first follow-up appointment after 1 to 2 months. Concerning the frequency of the appointments during the retention phase, about 1/5 of the orthodontists (20%) checked their patients at intervals of 2 to 4 months, whereas fewer orthodontists (11.42%) recommended two visits per year. In Turkish study, after debonding, most participants (69%) arranged the first retention appointment after 1 to 2 months, whereas 26% of orthodontists preferred the first checkups after 2 to 4 months⁷ In current study, female orthodontists arranged the first appointment after debonding significantly sooner than male consultants.

77.14% of participants prefer canine to canine fixed lingual retainer in upper and 85.71% in lower in non-extraction therapy, however for extraction cases, 60% of orthodontists use second premolar to second premolar retention wire in upper and

57.14% in lower followed by 34.28% in upper canine to canine and 40% in lower canine to canine.

In a study of Andriekute et al., it recommends the most preferred fixed retainer was the retainer bonded to all anterior teeth (canine to canine). 80.2% of orthodontists bonded a fixed retainer in the lower jaw to all six anterior teeth, and 71.6% of them did it in the upper jaw.⁵

Current results are agreed with a study done by Keim et al., which discussed that fixed retainers bonded to all anterior teeth (3-3) particularly in the mandibular arch which were in the ascendant.²⁰

In Dutch³ and Switzerland,⁶ the most commonly used retainers for both types of arches were bonded retainers. Also maxillary invisible retainers and mandibular canine-canine bonded retainers were the retainer of choice of orthodontists in Australia and New Zealand.⁹

Conclusion

All Orthodontists participated in the survey recommend retention protocol. According to the present survey, there are large controversies regarding to duration of retention and timing of scheduled follow up during retention phase.

Final state of occlusion was the most important factor considered for deciding the type of retainer. Orthodontists in Kurdistan Region of Iraq pay less attention to the third molars in their retention protocol comparing to Western countries. Fixed lingual retainers were most common retention protocol among participated orthodontists.

Conflicts of interest

The author reported no conflict of interests.

References

1. Johnston C, Burden D, Morris D. Clinical guidelines: Orthodontic retention. London: Royal College of Surgeons; 2008.
2. Littlewood SJ, Millett DT, Doubleday B, Bearn DR, Worthington HV. Retention procedures for stabilising tooth position after treatment with orthodontic braces. 2006; Cochrane Database Syst Rev (1):CD002283.

3. Renkema AM, Sips ET, Bronkhorst E, Kuijpers-Jagtman AM. A survey on orthodontic retention procedures in The Netherlands. *Eur J Orthod* 2009; 31:432-7.
4. Little RM, Riedel RA, Artun J. An evaluation of changes in mandibular anterior alignment from 10 to 20 years postretention. *Am J Orthod Dentofacial Orthop* 1988; 93 (5):423-8.
5. Alvyda Andriekute, Arunas Vasiliauskas and Antanas Sidlauskas. A survey of protocols and trends in orthodontic retention. *Progr Orthod* 2017; 18:31.
6. Lai CS, Grossen JM, Renkema AM, Bronkhorst E, Fudalej PS, Katsaros C. Orthodontic retention procedures in Switzerland. *Swiss Dent J* 2014; 124(6):655-61.
7. Aylin Paşaoğlu, Işıl Aras, Ali Mert. Survey on Retention Protocols among Turkish Orthodontists. *Turk J Orthod* 2016; 29: 51-8.
8. Vandevska-Radunovic V, Espeland L, Stenvik A. Retention: type, duration and need for common guidelines. A survey of Norwegian orthodontists. *Orthodontics. Progr Orthod* 2017; 18(1):3.
9. Wong PM, Freer TJ. A comprehensive survey of retention procedures in Australia and New Zealand. *Aust Orthod J* 2004; 20:99-106.
10. Rowland H, Hichens L, Williams A, Hills D, Killingback N, Ewings P, et al. The effectiveness of Hawley and vacuum-formed retainers: a single-center randomized controlled trial. *Am J Orthod Dentofacial Orthop* 2007; 132: 730-7.
11. Bibona K, Shroff B, Best AM, Lindauer SJ. Factors affecting orthodontists' management of the retention phase. *Angle Orthod* 2014; 84: 225-30.
12. Pratt MC, Kluemper GT, Hartsfield JK, Jr., Fardo D, Nash DA. Evaluation of retention protocols among members of the American Association of Orthodontists in the United States. *Am J Orthod Dentofacial Orthop* 2011; 140: 520-6.
13. Meade MJ, Millett D. Retention protocols and use of vacuum-formed retainers among specialist orthodontists. *J Orthod* 2013; 40:318-25.
14. Al-Jewair TS, Hamidaddin MA, Alotaibi HM, Alqahtani ND, Albarakati SF, Alkofide EA, et al. Retention practices and factors affecting retainer choice among orthodontists in Saudi Arabia. *Saudi Med J*. 2016; 37(8):895-901.
15. Singh P, Grammati S, Kirschen R. Orthodontic retention patterns in the United Kingdom. *J Orthod* 2009;36(2):115-21.
16. Ab Rahman N, Low TF, Idris NS. A survey on retention practice among orthodontists in Malaysia. *Korean J Orthod*. 2016;46(1):36-41.
17. Lang G, Alfter G, Göz G, Lang GH. Retention and stability--taking various treatment parameters into account. *J Orofac Orthop* 2002; 63: 26-41.
18. Al Yami EA, Kuijpers-Jagtman AM, van 't Hof MA. Stability of orthodontic treatment outcome: follow-up until 10 years postretention. *Am J Orthod Dentofacial Orthop* 1999; 115: 300-4.
19. Little RM. Stability and relapse of mandibular anterior alignment: University of Washington studies. *Semin Orthod* 1999; 5: 191-204.
20. Keim RG, Gottlieb EL, Nelson AH, Vogels DS III. 2008 JCO study of orthodontic diagnosis and treatment procedures, part 1: results and trends. *J Clin Orthod*. 2008;42(11):625-40.