Clinical Evaluation of Self Ligating Versus Conventional Ligating Preadjusted Edgewise Brackets- A Prospective Clinical Study

Thapa A¹, Datana S², Agarwal SS³, Jayan B⁴, Chopra SS⁵, Bhandari SK⁶

¹Lucknow (India); ²Associate Professor, Department of Orthodontics & Dentofacial Orthopedics, Armed Forces Medical College, Pune (India); ³Assistant Professor, Department of Orthodontics & Dentofacial Orthopedics, Armed Forces Medical College, Pune (India); ⁴Bangalore (India); ⁵Professor, Department of Orthodontics & Dentofacial Orthopedics, Armed Forces Medical College, Pune (India); ⁶Professor, Department of Oral and Maxillofacial Surgery, Armed Forces Medical College, Pune (India)

ABSTRACT

Objective: The prospective study was taken up with null hypothesis that there is no difference clinically in treatment efficiency and gingival condition before start of treatment & twelve months after bonding in SLB and CLB system. Materials and Methods: This clinical study include 30 patients, divided into two groups of 15 each were included in the present study. Intraoral photos and study models taken at pre-treatment (T0), 5 weeks (T1), 10 weeks (T2) and 15 weeks (T3). Initial alignment was assessed by using the Little irregularity index (LII) in the mandibular anterior teeth. The subjects were also examined for bleeding potential of the tissues by using Gingival Index (GI). Results: The mean initial irregularity (MII) score for SLB T0, T5, T10 and T15 was 5.867, 2.252, 0.516 and 0.039. MII score for CLB T0, T5, T10 and T15 was 6.000, 3.630, 1.589 and 0.327. A two sample t-test revealed gap of 4.02% was statistically significant (T= 2.80, 0.012). This data suggests that total alignment change of mandibular arch from T 0 to T 15 was better in SLB compared to CLB group. The mean increase of GI with SLB system was 0.183 while for CLB were equal to 0.98. This difference of GI between SLB and CLB before and after twelve months of bonding was statistically significant (T= -2.96, P value=0.010). Conclusion: The present study could facilitate the orthodontist to compare the potential benefits of SLB over the CLB system that facilitate less gingival bleeding and increase in alignment efficiency.
INTRODUCTION
Brackets incorporating their own ligation system have existed for a long time in orthodontics. To reduce friction and improve efficiency of the appliance, several modification have been made in conventional appliance however most successful noted in SLB [1]. The first, ‘Russell Lock’ edgewise attachment was described in 1935 [2]. Recent designs harness the combination of two other claimed advantages of this type of bracket – low friction [3-4] and archwire engagement which is secure and complete [5]. The self-ligating bracket was introduced to create a friction-free environment, with the belief that it will allow for better sliding mechanics; as the teeth move more rapidly and treatment time is decreased [6]. The basic premise of the self-ligating bracket is that the closing or opening mechanism of the bracket turns the bracket slot into a tube that passively or actively contains the wire. In the absence of wire or elastomeric ties, presumably frictional resistance is dramatically reduced and faster tooth movement occurs [7]. Self-ligation eliminates the requirement for an elastomeric attachment and is associated with considerable reduced friction with different archwires [8]. It is also claimed that self-ligating brackets promote reduced retention of oral cariogenic bacteria during the orthodontic treatment and so it is claimed to be more hygienic than conventional bracket system [9].

Self-ligating brackets system claims that placement of archwire easier and frictional forces are minimal - an advantage when sliding mechanics are used [10, 11, and 12]. The efficacy of appliance can be assessed by assessing the time in reduction of crowding in mandibular arch by using Little’s irregularity index [13]. Therefore, a prospective study was carried out to evaluate the difference in clinical efficiency between self-ligating brackets and conventional ligating preadjusted edgewise brackets.

The following study was taken up with null hypothesis that there is no difference clinically in treatment efficiency and gingival condition before start of treatment and twelve months after bonding in SLB (Self Ligating Bracket) and CLB (Conventional Ligating Bracket) system.

MATERIAL & METHODS
This multidisciplinary study was conducted at the Department of Orthodontics and Dentofacial Orthopedics of a tertiary care Dental establishment. The study populations of 30 patients requiring fixed Orthodontic therapy were selected from Out Patient Department of the Institute. The study sample was divided into two groups based on the random number allocated to the selected subjects. Group 1 consisted of 15 patients who received fixed Orthodontic treatment with self-ligating preadjusted bracket system (Damon 3M/Unitek, Monrovia, CA, USA) and Group 2 consisted of 15 patients who received treatment with a conventional ligating preadjusted edgewise bracket system (Ortho Organisers). Similar oral hygiene and appliance maintenance instructions were given to both groups. The sample size was calculated using previous references with α = 0.05 and statistical power close to 0.8 [14]. The research protocol described in this article was reviewed and approved by the Institutional Ethical Committee. Informed consent was taken from all patients at the time of enrolment after each patient was explained the nature and purpose of the study.

The individuals included in the study had permanent dentition with Class I malocclusion, undergone orthodontic treatment for the first time, a minimum irregularity of 3 mm in the mandibular anterior region, ability to maintain adequate oral health. Exclusion criteria were subjects with previous history of orthodontic treatment, known compromised medical condition, those using mouth rinses or interacting medications (including antibiotic therapy within 3 months before study, patients with cleft lip and palate or severe skeletal dysgnathia, patients requiring intermaxillary or other intraoral/extraoral appliances including lip bumpers, treatment requiring extractions,
impacted or unerupted permanent teeth anterior to the first molars and ectopic canines, patients requiring adjuncts for fixed appliance therapy, maxillary expansion appliances or headgear.

**METHOD OF INITIAL ALIGNMENT BETWEEN SELF-LIGATING AND CONVENTIONAL LIGATING PREADJUSTED EDGEWISE BRACKET SYSTEM**

30 patients, divided into two groups of 15 each were included in the present study. Group I (n=15) received a self ligating bracket and group II (n=15) received a conventional ligating preadjusted edgewise appliance. Patients were taken after they fulfilled the inclusion and exclusion criteria. Intraoral photos and study models taken at pre-treatment (T0), 5 weeks (T1), 10 weeks (T2) and 15 weeks (T3). Bonding with 0.022 x 0.028-in SLB (Ortho Organisers, CA, United States) and 0.022 x 0.028-in CLB system was done in selected groups. Direct bonding was done by using same light cured bonding agent by same operator. Initial arch wire of 0.014-inch Damon Copper Ni-Ti (Ormco) was placed to each selected patient. All patients were reviewed every three weeks. The initial aligning archwire was left in place until the teeth are passively engaged in all bracket slots before proceeding to second arch wire. Initial orthodontic alignment was assessed by using the Little irregularity index (LII) in the mandibular anterior teeth [13]. The scoring method was done by measuring the linear displacement of anatomic contact points of each mandibular incisor from adjacent tooth anatomic point, the sum of these five displacement was calculated which indicate the relative degree of anterior irregularity. A measurement was accomplished by using Vernier caliper (Dentauram, Germany), and was held parallel to the occlusal plane thereby ensuring the recording of only horizontal displacement. Each of the five measurements was obtained directly from the mandibular casts at the time interval of T0wks, T1 (5wks), T2 (10wks) and T3 (15wks).

**GINGIVAL INDEX (GI)**

**Method**

The subjects were kept in dental chair with sufficient illumination and use mouth mirror along with William graduated probe was done for recording GI. The teeth and gingiva were dried lightly with a blast of air from a three way syringe for each selected patient. The tissues surrounding each tooth were divided into four gingival scoring units: distal-facial papilla, facial margin, mesial-facial papilla, entire lingual gingival margin. The Periodontal William graduated probe was lightly passed over the above mentioned surfaces. Bleeding potential of the tissues was assessed before and one year after bonding and the calculation was done and each of the four gingival units was assessed according to the criteria mentioned in GI [15].

**RESULTS**

The present study was performed to compare the treatment efficiency between self ligating preadjusted edgewise brackets and conventional ligating preadjusted edgewise brackets for initial alignment of mandibular anterior teeth and gingival bleeding. The data pertaining to all the objectives were compiled on MS excel work sheet.

**Statistical analysis**

The statistical analysis of all the parameters was performed using statistical software MINITAB 1513. For all comparison within the group paired ‘t’ test was carried out and for comparison in between two groups, samples ‘t’ test was used. Box plot display the minimum value by end of the lower whisker and the maximum value by the end of upper whisker. The lower end of the box represents the first quartile, middle line of the box represents the median and upper edge represents the third quartile. Mean values are plotted by solid circle within the box. Asterix above and below the box represents low and high observation unusually.

**ASSESSMENT OF GINGIVAL INDEX IN BETWEEN SLB AND CLB GROUP**
Mean of gingival index in SLB system (pre-bonding) was 0.599 while for SLB system (post-bonding) was equal to 0.782. This increase was statistically significant ($T = -3.50$, $P = 0.004$). The data suggest that gingival bleeding for group bonded with SLB appliance after twelve months is significantly more as compared to pre-bonding stage.

Mean of gingival index in CLB system (pre-bonding) was 1.616 while for CLB (post-bonding) equal to 2.600. This difference was statistically highly significant ($T = -3.17$, $P = 0.002$). The data suggest that gingival bleeding associated for group bonded with CLB appliance after twelve months was significantly high when compared to pre-bonding stage.

The mean increase of gingival index with respect to group with SLB system was 0.183 while for group with CLB were equal to 0.98. This difference of gingival index between SLB and CLB before and after twelve months of bonding was statistically significant ($T = -2.96$, $P = 0.010$). The data suggest that gingival bleeding associated for group bonded with CLB appliance after twelve months was significantly more as compared to SLB (Fig. 1).

**COMPARISON OF TREATMENT EFFICIENCY BETWEEN SLB AND CLB SYSTEM**

The mean initial irregularity score with respect to SLB (T0) was 5.867 and mean irregularity score for SLB after 5 weeks (T5) was equal to 2.252 (Table 1a). This decrease of irregularity between T (0) and T (5) interval was statistically significant ($T = 14.13$, $P = 0.0001$). The data suggests that there was significant alignment change from T (0) to T (5) in SLB group.

The mean alignment score with respect to SLB (10) was 0.516 while for SLB (15) equal to 0.039 (Table 1c). This decrease of irregularity between T (10) and T (15) interval was statistically significant ($T = 4.33$, $P = 0.001$). The data suggests that there was significant alignment change from T (10) to T (15) in SLB group.

The mean alignment score with respect to CLB (T0) was 6.000 while for CLB (T5) equal to 3.630. This decrease of irregularity between T (0) and T (5) interval was statistically significant ($T = 10.92$, $P = 0.0001$) (Table 2a). The data suggests that there was significant alignment change from T (0) to T (5) in CLB group.

The mean alignment score with respect to CLB (T5) was 3.630 while for CLB (T10) equal to 1.589 (Table 2b). This decrease of irregularity between T (5) and T (10) interval was statistically significant ($T = 7.47$, $P = 0.0001$). The data suggests that there was significant alignment change from T (5) to T (10) in CLB group.

The mean alignment score with respect to CLB (10) was 1.589 while for CLB (15) equal to 0.327 (Table 2c). This decrease of irregularity between T (10) and T (15) interval was statistically significant ($T = 8.26$, $P = 0.0001$). The data suggests that there was significant alignment change from T (10) to T (15) in CLB group.

The mean initial irregularity at T (0) with respect to SLB was 5.87 while for CLB were equal to 6.00. This mean initial irregularity score between SLB and CLB at the start of treatment (T0) was statistically non-significant ($T = -0.20$, $P = 0.840$). Since the baseline values are comparable, further comparisons are based on period values.

The mean alignment score at the end of 5 weeks (T5) with respect to SLB was 2.252 while for CLB was equal to 3.63. This difference of alignment between SLB and CLB at the end of 5 weeks was statistically significant ($T = -3.04$, $P = 0.006$). The data suggests that
the alignment of mandibular arch for this time interval was better in SLB compared to CLB. The mean alignment score at the end of 10 weeks (T10) with respect to SLB was 0.516 while for CLB equal to 1.589 (Table III). This difference of alignment between SLB and CLB at the end of 10 weeks was statistically significant (T= -4.07, P value= 0.001). The data suggests that the alignment of mandibular arch for this time interval was better in SLB compared to CLB. The mean alignment score at the end of 15 weeks (T15) with respect to SLB was 0.039 while for CLB equal to 0.327 (Table IV). This difference of alignment between SLB and CLB at the end of 15 weeks was statistically significant (T= -2.72, P value= 0.016). The data suggests that the alignment of mandibular arch for this time interval was better in SLB compared to CLB. For SLB, total % change was 99.32 whereas the corresponding total % changes for CLB equal to 95.30 (Table V). A two sample t-test revealed this gap of 4.02% was statistically significant (T= 2.80, 0.012). The data suggests that total alignment change of mandibular arch from T 0 to T 15 was better in SLB compared to CLB group (Fig. 2).

![Gingival index](image1)

Fig 1: Comparison of Gingival index in SLB and CLB before and after twelve months of bonding (means are indicated by solid circles)

![Total percentage change](image2)

Fig 2: Comparison of total percentage change in initial alignment of mandibular arch in SLB and CLB (means are indicated by solid circles)
Table 1: Comparison of mean alignment scores in mandibular arch by SLB at different time intervals

### Table 1a. Comparison of mean alignment scores in mandibular arch by SLB from T0 to T5 interval.

<table>
<thead>
<tr>
<th>Alignment (Weeks)</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE Mean</th>
<th>p Value</th>
<th>T Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLB T (0)</td>
<td>15</td>
<td>5.867</td>
<td>1.356</td>
<td>0.350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLB T (5)</td>
<td>15</td>
<td>2.252</td>
<td>0.967</td>
<td>0.250</td>
<td>0.0001</td>
<td>14.13</td>
</tr>
</tbody>
</table>

95% CI for mean difference: (3.066, 4.163)
T-Test of mean difference = 0 (vs not = 0)

### Table 1b. Comparison of mean alignment scores in mandibular arch by SLB from T5 to T10 interval.

<table>
<thead>
<tr>
<th>Alignment (Weeks)</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE Mean</th>
<th>p Value</th>
<th>T Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLB T (5)</td>
<td>15</td>
<td>2.252</td>
<td>0.967</td>
<td>0.250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLB T (10)</td>
<td>15</td>
<td>0.516</td>
<td>0.495</td>
<td>0.128</td>
<td>0.0001</td>
<td>10.42</td>
</tr>
</tbody>
</table>

95% CI for mean difference: (1.379, 2.093)
T-Test of mean difference = 0 (vs not = 0)

### Table 1c. Comparison of mean alignment scores in mandibular arch by SLB from T10 to T15 interval.

<table>
<thead>
<tr>
<th>Alignment (Weeks)</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE Mean</th>
<th>p Value</th>
<th>T Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLB T (10)</td>
<td>15</td>
<td>0.516</td>
<td>0.495</td>
<td>0.128</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLB T (15)</td>
<td>15</td>
<td>0.039</td>
<td>0.103</td>
<td>0.027</td>
<td>0.001</td>
<td>4.33</td>
</tr>
</tbody>
</table>

95% CI for mean difference: (0.241, 0.714)
T-Test of mean difference = 0 (vs not = 0)

Table 2: Comparison of mean alignment scores in mandibular arch by CLB at different time intervals

### Table 2a. Comparison of mean alignment scores in mandibular arch by CLB from T0 to T5 interval. (Valued scaled to 10^5)

<table>
<thead>
<tr>
<th>Alignment (Weeks)</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE Mean</th>
<th>p Value</th>
<th>T Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLB T (0)</td>
<td>15</td>
<td>6.000</td>
<td>2.138</td>
<td>0.552</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLB T (5)</td>
<td>15</td>
<td>3.360</td>
<td>1.468</td>
<td>0.379</td>
<td>0.0001</td>
<td>10.92</td>
</tr>
</tbody>
</table>

95% CI for mean difference: (1.905, 2.835)
T-Test of mean difference = 0 (vs not = 0)

### Table 2b. Comparison of mean alignment scores in mandibular arch by CLB from T5 to T10 interval.

<table>
<thead>
<tr>
<th>Real time (PCR)</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE Mean</th>
<th>p Value</th>
<th>T Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLB</td>
<td>15</td>
<td>3.360</td>
<td>1.468</td>
<td>0.379</td>
<td>0.0001</td>
<td>7.47</td>
</tr>
<tr>
<td>CLB</td>
<td>15</td>
<td>1.589</td>
<td>0.893</td>
<td>0.230</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% CI for mean difference: (1.455, 2.628)
T-Test of mean difference = 0 (vs not = 0)

### Table 2c. Comparison of mean alignment scores in mandibular arch by CLB from T10 to T15 interval.

<table>
<thead>
<tr>
<th>Agar</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE Mean</th>
<th>p Value</th>
<th>T Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLB (Pre-bonding)</td>
<td>15</td>
<td>1.598</td>
<td>0.893</td>
<td>0.230</td>
<td>0.0001</td>
<td>8.26</td>
</tr>
<tr>
<td>SLB (Post-bonding)</td>
<td>15</td>
<td>0.327</td>
<td>0.397</td>
<td>0.153</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

95% CI for mean difference: (0.934, 1.589)
T-Test of mean difference = 0 (vs not = 0)

Table III: Comparison of mean alignment scores in mandibular arch by Two-sample T-test in SLB and CLB from T10 to T10 interval.

<table>
<thead>
<tr>
<th>Alignment (Weeks)</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE Mean</th>
<th>p Value</th>
<th>T Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLB T (10)</td>
<td>15</td>
<td>0.516</td>
<td>0.495</td>
<td>0.13</td>
<td>0.001</td>
<td>-4.07</td>
</tr>
<tr>
<td>CLB T (10)</td>
<td>15</td>
<td>1.589</td>
<td>0.893</td>
<td>0.23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Difference—Initial alignment for SLB T(10)—Initial alignment for CLB T(10)
Estimate for difference: -1.073
95% CI for difference: (-1.621, -0.525)
T-Test of difference = 0 (vs not = 0)
Table IV: Comparison of mean alignment score in mandibular arch by Two-sample T-test in SLB and CLB from T 15 to T 15 interval.

<table>
<thead>
<tr>
<th>Alignment (Weeks)</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE Mean</th>
<th>p Value</th>
<th>T Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLB T (15)</td>
<td>15</td>
<td>0.039</td>
<td>0.103</td>
<td>0.027</td>
<td>0.016</td>
<td>-2.72</td>
</tr>
<tr>
<td>CLB T (15)</td>
<td>15</td>
<td>0.327</td>
<td>0.397</td>
<td>0.10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Difference = Initial alignment for SLB (15) – Initial alignment for CLB (15)
Estimate for difference: -0.289
95% CI for difference: (-0.514, -0.063)
T-Test of difference = 0 (vs not = 0)

Table V: Comparison of total percentage change in alignment of mandibular arch by Two-sample T-test in SLB and CLB

<table>
<thead>
<tr>
<th>Alignment (Total % change)</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE Mean</th>
<th>p Value</th>
<th>T Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLB (% change)</td>
<td>15</td>
<td>99.32</td>
<td>1.88</td>
<td>0.49</td>
<td>0.012</td>
<td>2.80</td>
</tr>
<tr>
<td>CLB (% change)</td>
<td>15</td>
<td>95.30</td>
<td>5.23</td>
<td>1.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Difference = Initial alignment for SLB (total %CHG) – Initial alignment for CLB (total %CHG)
Estimate for difference: 4.02
95% CI for difference: (0.99, 7.05)
T-Test of difference = 0 (vs not = 0)

DISCUSSION

Self-ligating brackets concept in orthodontics can be traced back several decades. Harradine reports that the concept of self-ligation is as old as that of the edgewise bracket itself [1]. Self-ligating brackets were introduced in clinical practice to replace the existing conventional ligation methods with elastomeric and stainless steel ligatures for improving clinical efficacy [15]. When using preadjusted edgewise brackets, important factors in determining the rate of tooth alignment include the bracket slot dimension, the associated interbracket span, and the choice of archwire [16]. Frictional forces generated between bracket and archwire also have a significant effect on tooth movement [17]. Friction is influenced by the physical characteristics of the archwire and bracket materials, and the method of attachment between archwire and bracket [18]. Conventional ligated edgewise brackets incur increased levels of frictional resistance via the elastomeric attachment between bracket and archwire [19]. To reduce unwanted friction, various self-ligating bracket systems have been developed. Self-ligation eliminates the requirement for an elastomeric attachment and is associated with considerably reduced friction with different archwires [20]. Self-ligating brackets may also offer more certain archwire engagement, a requirement for less chair-side assistance and faster archwire removal and ligation [21]. Significantly, an overall reduction in treatment time has been associated with these appliances [22]; however, this is not necessarily associated with more rapid tooth alignment [23]. During fixed orthodontic treatment pathologic changes in patients treated with fixed orthodontic appliances have been reported as mostly gingivitis, gingival bleeding, gingival enlargement and increased periodontal pocket depth. The method of ligation is an additional factor to be taken into account for microbial dental plaque retention. However, few studies have evaluated the effect of the ligation method [24].

This present study was designed to clinically evaluate and compare the treatment efficiency, gingival condition before the start of treatment and twelve months after bonding in order to reach near to the conclusion whether projected hypothesis was true or not.
ASSESSMENT OF EFFECT OF TWO LIGATION SYSTEM IN TREATMENT EFFICIENCY

Mandibular lower anterior crowding was selected as a model for examining the efficiency of brackets because correction of this discrepancy largely depends on the “free play” or clearance of the archwire inside the slot walls. Although canine retraction with sliding mechanics is the basic scenario when free play is the dominant mechanotherapy, this model has some fundamental difficulties when a research design is considered. These include the necessity for adjustment of the rate of movement between the 2 groups, the requirement for estimation of the pre and post movement condition, and the assessment of the relative efficiency of the appliances. On the other hand, alleviation of crowding is a treatment process in which both initial and final stages can be quantitatively determined with the irregularity index, and measurements can be made regardless of tooth inclinations or rotations, as opposed to retracting canines, where these 2 parameters can interfere with the assessment of crown spatial orientation.

One of the objectives of present study was to evaluate the efficiency of SLB and CLB system by comparing their total time taken while relieving the lower anterior arch irregularity. The results of the present study showed that treatment duration for correction of irregularity for time interval T0-T1, T1-T2, T2-T3 and T3-T4 and total percentage change is comparatively less for SLB than CLB group [Table V]. The results of the present study are similar to clinical studies done by Eberting et al [17], where they reported decreased total treatment times and fewer appointments for patients treated with Damon SL brackets. Miles and Fleming et al also reported reduction of irregularity at various times of alignment with SLB brackets [25].

Contrary to the findings of the present study, Miles et al did not find any significant differences when they prospectively compared Damon SL and Smart Clip SL with Victory Series CL brackets during initial alignment. Despite these findings, it has been suggested that SL brackets might provide benefits for extraction patients during initial alignment or space closure [23]. Pandis et al. investigated in vitro the duration of mandibular crowding alleviation with SLB (Damon 2) compared with conventional appliances (Microarch) and the accompanying dental effects. They recruited 54 patients with no spaces in the mandibular permanent dentition and with a LII score greater than 2. All patients were treated non-extraction and the time for alignment was estimated in days. Lateral cephalometric radiographs were used to assess mandibular incisor position in pre and post alignment stages. They observed that, in general, there was no difference in the time needed to correct mandibular crowding either with Damon 2 or with conventional brackets (Microarch) during the initial aligning and leveling stage. However, for irregularity index less than 5, the Damon 2 brackets aligned the teeth 2.7 times faster than the other bracket type in a crowded mandibular arch. For greater crowding with a LII score of more than 5, they found that for every irregularity index unit, treatment was prolonged by an additional 20 percent regardless of bracket type. In addition, they found a statistically greater intermolar width increase in the Damon 2 group. Proclination of the incisors was observed but there was no difference for this parameter between either bracket types. In that study, crowding alleviation showed a higher percentage with CLB (98 per cent) compared with SLB (67 per cent) [24].

Orthodontic appliance system that has the potential to significantly reduce treatment duration has a clear advantage for both the patient and orthodontist. There is some evidence that use of the Damon self-ligated bracket system can reduce the total length of orthodontic treatment by up to 6 months and number of visits by 4 to 7 [26]. However, retrospective studies mentioned above were
both potentially subjected to bias. The effect of confounding factors might have been considerable because the selection criteria were not well detailed, the pre-treatment characteristics of the sample were not tested for equivalence, and clinical variables such as archwire sequences were different in each bracket group [27]. In the present study, the same initial wire sequence were used as done by Scott et al, which included 0.014-in and 0.014 x 0.025-in copper-nickel-titanium archwires in the Damon arch form [23].

In the present study, the effect of brushing, only right handed patients were included in present study. Another strong point was the inclusion and exclusion criteria that enabled control over certain clinical variables such as archwire sequence and type, inter-appointment interval and bracket composition. In the present study an endeavour to minimize the confounding factors so that the critical difference between the treatment groups was the method of ligation.

ASSESSMENT OF GINGIVAL BLEEDING IN TWO LIGATION SYSTEM

One of the objectives was to evaluate the effect of SLB and CLB bracket system on gingival bleeding. Assessment was done before bonding and one year after bonding by the same observer to prevent inter-observer difference. The present study has shown that association of gingival bleeding was more with group bonded with CLB than SLB bracket system (Fig. 1).

The results of present study are similar to many other studies where increase in bleeding on probing was observed. Increase in bleeding on probing was also reported in study done by Huser and co-workers and Liu H et al [29].

Souza et al found that elastomeric rings were associated with higher scores for bleeding on probing and plaque index than with steel ligatures [30]. Contrary to the present study, Turkkahraman et al found no significant differences in gingival and plaque index values between steel and elastic ligatures. However, they reported that teeth ligated with elastomeric rings were more prone to bleeding [31].

CONCLUSIONS

The null hypothesis of the present study was ‘there is no difference between the number of visits of patients treated with self-ligating brackets and conventional ligating preadjusted edgewise brackets for initial alignment of mandibular anterior teeth and gingival condition by using Gingival Index between self-ligating preadjusted edgewise bracket system and conventional ligating preadjusted edgewise brackets. The null hypothesis was rejected. The initial alignment efficiency of mandibular anterior teeth was significantly greater for patients treated with self-ligating brackets compared to conventional ligating brackets system. The present study indicated that the self-ligating bracket system was associated with statistically less gingival bleeding compared to conventional ligating preadjusted edgewise bracket system.

REFERENCES


