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DOI: 10.2478/aoj-2011-0010

Effectiveness and acceptability of Essix and Begg retainers: a prospective study

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Background: Retainers vary in their effectiveness in maintaining teeth in their treated positions and in their acceptability by patients.

Aims: To compare the effectiveness and acceptability of Essix and Begg retainers.

Methods: Two hundred and twenty-four patients were randomly assigned to receive either upper and lower Essix or upper and lower Begg retainers. Subject acceptability was evaluated with seven questions related to chewing and biting, fit, speech, appearance, oral hygiene, comfort and maintenance recorded on a 10-point visual analogue scale. The effectiveness of the retainers to maintain alignment was assessed on study models taken on the day after debonding (T1), after three months retention (T2) and six months retention (T3) with the Peer Assessment Rating (PAR) and Irregularity Index (II). In addition to the upper and lower retainers, all subjects had bonded lower lingual retainers placed at the end of active treatment.

Results: There were small, but statistically significant, deteriorations in the PAR scores in both groups at T2 and T3. The T2-T1 and T3-T1 differences between the groups were statistically significant (Begg > Essix), but the differences did not exceed 2 points. For the Irregularity Index, the T3-T1 difference was statistically significant (Begg > Essix), but clinically insignificant as the difference was only 0.25 points. Subjects preferred the Begg retainer for chewing and biting ($p = 0.000$), and liked the appearance ($p = 0.000$) and comfort ($p = 0.05$) of the Essix retainers. The subjects in both groups reported both retainers had an acceptable fit.

Conclusions: More subjects wearing Essix retainers considered their retainers were comfortable and had an acceptable appearance than subjects wearing Begg retainers, and more subjects with Begg retainers considered that their retainers were acceptable for biting and chewing than the subjects wearing Essix retainers. Both retainers allowed some relapse of teeth post-treatment, but the 6-month differences were small and may not be clinically significant.

(Aust Orthod J 2011; 52–56)

Received for publication: February 2010
Accepted: May 2010

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Introduction

Retainers are routinely fitted at the end of active orthodontic treatment to allow the teeth to adjust to their new positions.[1,2] Frequently used appliances are the Hawley retainer, lingual bonded retainers, wrap-around or Begg retainers and the recently introduced Essix retainer. Begg retainers lack clasps and rely on close contact between the wire labial bow and acrylic baseplate for retention. They tend to become loose over a period of time and allow the teeth to shift. The visible wire labial bow may make the appearance of the retainer less acceptable to patients.

Vacuum-formed retainers, such as the Essix, are claimed to be aesthetic, comfortable and inexpensive alternatives to traditional orthodontic retainers.[3] These appliances are thermoformed from a thin plastic sheet material and are less bulky than traditional acrylic retainers. Thermoformed retainers are considered to be more effective than Hawley retainers for retaining the overjet and overbite and alignment of the incisors.[4] This study was designed to compare the effectiveness and acceptability of Essix and Begg retainers over six months.

Materials and methods

This prospective study was conducted in the Department of Orthodontics and Dentofacial Orthopedics, College of Dental Sciences, Davangere, India. Ethical approval was obtained from the institution, and the subjects were treated by postgraduate students in the department.

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Figure 1. Maxillary and mandibular Begg retainers.

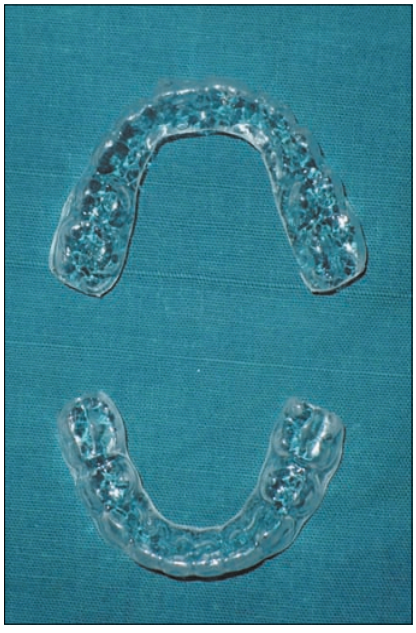

Figure 2. Maxillary and mandibular Essix retainers.

Subjects who were due to have their fixed orthodontic appliances removed were assessed and included in the study providing they met the following criteria: they had received fixed appliance treatment in both arches; only preadjusted edgewise appliances were used for treatment and they were willing to wear maxillary and mandibular retainers. Two hundred and twenty-four patients met the inclusion criteria and were randomly allocated to receive either an Essix or a Begg retainer. Each group had 112 subjects.

The retainers were fabricated to standardised designs. Upper and lower Begg retainers were constructed with acrylic baseplates and labial bows made of 0.9 mm stainless steel wire. The labial bows had U loops opposite the premolars and extended past the last erupted molars (Figure 1). Upper and lower Essix retainers[5] were thermoformed using Essix 1.5 mm A+ sheet (Raintree Essix, New Orleans, LA, USA) and trimmed to provide 2 mm buccal and 3–4 mm lingual extensions. The Essix retainer covered the occlusal surfaces up to and including the most distal molars (Figure 2). The retainers were fitted on the day the subjects were debonded. The subjects were instructed to wear both retainers 24 hours per day for the first six months and 12 hours per day (night time wear) for the next six months, to eat with the retainers in place and remove the retainers after eating for cleaning. Lower lingual retainers, extending from canine to canine, made from coaxial wire were bonded in all subjects.

Subject acceptance was evaluated three months after fitting the retainers, using a 10-point visual analogue scale.[6] The subjects were given oral instructions and explanations on how to complete the questionnaires, which contained questions on chewing and biting, fitting of the appliance, speech, appearance, oral hygiene, comfort and maintenance. The subjects were asked to score each question according to how the words at the extremes expressed how they felt. The lowest (least favourable) score was '1' and the highest (most favourable) score was '10'. For example, if the retainer was very uncomfortable it was scored as '1' and if it was very comfortable, as '10'.

Occlusal stability was assessed with the Peer Assessment Rating (PAR) and lower incisor crowding with the Irregularity index (II) on study models taken on the day after debonding (T1), after 3 months retention (T2) and after 6 months retention (T3).[7,8]

Statistical analysis

The Wilcoxon test was used to compare the relapse from T1 to T3 in the groups. The Mann-Whitney U test was used to compare the occlusal indices and

Table I. PAR scores for Essix and Begg retainers.

Retainer		T1	T2	T3	Difference (T2-T1)	Difference (T3-T1)
Essix	Mean ± SD	5.88 ± 2.71	6.58 ± 2.84	6.67 ± 2.80	0.71 ± 0.54	0.79 ± 0.54
	*p**	-	-	-	**0.007**	**0.006**
Begg	Mean ± SD	7.54 ± 3.60	9.33 ± 4.09	10.04 ± 4.11	1.79 ± 1.34	2.50 ± 1.35
	*p**	-	-	-	**0.005**	**0.002**
Essix vs Begg	Mean ± SD	-	-	-	1.08	1.71
	*p**	-	-	-	**0.05**	**0.004**

* Wilcoxon signed rank test, significant values in bold

Table II. Irregularity Index scores for Essix and Begg retainers.

Retainer		T1	T2	T3	Difference (T2-T1)	Difference (T3-T1)
Essix	Mean ± SD	0.46 ± 0.39	0.53 ± 0.44	0.58 ± 0.46	0.08 ± 0.11	0.12 ± 0.12
	*p**	-	-	-	**0.041**	**0.017**
Begg	Mean ± SD	0.33 ± 0.23	0.52 ± 0.40	0.69 ± 0.45	0.19 ± 0.26	0.37 ± 0.29
	*p**	-	-	-	**0.026**	**0.005**
Essix vs Begg	Mean ± SD	-	-	-	1.12	0.25
	p	-	-	-	**0.41**	**0.02**

* Wilcoxon signed rank test, significant values in bold

the acceptability of the Essix and Begg retainers. A p value of 0.05 or less was considered to be significant.

Results

Occlusal stability

The mean changes in the PAR scores after three months of retention (T2-T1) was 0.71 ± 0.54 in the Essix group and 1.79 ± 1.34 in the Begg group (Table I). The mean difference in the PAR scores over six months was 0.79 ± 0.54 in the Essix group and 2.50 ± 1.35 in the Begg group. The mean differences (T2-T1 and T3-T1) in the PAR scores were significantly larger in the Begg group compared with the Essix group.

In spite of the bonded lower retainers, the alignment of the lower incisors deteriorated steadily in both groups, but did not exceed 1 mm (Table II) of displacement. When the group changes T2-T1 and T3-T1 were compared, only the 6-month difference was statistically significant (p = 0.02). The irregularity of the lower incisors in the Begg group increased 0.25 mm more than the incisor irregularity in the Essix group.

Questionnaire analysis

The subjects in the Begg group scored their retainers more highly (Mean score: 9) for chewing and biting than the subjects in the Essix group (Mean score: 2.4; p = 0.000). The subjects in the Essix group scored the appearance and comfort of their retainers more highly than the subjects in the Begg group (Table III). The subjects in both groups considered the fit of their retainers was acceptable. The differences in scores between the two groups in terms of maintaining oral hygiene, maintenance of the appliance and effect on speech, were not statistically significant.

Discussion

The effectiveness of Essix and Begg retainers to maintain treated alignment and occlusion after orthodontic treatment was compared, along with subject acceptance of both retainers. The subjects were asked to complete their questionnaires after three months and reviewed after six months because most patients were expected to still be wearing their retainers as directed. Although there were small, but statistically significant, deteriorations in the PAR scores in both

Table III. Acceptability of Essix and Begg retainers.

Question	Essix			Begg			Essix vs Begg
	Mean	Median	Range	Mean	Median	Range	*p**
Chewing and biting	2.4	2	2-3	9.0	9	8-10	**0.000**
Fit	7.9	8	7-9	7.8	8	5-9	0.89
Speech	8.3	9	5-10	7.9	8	6-9	0.35
Appearance	8.9	9	8-10	4.5	4	3-7	**0.000**
Oral hygiene	8.3	9	6-9	8.2	8	6-9	0.59
Comfort	8.4	8.5	7-10	6.9	8	3-9	**0.05**
Maintenance	8.6	9	8-9	7.5	7.5	5-9	0.06

* Mann-Whitney U test, significant values in bold

retainer groups, the differences did not exceed 2 points. The subjects assigned to the Begg retainer group scored their retainers highly for their ability to chew and bite, whereas the subjects assigned to the Essix group preferred the appearance and comfort of their retainers. The subjects in both groups reported that their retainers fitted satisfactorily. Although the Begg retainers provided excellent retention and no occlusal interferences, the retainers required regular supervision and adjustment of the labial wire.

It has been reported that Essix retainers are as efficient as either bonded or Hawley retainers.[3] However, if the occlusion requires settling during retention, the Hawley-type appliance has been suggested as the retainer of choice because it allows more vertical movement of the posterior teeth and its labial wire may be adjusted to correct minor irregularities.[9] Although each case was finished so that minimal/no settling of the occlusion was necessary, small occlusal changes occurred.

Although both groups had identical bonded lower retainers and lower removable retainers, the irregularity of the mandibular incisors increased statistically significantly in both groups. However, the six-month findings were not considered clinically significant. Lindauer and Shoff conducted a study of Hawley and Essix retainers and similarly reported increased lower incisor irregularity in both retainer groups, although their findings did not reach statistical significance.[3] Subsequently, bonded lower lingual retainers have been found to provide excellent long-term retention with no damage to the teeth and/or hard and soft tissues adjacent to the affixed wire.[10–12]

Most of the deterioration in the PAR scores occurred in the first three months of retainer wear and was found to be greater in the Begg group compared with the Essix group; 1.79 ± 1.34 points and 0.71 ± 0.54 points, respectively. However, the Begg group had a slightly higher, but not statistically significant, PAR score at T1 than the Essix group, which may indicate that the Begg group had more severe initial malocclusions and/or were less well finished than the Essix group. The greater change in the PAR scores of the two retainer groups occurred between T2 and T3. Essix retainers are made to closely fit the teeth and maintain small corrections that Begg retainers are unable to achieve, because the teeth are held by the labial wire and acrylic baseplate.[1,5] If the labial wire is deformed during normal wear and/or repeated removal of the appliance, the teeth are free to move. The Begg retainer is, however, easily adjusted and modified to achieve small corrections, whereas the Essix is less easily modified and usually has to be remade.

Subjects wearing the Essix retainers found biting and chewing food difficult, presumably because the appliances covered the occlusal surfaces and the incisal edges of the teeth. These problems were not reported by subjects wearing Begg retainers. Both groups considered their retainers fitted well, did not interfere with speech, and were easy to clean and maintain. Speech was not usually altered if only one removable retainer was worn, and any distortion in speech was reported as temporary.[13] However, each subject only experienced one type of retainer and was therefore unable to make comparisons which may have produced an alternative result.

Not surprisingly, the subjects in the Essix group were pleased with the appearance of their retainers (Range of scores: 8–10). The labial wire of the Begg retainers

was visible and a number of subjects expressed mild dissatisfaction (Range of scores: 3–7). However, thermoplastic retainers such as the Essix have demonstrated poor wear resistance and durability after only a few months of use and may need to be replaced. This reduces their cost-effectiveness.[14] The Essix group considered their retainers were comfortable (Range: 7–10), whereas the responses from the Begg group were more variable (Range: 3–9). The closely adapted Essix retainer was less likely to cause discomfort than the acrylic and wire components of the Begg retainer, and if a retainer was comfortable it was more likely to be worn.[15]

Conclusions

The present study evaluated the effectiveness and acceptability of Essix and Begg retainers. There were small, but statistically significant, differences in the effectiveness of both retainers in maintaining the occlusion for six months. The occlusal changes and differences may not be clinically significant.

The subjects wearing Essix retainers were more pleased with the appearance and comfort of their retainers compared with the subjects wearing Begg retainers.

The subjects in the Begg group preferred their retainers for chewing and biting, whereas the subjects wearing Essix retainers were dissatisfied with the functional capabilities of their retainers.

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