

Retention Phase After Orthodontic Treatment

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ABSTRACT

Background: To evaluate postorthodontic tooth movement with and without retention.

Materials and Methods: Thirty patients participated in the study. At the end of active treatment (T1), final archwires were removed while leaving the fixed appliances on, and alginate impressions were taken. Four weeks later (T2) a second set of impressions was taken. A clinical examination performed at T2 determined if the fixed appliances could be removed or if additional treatment was required.

Results: Mandibular crowding, overjet, and interproximal contacts worsened for the entire sample, while marginal ridges, occlusal contacts, and total American Board of Orthodontics scores improved. No statistically significant changes were found within group I from T1 to T2. Mandibular crowding, overbite, overjet, alignment/rotations, and interproximal contacts worsened within group II from T1 to T2, while marginal ridges and occlusal contacts improved. Significant differences were noted between the groups in terms of alignment/rotations, interproximal contacts, and mandibular inter canine width.

Conclusion: Postorthodontic tooth movement without retainers demonstrated improvement in specific characteristics of the occlusion but negatively affected alignment and interproximal contacts in the sample. Stability of the maxillary anterior alignment 5 years posttreatment did not appear to be influenced by choice of retention protocol. Mandibular anterior alignment was significantly better for the group using a fixed retainer compared with the group where the retainer was removed 3 years posttreatment.

Keywords: Stability, Retention, Relapse, Alignment.

INTRODUCTION

Detrimental prosthodontic tooth movement has challenged orthodontists from time immemorial. In an attempt to prevent such dental changes, orthodontists have developed different philosophies, strategies, and appliances. However, most of these are based on clinical experience that has led to strong convictions rather than compelling scientific evidence.¹ In a recent study it was found that fixed retention strategies are gaining in popularity, and no clinician was found to not retain cases. About 70 years later, a systematic review of

retention procedures² concluded that there is a lack of research on the influence of different retention protocols on posttreatment relapse. Another systematic review³ evaluated the morphologic stability and changes in occlusion at least 5 years posttreatment and reported that few evidence-based conclusions can be made, despite a large number of studies on this subject. Long-term stability after orthodontic treatment has been found to be unpredictable at the individual level³ as growth and dental tissue changes may interfere with an otherwise good treatment result. The rationale behind retention after orthodontic tooth

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Table 1: Outlines the changes in the six continuous variables between the time the archwires were removed and the recall visit (4 weeks later) for all subjects.

Patient no.	Alignment Rotations (T2-T1)	Marginal Ridges (T2-T1)	Bucco-lingual Inclination (T2-T1)	Overjet (T2-T1)	Occlusal Contacts (T2-T1)	(Occlusal Relationshis T2-T1)	Interproximal T2-T1) s T2-T1) Contacts (T2-T1)	Total (T2-T1)
1.	1.19	0.3	1.1	1.2	.3	1.5	1.6	-1.2
2.	0.50	-0.51	-1.3	1.2	1.1	0.3	.9	0.5
3..	0.02	0	1.2	0.4	0.3	0.3	1.3	-1.3
4.	0.13	0.5	0.8	0.4	-1.2	1.3	1.9	1.0
5.	0.39	-1.0	0.9	1.3	-1.1	1.2	0.2	2.0
6.	0.24	-1.5	1.1	0.2	2.0	0.2	0.2	0.1
7.	0.37	-0.5	1.1	0.7	1.2	1.2	0.6	0.9
8.	0.10	-1.5	1.5	0.6	1.9	1.2	0.2	0.2
9.	2.8	0.5	0.9	0.3	1.9	1.4	0.3	0.5
10.	1.9	0.7	0.3	0.4	1.6	1.6	1.0	0.7
11.	-0.4	-1.7	0.5	0.8	1.2	0.2	1.1	1.0
12.	-1.5	1.28	0.9	-1.0	0	1	1.0	0.8
13.	-1.2	2.9	1.2	-1.2	1.2	0.8	1.1	0.7
14.	0.5	3	1.2	-1.2	1.6	0.9	1.3	0.9
15.	0.20	1.9	.2	1.0	2.1	1.2	1.13	1.4
16.	0.3	1.0	.2	1.7	2.0	-1.4	1.2	1.3
17.	0.8	-0.6	.08	-2.8	-1	2.1	-1.3	1.2
18.	1.2	-0.5	-0.8	1.2	0.1	-1.2	1.4	-1.5
19.	1.2	-0.7	-.5	1.0	-.7	-1.2	1.5	-1.5
20.	-0.5	-1.17	-2.8	-1.0	-0.3	-1.3	1.4	3.0
21.	0.2	-1.8	1.1	-1.8	-.6	1.88	1.0	-1.6
22.	-1.5	-1.6	0.8	-1.6	-0.6	2.1	1.3	-1.4
23.	-1.2	0.95	2.3	0.8	-.09	1.9	1.3	-1.4
24.	0.2	-1.1	1.6	0.33	-1.5	1.0	-1.5	-2.2
25.	0.3	.04	1.8	0.22	-1.1	2.0	-1.5	-2.6
26.	0.8	.86	-1.5	0.1	-1.4	-1	-1.6	1.2
27.	1.2	3.18	3.0	0.12	1.4	1.0	-1.8	1.5
28.	1.2	.14	0.3	-1.2	1.3	1.9	2.0	1.3
29.	-0.5	-1.3	1.8	-1.2	1.5	.2	1.3	1.1
30.	-1.4	-.3	2.8	-1.2	1.9	1.6	2.0	0.1

movement is well-known. Research has shown that the periodontal ligament needs 3–4 months to remodel.⁴

The collagenous fiber networks need 4–6 months to reorganize, and the elastic supracrestal fibers may need up to 1 year to settle. Because of these factors, relapse tendency is highest immediately after debonding and in the first 12 months posttreatment.⁵

MATERIALS AND METHODS

All patients treated with fixed MBT appliances in the orthodontic clinic. The study was carried out at Dr. B.R. Ambedkar Dental College, Patna at orthodontic graduate clinic consists of patients who are in the permanent dentition, under the age of 18 years, and are not in need of additional

specialty services. Out of 30 patients 19 were female and 11 were male.

When the end of treatment (T1) was approved by the faculty member overseeing the case, final arch wires were removed and a set of alginate impressions was taken. Four weeks later (T2), a second set of alginate impressions was taken. The patient's occlusion was then compared to the set of models taken 4 weeks earlier (at T1). In the absence of undesirable changes, braces were removed and retainers delivered. If undesirable changes were detected by the supervising orthodontic faculty member, additional treatment was rendered. The faculty member's decision was purely based on his/her clinical assessment. Thus, two groups were formed based on the results of the clinical examination performed at T2. Group I consisted of the 12 individuals who had their braces removed at the recall appointment, and group II

consisted of 8 individuals who required additional treatment. Any removal of fixed retainers at T3 was done because of hygiene issues, breakage, or the patient's wishes. All data were collected by a single operator. The following six measurements were made with a digital caliper to the nearest hundredth of a millimeter on plaster models at pretreatment (T0), T1 (post-active treatment), and T2 (4-week recall): Maxillary crowding: the difference between space available (from first molar to first molar) and space necessary (sum of the mesio-distal dimension of each tooth anterior to the first molar); Mandibular crowding: the difference between space available (from first molar to first molar) and space necessary (sum of the mesio-distal dimension of each tooth anterior to the first molar); Overbite: the vertical overlap of maxillary and mandibular incisors; Overjet: distance from the facial surface of the mandibular central incisors to the facial surface of the maxillary central incisors; Mandibular intercanine width: distance between cusp tips; and Mandibular intermolar width: distance between the mesiobuccal cusp tips.

RESULTS

The final sample consisted of 11 males and 19 females, with an average age of 15.2 and 16.4 years, respectively. Six individuals had extractions, and five had a rapid palatal expander prior to fixed treatment. Subjective clinical exams performed at the recall appointment revealed that 14 patients showed no change or an improvement in their occlusion after 4 weeks without archwires. Their appliances were therefore removed during the follow-up appointment. 18 patients required additional treatment, and maxillary, mandibular, or maxillary and mandibular archwires were reinserted for an average of 62 days.

Subjective clinical exams performed at the recall appointment revealed that 13 patients showed no change or an improvement in their occlusion after 4 weeks without archwires. Their appliances were therefore removed during the follow-up appointment. Seventeen patients required additional treatment, and maxillary, mandibular, or maxillary and mandibular archwires were reinserted for an average of 62 days. One patient received a mandibular spring aligner, and another was given a custom-made positioner. Table

1 outlines the changes in the six continuous variables between the time the archwires were removed and the recall visit (4 weeks later) for all subjects. Across the entire sample, mandibular crowding and overjet were found to be statistically significant.

DISCUSSION

The patients selected for the study included common malocclusion case coming in our day to day practice. 30 Patients with agenesis or extractions in the anterior segment were excluded from this investigation. The results of this study raise several important considerations. Relapse indicates a return to a previous, usually undesirable state. From our preliminary study it is evident that several changes that occur following orthodontic treatment (in the absence of retention) are not undesirable but are in fact welcome and desirable changes. It is interesting to note that seven out of the eight categorical variables showed substantial overall improvement in the short run. Marginal ridges and bucco-lingual inclination scores exhibited stability and/or improvement. Additionally, every patient exhibited some change in at least one variable, reminding us that the human dentition is a dynamic entity. Among the continuous variables, only mandibular crowding and overjet showed a statistically significant change over 4 weeks, a finding that concurs with the literature.^{6,7} The increases in mandibular crowding and overjet, while statistically significant, were small. Such differences can, however, be clinically relevant. It is important to note that the use of mean values masks

CONCLUSIONS

Our study is beneficial to decide the timing of removal the archwires from the posterior teeth a few weeks prior to removing archwires from the anterior teeth. N Beneficial postorthodontic tooth movement occurs in the absence of retention, immediately following completion of active treatment. Across the sample, posttreatment improvements occurred in the occlusion, but negative changes were noted in dental alignment. N A good proportion of the participants did not suffer any negative changes during the observation period.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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