

Original Article

A comparative study of treatment outcomes between begg and edgewise orthodontic systems in class I cases

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ABSTRACT

Background: The purpose of this study was to compare the occlusal peer assessment rating (PAR) index in Class I patients treated by means of Begg and Edgewise methods.

Materials and Methods: The pre- and post-treatment study models of Class I patients, referred to two private clinics, treated with Begg method ($n = 30$) and standard Edgewise method ($n = 30$), were reviewed retrospectively using PAR index including dental displacements, buccal occlusion (anteroposterior, vertical and transverse), overjet, overbite and midline parameters. The changes in PAR indices were analyzed using paired *t*-test. A $P < 0.05$ was considered as statistically significant.

Results: There was no significant difference in sex and age distribution between the two groups. The improvement of buccal occlusion in patients treated by Begg method (1.51 ± 0.39) was significantly higher than that of patients treated by Edgewise method (0.28 ± 0.39). The duration of treatment in Begg method (17.8 ± 1.3 months) was significantly shorter than that of Edgewise method (23.7 ± 1.3 months). However, there were no significant differences between the two methods in terms of total PAR index, dental displacements, overjet, overbite and midline.

Conclusion: In conclusion, findings of the present study indicated that Begg method might be associated with better improvement of buccal occlusion and shorter duration of treatment

Key Words: Begg, edgewise, peer assessment rating

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INTRODUCTION

Orthodontic patients are often treated by Edgewise or less commonly Begg methods. These two methods are different in terms of bracket type, placement of wire inside brackets and treatment stages. In the Edgewise method with horizontal slots, which was introduced by Angle,^[1] a cube case with 3 walls of 0.028×0.022 inches is placed horizontally. This type of bracket creates more accurate tooth movement and more effective

torque.^[2] Edgewise method, however, suffers from mesial movement of posterior teeth and anchorage loss. This issue prompted Begg to design a bracket of ribbon arch type in a way that bracket slot size could be changed by locking pins, so that it could accept 0.016-0.020 inch wires.^[3]

Previous studies have compared the two methods from various aspects. It was shown that while both methods restrict mandibular growth, Begg method is more successful in reducing saddle-nasion-A point (SNA) and A point, nasion, B point angles probably because of palatal root movement of upper anterior teeth.^[4,5] Furthermore, Begg methods did lead to a greater improvement of the inclination of lower incisors.^[6] Both methods were associated with labial inclination of lower incisors, whereas Begg method resulted in lingual inclination of upper incisors.^[7] To the best of our knowledge, standard Edgewise and Begg methods have not

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been compared using peer assessment rating (PAR) index in the literature. However, the only published study that has compared pre-adjusted Edgewise and Begg methods using PAR index concluded that pre-adjusted Edgewise method was associated with more reduction of PAR index.^[8] PAR index is an occlusal index that measures how much a patient deviates from normal occlusion and quantitatively evaluates orthodontic outcome by comparing the score given to pre- and post-treatment study models.^[9,10] PAR index was shown to be a reliable index in the assessment of orthodontic treatment outcomes^[9-12] and to have a close relation with the index of complexity, outcome and need.^[13]

A comparison of Edgewise and Begg methods using PAR index might be valuable in showing the appropriate method. Therefore, present study aimed to compare these two methods using PAR index.

MATERIALS AND METHODS

In this retrospective study, pre- and post-orthodontic treatment study models of 30 patients with Class I malocclusion treated by one clinician using the standard Edgewise method (0.018 slot dimension; Dentarum, Germany) and 30 Class I patients treated by another clinician using Begg method (Dentarum, Germany) were randomly obtained from two orthodontic clinics. Class I malocclusion was defined by pre-treatment Class I first molar relationship. Skeletal relations and growth patterns were not taken into consideration in the study design. Orthodontic treatment of all cases was over within mid-2001 to mid-2002.

Pre- and post-treatment study models were prepared by a single dental technician in each clinic. Post-treatment study models were prepared in debonding session. Impression by Alginate (dust free alginate, Golchai, Iran) and casting by orthodontic plaster (papidur, dentarum/synthetic stone plaster/white) was accomplished and measurements were done by orthometer (Nachprof, Dr. Korkhaus, Seitz and Haas, Giessen/Lahn). The orthodontic treatment outcomes were evaluated by an examiner "blind" to the treatment method using PAR index. PAR index measures several components of occlusion, which are then summed to obtain an overall score.^[14]

In this study, for the 1st time, in addition to total PAR index, each component of PAR index was compared

between these two groups. Briefly, the index scores were buccal occlusion of anteroposterior, vertical and transverse dimension, overjet, overbite and midline [Table 1].^[8] In order to evaluate intraexaminer reliability, pre- and post-treatment study models of seven cases in each group were randomly scored for the second time by the same examiner with a 2 weeks interval. Since, the two study groups were matched regarding the age and gender; paired *t*-test was used for the statistical analyses of the mean decrease of PAR indices of the Begg and Edgewise groups and also for the comparison of the mean decrease of each component of PAR index between the two groups. α was set at 0.05 below which statistical significance was implied.

RESULTS

There was no significant difference between the age of patients in Begg (14.4 ± 4.79) and Edgewise (15.37 ± 3.48) groups at the beginning of the orthodontic treatment. PAR index in Begg group prior to treatment ranged from 14 to 37 and those of Edgewise group ranged from 17 to 37. Only in one patient of the Begg group, the PAR was out of the range, which was excluded from the study.

Dental displacement in maxilla

There was no significant difference in the improvement of dental displacement in the maxilla between Begg (8.23 ± 0.67) and Edgewise (6.89 ± 0.68) groups using paired *t*-test ($df = 57$; 95% confidence interval [CI] = ± 0.24).

Dental displacement in mandible

There was no significant difference in improvement of dental displacement in mandible between Begg (5.92 ± 0.85) and Edgewise (8.01 ± 0.87) groups using paired *t*-test ($df = 57$; CI = ± 0.31).

Table 1: Simplified sample of PAR index scoring chart showing the main components of the index

Branch of PAR index	Scores
Dental displacement	0-5
Buccal occlusion	
Anteroposterior	0-2
Vertical	0-1
Transverse	0-4
Overjet	0-4
Overbite	0-4
Midline	0-2
Total	Sum

PAR: Peer assessment rate

Buccal occlusion

Improvement of buccal occlusion in patients using Begg method (1.51 ± 0.39) was significantly higher ($P = 0.039$) than those in patients using the Edgewise method (0.28 ± 0.39) [Figure 1] using paired *t*-test ($df = 57$; $CI = \pm 0.14$).

Overjet

Overjet reduction in Begg group (1.77 ± 0.23) was not significantly different from that of Edgewise group (1.52 ± 0.23) using paired *t*-test ($df = 57$; $CI = \pm 0.08$).

Overbite

There was no significant difference in overbite reduction between Begg and Edgewise groups (0.1 ± 0.17 vs. 0.28 ± 0.18) using paired *t*-test ($df = 57$; $CI = \pm 0.06$).

Midline

Correction of midline deviation in Begg group was 0.264 ± 0.8 , which was not significantly different from that of Edgewise group (0.155 ± 0.8) using paired *t*-test ($df = 57$; $CI = \pm 0.29$).

Total PAR index

There was no significant difference between total reduction of PAR index in Begg method (17.7 ± 1.2) and Edgewise method (17.1 ± 1.3) using paired *t*-test ($df = 57$; $CI = \pm 0.44$).

Duration of treatment (measured from the treatment outset to debonding)

The Begg method (17.8 ± 1.3 months) was significantly less than that of Edgewise method (23.7 ± 1.3 months) [Figure 2] using paired *t*-test ($df = 57$; $CI = \pm 0.47$).

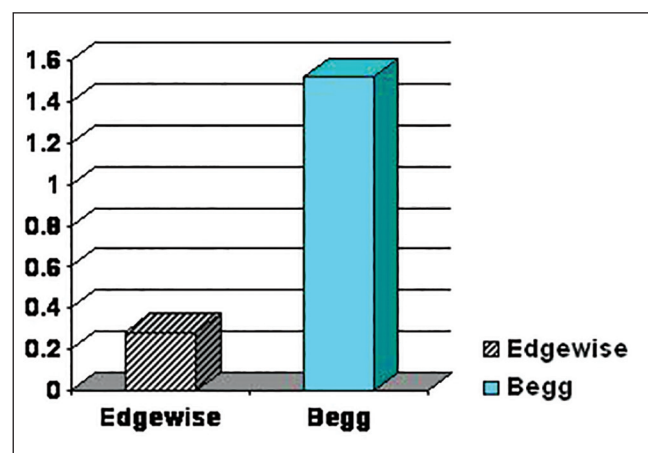


Figure 1: Comparative illustration of the mean reduction (improvement) of buccal occlusion in Begg and Edgewise methods. The mean reduction of buccal occlusion in patients using Begg method (1.51 ± 0.39) was significantly higher than those in patients using Edgewise method (0.28 ± 0.39)

DISCUSSION

The present study showed that the duration of orthodontic treatment in Begg method was significantly shorter than that of Edgewise method. It also showed that the improvement of buccal occlusion was significantly higher in Begg method than that of Edgewise method. Moreover, the study failed to show any significant difference in terms of dental displacement, overjet, overbite and midline between the two groups.

The duration of orthodontic treatment was shown to be shorter in Begg method than that of Edgewise method. To the best of our knowledge, no previous studies have actually compared Begg and Edgewise method in terms of treatment duration. Shorter treatment duration in Begg method might be due to the tipping movement which occurs faster than other movements such as bodily or torque movements. This finding is in agreement with the suggestion that Begg method is a fairly rapid procedure.^[15] The longer treatment duration can result in root resorption, decalcification and caries.^[16-25] Due to a shorter duration, the Begg method might be preferable because it does not accompany such side effects.

The study showed that the improvement of buccal occlusion was significantly higher in Begg method than Edgewise. Better buccal occlusion in Begg method might be due to one point contact of the bracket and wire. One point contact allows free movement of the tooth crown into normal position, but not roots. However, the finding should be interpreted in the light that PAR index evaluates only occlusion and does not

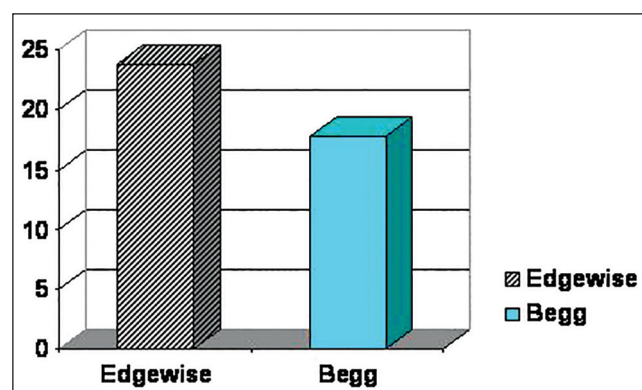


Figure 2: Comparative illustration of the mean treatment duration by Begg and Edgewise methods. Measured from the treatment outset to debonding, the duration of treatment in Begg method (17.8 ± 1.3 months) was significantly less than that of Edgewise method (23.7 ± 1.3 months)

assess the cephalometric features of a malocclusion and treatment (for example tooth angulation and inclination).^[9] A better buccal occlusion, which minimizes orthodontic relapse, increases occlusal stability and prevents the appearance of occlusal pathologies, has been widely considered as a goal for orthodontic treatment.^[26,27] Instability of occlusion might lead to the shift of condyles, which may be associated with temporomandibular disorder.^[28,29]

This study failed to show a significant difference in terms of overjet between the two groups. Our findings are consistent with the previous studies indicating that Begg method^[4] or Edgewise method^[5] is associated with overjet reduction. Whereas some studies have reported that in Begg method upper incisor retroclination, lower incisor proclination and reducing SNA angle could reduce overjet.^[4] However, the limitation of maxillary growth, anterior reposition of chin and increase of mandibular length were suggested to underlie the reduction of overjet by Edgewise method. Such differences might be related to the differences in sample selection.

The two methods were not significantly different in terms of overbite reduction. In agreement with the present study, Papaioannou-Maragou and Papaioannou^[7] showed that both methods were associated with the increase in lower facial height. However, the findings of the present study do not confirm the speed of bite opening as an advantage for Begg method.^[30]

There was no significant difference in total PAR index between Begg and Edgewise methods. The only similar study,^[8] which compared treatment outcomes by Begg and pre-adjusted Edgewise system, showed that PAR reduction in pre-adjusted Edgewise group was significantly more than that of Begg method. The different findings of the two studies might be due to bracket prescription, clinician's experience and sample harmony. Bracket prescription in pre-adjusted Edgewise could result in better occlusal outcomes than in standard Edgewise. Moreover, clinician's experience might influence treatment outcomes. In Buchanan *et al.*^[8] study, samples were recruited from two clinics in which treatment methods changed from Begg to pre-adjusted Edgewise. However, the clinicians performing the present study were using a single method for years. Whether or not the differences in clinicians' experiences could make a difference in the studies is a matter of speculation.

Samples in the present study were more harmonious due to the selection of a certain range of pre-treatment PAR index, whereas those in Buchanan *et al.*^[8] study were selected from patients with a wider range of PAR index. The main limitation of the present study was that the two groups were examined and treated by two different clinicians.

CONCLUSION

The findings of the present study indicated that Begg method might be associated with a better outcome and less complications, which might be attributed to higher improvement of buccal occlusion and shorter duration of treatment.

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