A Comparison of Effect of Regular Laceback Technique and Its Modification on Anchorage Loss

Chairat Charoemratrote. Chidchanok Leethanakul *Suthatip Jongbundan***

Abstract

Objective: *To compare the effect of laceback ligatures and its modification on anchorage loss in MBT™ system during leveling and aligning phase.*

Materials and Methods: *Twenty adolescents patients, requiring extraction of upper first premolars, were received two different laceback techniques on either right or left side in the upper arch by random selection. Regular laceback ligature wire size 0.010" was tied in a figure of 8 from upper second molar tube to canine bracket on one side. The opposite side, modified laceback ligature wire was tied from upper second molar to upper canine as well but with two twists, first, mesial to the second premolar and second, mesial to the canine bracket. All of teeth will be bracketed with MBT™ brackets. Each patient went through the same arch wire sequence of 0.016" HANT, 0.019"x0.025" HANT and 0.019"x0.025" SS. The arch wire was bended immediately behind the second molar tube. The lateral cephalogram and impression were taken immediately after appliances placement and after leveling and aligning phase. The amounts of the movement and the rotation of maxillary first molar and second premolar were determined form study model. The angulation of maxillary first molar, second premolar, canine and incisor were determined form cephalogram. The changes of teeth movement, angulation and rotation between regular and modified laceback were compared using pair t-test.*

Results: *The maxillary first molar in regular laceback group were statistically significant moved mesially more than the movement in modified laceback group (0.69 ± 0.29 mm and 0.49 ± 0.23 mm respectively). The maxillary second premolar in regular laceback group were statistically significant moved mesially more than the movement in modified laceback group (1.04 ± 0.42 mm and 0.59 ± 0.25 mm respectively). In the modified laceback group, the difference between mesial movement of the second premolar and first molar was 0.1 ± 0.42 mm and in the regular laceback group was 0.35 ± 0.45 mm, there was statistically significant (p = 0.035).*

Conclusion: *The modified laceback technique creates a statistically significant decreased in the loss of posterior anchorage compared with regular laceback technique.*

Keywords: *Laceback technique, Anchorage*

** Orthodontic section, Department of Preventive, Faculty of Dentistry, Prince of Songkla University, Thailand.*
***Dental section, Samutprakan Hospital, Thailand*

Introduction

One of the major disadvantages of incorporating second order values into the pre-adjusted edgewise bracket system, was it created stress on anchorage in the initial stages of treatment.[1] The tip was greater in the upper canine brackets that increased the tendency for the labial segment tip forward and created a significant drain on antero-posterior anchorage. McLaughlin and Bennett suggested lacebacks and bendbacks to control canine angulation and incisor proclination during leveling and aligning phase.[2] Lacebacks, 0.009 or 0.010" soft stainless steel wire passively tied in a figure of 8 from the most distally incorporated molar to the canine bracket, minimized forward tipping of the canine crowns. Bendbacks, bending the archwire back immediately behind the most distal banded or bonded molar, were used to minimize forward tipping of the incisors.

McLaughlin *et al* introduced the MBT^{TM} system, which the brackets were designed to provide enough torque and tip to the teeth to allow them to assume the correct inclination and angulation.[3] During leveling and aligning phase, they suggested the use of lacebacks and bendbacks to control canine angulation and support posterior anchorage. Usmani *et al.* examined the effectiveness of canine lacebacks for pre-adjusted edgewise appliance. There was no statistically significant difference between groups for mesial movement of upper first molars ($p = 0.99$).[4] However, a mean mesial movement of right upper first molars in the laceback group of 0.40 $\pm$ 1.66 mm was more than the non-laceback group of 0.15 $\pm$ 1.63 mm. Irvine *et al.* evaluated the effects of laceback ligatures for 3M Unitek Dyna Lock pre-adjusted edgewise brackets (Andrews values for tip and torque). They found that the lower first molars showed 0.75 mm greater mesial movement in the experimental group, which was statistically significant ($p=0.05$). [5]

These demonstrate that the use of laceback ligature creates an increased in the loss of posterior anchorage. Our possible explanation is this may depends on laceback techniques which passively tied in a figure of 8 from the first molar to the canine bracket, did not tie the wire from the first molar to the second premolar to incorporated posterior anchorage unit. There is no recent study evaluate the effects of laceback ligatures on the anchorage loss for the MBT^{TM} system.

Materials and methods

A sample of 20 patients was randomly selected from the new patient pool at the postgraduate orthodontic clinic, Prince of Songkla University. The inclusion criteria for the study were as follows;

1. Age 18 - 30 years at the start of treatment
2. Good general health and periodontal status
3. Patients required the removal of first premolars in upper (and/or lower) arches as a part of their orthodontic treatment.
4. All of teeth (central incisor to second molar) in maxillary arch were presented.
5. Symmetrical molar relationship class I or class II $\leq$ 2 mm
6. Upper posterior teeth present good alignment, no rotation.
7. No impacted third molar

The exclusion criteria for the study are as follows;

1. Patients with oral manifestations of diseases (e.g., cysts) or chronic debilitating disease or on medication.
2. Patient who miss an appointment (routinely at 4-week intervals).
3. Broken appliances during the study.

All patients and their parent(s) were advised of the purpose of this study. The patients and parents or guardians signed a consent form.

Trial in study model

The laceback ligatures were performed by one operator. The reproducibility of passively laceback placements were performed using the study model, bracketing with MBT™ bracket 0.022" slot (3M-Unitek,USA) on the buccal segment. Each laceback ligature was tightened with Spencer-Wells clip. The operator was right handed. The trial in study model shown that the tip of wires should hold together at 2 mm. from mesial side of canine bracket, then twisted 4 turns to create a knot closed to mesial side of canine bracket. The laceback ligatures were tight and passive.

Clinical management

After premolar extraction for at least 7 days, stainless steel direct-bonding MBT™ bracket 0.022" slot (3M-Unitek, USA) were used in all patients. Each patient was received two different laceback techniques on either right or left side in the upper arch by random selection. The regular laceback technique used 0.010" stainless steel ligature wire, ligature wire was tied in a figure of 8 from upper second molar tube to canine bracket on one side. (Figure 1)

The opposite side, the modified laceback technique, ligature wire was tied from upper second molar to upper canine as well but with two twists, first, mesial to the second premolar and second, mesial to the canine bracket. (Figure 2)

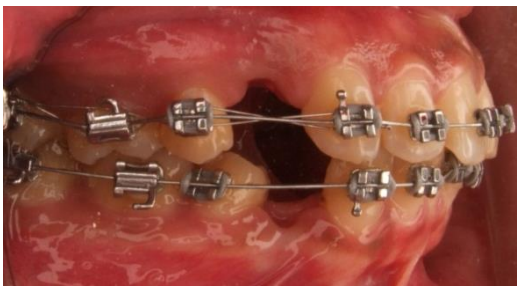

Figure 1 Regular laceback technique: Laceback ligature wire was tied in a figure of 8 from upper second molar tube to canine bracket.

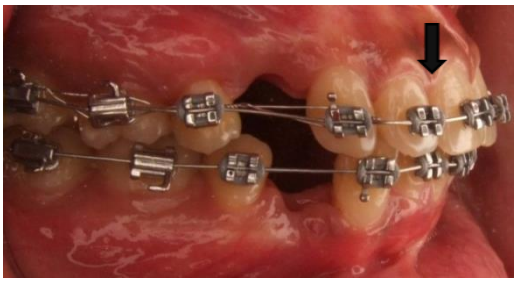

Figure 2 Modified laceback technique: Laceback ligature wire co-ligated upper second molar to upper second premolar together then extended the wire tied at mesial of canine bracket, created a knot closed to mesial side of second premolar (arrow) and canine bracket.

Each patient went through the same arch wire sequence of 0.016" HANT, 0.019x0.025" HANT and 0.019x0.025" SS. The arch wire was bended immediately behind the second molar tube. The initial records (lateral cephalogram and impression) were taken immediately after appliances were fixed (T0) Canine lacebacks were replaced at each appointment. Patients were recalled for routine reviews at regular intervals of 4 weeks. The final records (lateral cephalogram and impression) were taken after leveling and aligning phase (T1).

Determining distance of maxillary first molar, second premolar and canine movement

Measurements were performed by direct-technique from stone casts obtained before and at the end of the experimental periods with metal-tipped calipers. To measure the movement of each first molar, second premolar and canine, an acrylic palatal plug was made for each maxillary arch. (Figure 3) The plug was selected because the anterior palatal vault could be used as a stable reference point.[6] The plug was fabricated from acrylic with reference wires (0.018-inch stainless steel) embedded in the acrylic that extended to the central fossa of the first molars and second premolars and to the cusp tips of canines. The initial model was used to make the plug, which was then fitted to the final model. This superimposition allowed for the direct observation of the amount of first molar, second premolar and canine movement.

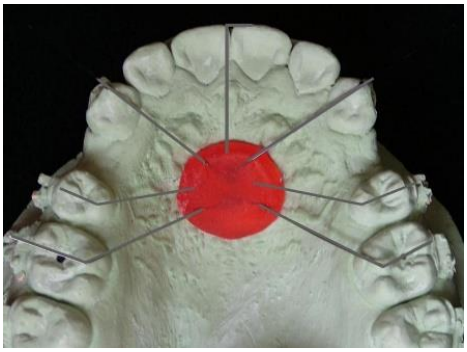

Figure 3 Study model with palatal plug

Cephalometric analysis for determining of maxillary first molar, second premolar, canine and incisor angulation and vertical position of incisor

All radiographs were taken with the same cephalostat (Orthophos®CD, Siemens, Germany). For each patient, lateral cephalogram films were taken two times. 1. T0 was immediately after appliances were bonded. 2. T1 was after finished leveling and aligning phase. Tooth positional locating devices (wire jig) were fabricated from sections of 0.016" x 0.022" stainless steel wires with different bend at the end to attach to the maxillary first molar tube, second premolar and canine bracket before film exposure to identify either right or left occlusion in lateral cephalogram. (Figure 4)

Figure 4 Wire jigs placement on right (a) and left (b) sides of maxilla

The radiographies were traced, superimposed and measured the parameters by one investigator. The long axis of the maxillary first molars and second premolars were obtained by drawing a perpendicular to the midpoint of a line connecting the most convex points on the crowns of these teeth. Angular differences in tooth position were determined by inclination of long axis of maxillary first molar, second premolar, canine and central incisor to the palatal plane (PP). Vertical position of central incisor was the distance measured from incisal edge of central incisor perpendicular to the palatal plane. All angular and linear parameters were described in Figure 5.

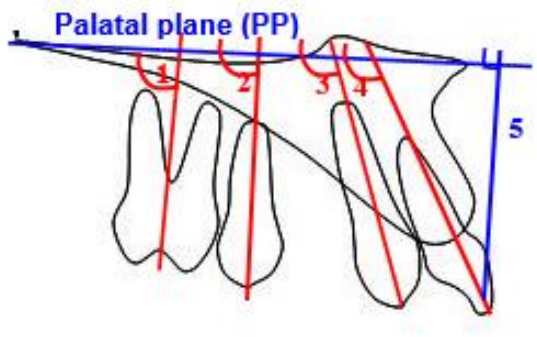

Figure 5 Cephalometric analysis: Linear and angular measurements: 1) long axis of maxillary first molarto PP (6-PP), 2) long axis of maxillary second premolarto PP (5-PP), 3) long axis of maxillary canine to PP (3-PP), 4) long axis of maxillary central incisor to PP (1-PP), 5) incisal edge of maxillary central incisor to PP

Dental cast analysis for determining of maxillary first molar and second premolar rotational changes

Rotational changes in maxillary first molar and second premolar were measured from the dental casts, mid-palatal suture and central grooves of maxillary first molar and second premolar were defined in dental cast. Imaginary line was drawn parallel to central groove of maxillary first molar and second premolar to intersect mid-palatal suture line. (Figure 6) Angular measurement from T0 and T1 record were measured and compared for each side.

Statistical methods

The data were statistically analyzed using SPSS software (version 13.0, SPSS, Chicago, III). The data showed as means and standard deviations. After the parametric assumptions would be tested to see whether the variables were suitable for parametric tests, the differences between the 2 dependent measurements would be evaluated with pair *t*-test, an alpha significance level of 0.05.

Results

A total of 20 patients; there were 2 males and 18 females, ranging in age from 18 to 25 year-old (average chronological age, 20 years 11 months). Mean treatment times of both groups were 4.15 months (range from 3-6 months).

The effect of regular and modified laceback on the movement of maxillary first molar and second premolar

From table 1, the maxillary first molar in regular laceback group were statistically significant moved mesially more than the movement in modified laceback group (0.69 ± 0.29 mm for regular laceback group and 0.49 ± 0.23 mm for modified laceback group). The maxillary second premolar in regular laceback group were statistically significant moved mesially more than the movement in modified laceback group (1.04 ± 0.42 mm for regular laceback group and 0.59 ± 0.25 mm for modified laceback group). Mesial tipping of the maxillary first molars were presented in both groups. The maxillary first molar in modified laceback group was tipped mesially less than that in regular laceback group (0.10 ± 0.26 degree for modified laceback group and 0.40 ± 0.66 degree for regular laceback group). No significant difference between the two groups was found.

Similar to angular changed of the maxillary first molars, the maxillary second premolars in modified laceback were also tipped mesially less than that in regular laceback group with 0.17 ± 0.90 degree and 0.37 ± 1.03 degree respectively. The rotational changed of maxillary first molars in both groups were statistically comparable.

Table 1 Statistical analysis comparing the effect of regular and modified laceback on the movement of maxillary first molar and second premolar ($p = 0.05$)

MeasurementsT1-T0	**Regular laceback**	**Modified laceback**	**Sig.***
6 movement (mm.)	0.69 ± 0.29	0.49 ± 0.23	0.004****
5 movement (mm.)	1.04 ± 0.42	0.59 ± 0.25	0.001****
3 movement (mm.)	-0.98 ± 0.90	-1.09 ± 1.00	0.352
5 – 6 movement (mm.)	0.35 ± 0.45	0.10 ± 0.18	0.035****
6-PP (°)	0.40 ± 0.66	0.10 ± 0.26	0.083
5-PP (°)	0.37 ± 1.03	0.17 ± 0.90	0.385
3-PP (°)	-1.15 ± 2.46	-1.09 ± 2.58	0.249
Central groove 6 to Palatal Suture (°)	-1.75 ± 3.87	-1.60 ± 2.68	0.888
Central groove 5 to Palatal Suture (°)	-1.55 ± 5.26	-0.50 ± 4.39	0.547

Table 2 Statistical analysis comparing the mesial movement between the maxillary first molar and second premolar in both group ($p = 0.05$)

MeasurementsT1-T0(mm.)	**Regular laceback**	**Modified laceback**	**Sig.***
6-PTV (mm.)	0.69 ± 0.29	0.49 ± 0.23	0.004*
5-PTV (mm.)	1.04 ± 0.42	0.59 ± 0.25	0.001*
(5-PTV) – (6-PTV) (°)	0.35 ± 0.45	0.10 ± 0.18	0.035*

Table 3 Statistical analysis comparing the effect of laceback ligature on maxillary incisors ($p = 0.05$)

Measurements	**T0**	**T1**	**T1-T0**	**Sig.***
1- movement (mm.)	0	0.53 ± 1.1	0.53 ± 1.1	0.04****
1-PP (mm.)	28.73± 2.46	28.97 ± 1.97	0.26 ± 1.21	0.45
1-PP (°)	120.02 ± 6.14	120.5 ± 5.48	0.48 ± 2.17	0.34

Both group showed approximately 1.7 degree mesiolingual rotation. The changed of maxillary second premolar showed more mesiolingual rotation in regular laceback group (1.55 degree) than that in modified laceback group (0.50 degree). However, the differences between these 2 groups were not statistically detected. Compared the mesial movement between the maxillary first molar and second premolar, the maxillary second premolar in regular laceback group statistically significant moved mesial than that of the maxillary first molar in the regular laceback group, whereas in the modified laceback group, the mesial movement of both the maxillary first molar and second premolar were almost the same, no statistically significant difference was detected. (Table 2) In the modified laceback group, the difference between mesial movement of the second premolar and first molar was 0.1 ± 0.42 mm, which was statistically significant less than that in the regular laceback group of 0.35 ± 0.45 mm
(p = 0.035).

The effect of laceback ligature on maxillary incisors

The effect of laceback ligature on the maxillary incisors was presented in table 3. The maxillary incisors were statistically significant moved labially 0.53 $\pm$ 1.1 mm (p = 0.04) and labial tipping 0.48 $\pm$ 2.17 degree (p = 0.34). However, there were no statistically significant of the vertical change of the maxillary incisors (p = 0.45). The result on maxillary incisors was from both regular and modified laceback groups.

The effect of regular and modified laceback on the movement of maxillary canine

The maxillary canine showed distal movement in both groups (Table 1). The modified laceback group exhibited distal movement of 1.09 mm which was more than that in regular laceback group of 0.98 rotational

mm. However, there was no statistically significant difference indicated. Distal tipping of the maxillary canine was presented in both groups. The maxillary canine in modified laceback group was tipped distally less than that in regular laceback group (1.09 ± 2.58 degree for modified laceback group and 1.15 ± 2.46 degree for regular laceback group). No significant difference between the two groups was found.

Discussions

Anchorage loss

The result of this study showed that the maxillary incisors were significantly moved labially 0.5 mm and the maxillary canines were distally moved 1 mm in both groups. In the modified laceback group, mesial movements of the maxillary first molar and second premolar were comparable (0.49 and 0.59 mm respectively). In the regular laceback group, the maxillary second premolar showed statistically significant more mesial movement than the maxillary first molar (1.04 and 0.69 mm respectively). The amount of the labial movement of the maxillary incisors was comparable to the mesial movement of the maxillary molars. Theses may be the result of bendbacks, bending the archwire back immediately behind the most distal bonded molar, which were used to minimize forward tipping of the incisors.[2] The proclination of maxillary incisor was the effect of the rectangular leveling arch wire, with bendbacks this may cause the posterior anchorage drained.

Mesial movement of the maxillary first molar in both groups of this study (0.69 mm for regular laceback group and 0.49 mm for modified laceback group) were similar to the other studies that using regular laceback technique, the means mesial movement of the molar were range between 0.40 - 0.75 mm.[4,5] The mesial movement of the maxillary first molar in

the regular laceback group was comparable to that of Irvine *et al*[5] , which demonstrated a significant larger anchorage loss when laceback ligatures were used for leveling in the lower jaw (0.75 mm). While Usmani *et al*[4] showed smaller amount of anchorage loss (0.40 mm) during leveling in the upper jaw with laceback ligatures. In our study, the mesial movement of the maxillary first molar in modified laceback group was comparable with the Usmani *et al*'s study[4], although this study used larger main arch wire with bendbacks.

The previous studies did not report the movement of the second premolar. In this study, the maxillary second premolar in modified laceback group was statistically significant less mesial movement than regular laceback group (0.59 mm and 1.04 mm respectively). The difference between mesial movement of the second premolar and first molar in the modified laceback group (0.1 mm) was statistically significant less than in the regular laceback group (0.35 mm). This result demonstrated that the second premolar in regular laceback group exhibited more mesial movement than the first molar in the same group. This might cause by difference laceback techniques, the modified laceback technique was tied the ligature wire from upper second molar to upper second premolar then twisted to create a knot closed to mesial side of second premolar before extend to twisted ligature wire at the mesial of canine bracket. This technique incorporated posterior anchorage as one unit, difference from the regular laceback technique which was tied the ligature wire in a figure of 8 from upper second molar tube to canine bracket, so this technique could not control the mesial movement of second premolars. The mesial movement of second premolars in regular laceback group may be the result of physiologic tooth movement and the extraction wound contraction. Woon[7] evaluated the changes after lower first premolar extraction without appliance therapy. There was a reduction in extraction space of 45 % by the distal movement of the canines and the mesial movement of the molars. Gragg *et al*[8] reported the mean reduction in extraction space of posterior teeth that there was approximately 1 mm reduction of extraction space during the first year post-extraction.

The correlation of anchorage loss in regular and modified laceback groups

In modified laceback group presented significant correlation of anchorage loss. There was a positive correlation between the mesial movement of maxillary first molar and the mesial movement of maxillary second premolar with the correlation of moderate. This could reveal that the more maxillary first molar mesially moved, the more maxillary second premolar mesially moved. This phenomenon could be explained by a simple reason that they were effectively tied together to be one unit, then they have to move simultaneously. On the other hand, there was no significant correlation between the mesial movement of maxillary first molar and the mesial movement of maxillary second premolar in regular laceback group. The maxillary second premolar was more mesial movement than the maxillary first molar. The further movement of second premolar indicated a natural tooth movement toward mesial as well as an extraction site especially during the wound healing process where the scar tissue tended to contract the adjacent teeth together**[9].**

The modified laceback group was also present significant correlation between the mesial movement of maxillary first molar and the movement of maxillary canine. The result reveals that the less maxillary first molar mesially moved, the more maxillary canine distally

moved. Strong anchorage could be expected from modified laceback group having the posterior teeth in this group move less compared to the canine movement. For the regular laceback group, no correlation between the mesial movement of the maxillary first molar and the movement of canine was noticed. This presented that the movements of molar and canine were vary or unpredictable.

Effect of regular and modified laceback techniques on the maxillary canine

Distal movement and distal tipping of the maxillary canine were presented in both groups. The maxillary canine in modified laceback group exhibited distal movement of 1.09 mm and distal tipping 1.09 degree which was comparable to these in regular laceback group of 0.98 mm and 1.15 degree respectively.

The amounts of canine movement was less than those of Sueri and Turk's study[10] that evaluated the effect of laceback ligatures on canine distalization during the leveling and aligning phase for 2.53 months. They reported that the canine in the laceback group moved and tipped distally (1.67 mm and 4.50 degree). The grater movement detected in Sueri and Turk's study[6] caused from higher force or active tied when the laceback was introduced, whereas, this study, a passive laceback was delivered. However, small amount of canine movement was still taken place which could be caused by extraction scar contraction.

The effect of laceback ligatures on the canine was significant correlation with treatment time. In this study, the treatment time was varying from 3 to 6 months (mean 4.15 months in both groups) due to amount of crowding in upper anterior teeth. The mean crowding of upper anterior teeth in both groups were 1.57 $\pm$ 1.59 mm. The treatment time was effected to the canine both distal movement and tipping in both groups. This analysis can reveal that if there was longer treatment time, the canine were more distally movement and tipping.

Clinical application

If there anchorage is critical, reinforced the anchorage is recommended when used with laceback ligature. Grouping the posterior teeth together (modified laceback technique) can reduce the degree of anchorage loss.

Conclusion

The modified laceback technique with an additional twist mesial to the second premolar bracket creates a statistically significant decreased in the loss of posterior anchorage, with less mesial movement of the maxillary second premolars and first molars compared with regular laceback technique.

References

1. Meyer M, Nelson G. Preadjusted edgewise appliances: theory and practice. Am J Orthod 1978;73:485–98.
2. McLaughlin RP and Bennet JC. The transition from standard edgewise to preadjusted appliance system. J Clin Orthod 1989;23:142-153.
3. McLaughlin RP, Bennet JC, Trevisi HJ. Systemized Orthodontic Treatment Mechanics. Edinburgh: Mosby Year Book; 2001.
4. Usmani T, O'Brien KD, Worthington HV, Derwent, S, Fox, D, Harrison S, Sandler PJ, Mandall NA. A randomized clinical trial to compare the effectiveness of canine lacebacks with reference to canine tip. J Orthod 2002;29:281-6.
5. Irvine R, Power S, McDonald F. The effectiveness of laceback ligatures: A randomized controlled clinical trial. J Orthod 2004;31:303-11.
6. Lebret L. Growth changes of the palate**.** J Dent Res 1962;36:39-47.

7. Woon KC. Space closure and incisor alignment in the mandibular arch following first premolar extraction without appliance therapy. Aust Orthod J 1989;11:115-8.
8. Gragg KL, Shugars DA, Bader JD, Elter JR, White BA. Movement of Teeth Adjacent to Posterior Bounded Edentulous Spaces. J Dent Res 2001;80 ;2021-24.
9. Rosenstiel SF, Land MF, Fujimoto J. Contemporary fixed prosthodontics. St. Louis: Mosby Year Book; 1995.
10. Sueri YM, Turk T. Effectiveness of laceback ligatures on maxillary canine retraction. Angle Orthod 2006;76:1010-1014.

Corresponding author
Chairat Charoemratrote
Orthodontic section, Department of Preventive, Faculty of Dentistry, Prince of Songkla University, Thailand. 90110
Tel: 074-429876
E-mail: metalbracket@hotmail.com

การเปรียบเทียบการสูญเสียหลักยึดจากเทคนิคการทำเลซแบคแบบปกติ

ไชยรัตน์ เฉลิมรัตนโรจน์ ชิดชนก ลีธนะกุล* สุธาทิพย์ จงบันดาล***

บทคัดย่อ

วัตถุประสงค์ *เพื่อเปรียบเทียบการสูญเสียหลักยึดจากเทคนิคการทำเลซแบคแบบปกติกับแบบดัดแปลงในช่วงปรับระดับและเรียงฟัน* ***วัสดุและวิธีการวิจัย*** *ผู้ป่วย 20 รายถูกคัดเลือกมาอย่างสุ่มโดยจำเป็นต้องรับการรักษาร่วมกับการถอนฟันกรามน้อยบนซี่ที่หนึ่ง ผู้ป่วยแต่ละรายได้รับการทำสุ่มทำเลซแบคแบบปกติในขากรรไกรบนด้านหนึ่งส่วนอีกด้านทำเลซแบคแบบดัดแปลง ฟันทุกซี่ในขากรรไกรบนถูกติดเครื่องมือจัดฟันชนิดติดแน่น (MBT™) เลซแบคแบบปกติทำโดยใช้ลวดโลหะไร้สนิมขนาด 0.010" ผูกจากฟันกรามบนซี่ที่สองมายังฟันเขี้ยวบนเป็นรูปเลขแปด ส่วนด้านตรงข้ามทำเลซแบคแบบดัดแปลงโดยใช้ลวดชนิดเดียวกันผูกจากฟันกรามบนซี่ที่สองมายังฟันกรามน้อยบนซี่ที่สองผูกปมลวดก่อนมัดฟันเขี้ยวอีกครั้ง ผู้ป่วยแต่ละรายได้รับการปรับระดับและเรียงฟันโดยใช้ลวดไนตินอล (Nitinol) ขนาด 0.019"x0.025" และลวดโลหะไร้สนิมขนาด0.019"x0.025" ตามลำดับ ซึ่งปลายลวดจะถูกงอหลังท่อข้างแก้ม (tube) ของฟันกรามซี่ที่สอง เก็บข้อมูลโดยใช้ภาพรังสีกะโหลกศีรษะด้านข้างและแบบจำลองฟันหลังจากติดเครื่องมือทันตกรรมจัดฟันชนิดติดแน่นทันทีหลังจากสิ้นสุดการปรับระดับและเรียงฟัน จากนั้นทำการวัดปริมาณการเคลื่อนฟันและปริมาณการหมุนของฟันจากแบบจำลองฟัน วัดการเปลี่ยนแปลงแนวฟันกรามบนซี่ที่หนึ่ง ฟันกรามน้อยบนซี่ที่สอง ฟันเขี้ยวและฟันหน้าจากภาพรังสีกะโหลกศีรษะดานข้าง เปรียบเทียบการการเปลี่ยนแปลงของฟันระหว่างการทำเลซแบคทั้งสองแบบโดยใช้สถิติ pair t-test* ***ผล*** *การเคลื่อนที่มาด้านใกล้กลาง(mesial) ของฟันกรามบนซี่ที่หนึ่งในกลุ่มเลซแบคแบบปกติมีปริมาณมากกว่ากลุ่มเลซแบคแบบดัดแปลงอย่างมีนัยสำคัญทางสถิติ (0.69 ± 0.29 มม.และ0.49 ± 0.23 มม. ตามลำดับ) และฟันกรามน้อยบนซี่ที่สองในกลุ่มเลซแบคแบบปกติมีปริมาณการเคลื่อนที่มาด้านใกล้กลางมากกว่ากลุ่มเลซแบคแบบดัดแปลงอย่างมีนัยสำคัญทางสถิติ (1.04 ± 0.42 มม. และ 0.59 ± 0.25 มม. ตามลำดับ) กลุ่มเลซแบคแบบดัดแปลงมีผลต่างระหว่างการเคลื่อนที่มาด้านใกล้กลางของฟันกรามน้อยบนซี่ที่สองกับฟันกรามบนซี่ที่หนึ่งโดยเฉลี่ย 0.1 ± 0.42 มม. น้อยกว่าในกลุ่มเลซแบคแบบปกติมีผลต่างระหว่างการเคลื่อนที่มาด้านใกล้กลางของฟันกรามน้อยบนซี่ที่สองกับฟันกรามบนซี่ที่หนึ่งโดยเฉลี่ย 0.35± 0.45 มม. อย่างมีนัยสำคัญทางสถิติ*

สรุป *การทำเลซแบคแบบดัดแปลงสามารถลดปริมาณการสูญเสียหลักยึดในฟันหลังได้มากกว่าเมื่อเปรียบเทียบกับการทำเลซแบคแบบปกติอย่างมีนัยสำคัญทางสถิต*

**สาขาวิชาจัดฟัน ภาควิชาทันตกรรมป้องกัน คณะทันตแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์ อ.หาดใหญ่ จ.สงขลา 90110*

***ฝ่ายทันตกรรม โรงพยาบาลสมุทรปราการ*