Clinical Efficacy of Laterally Closed Tunnel with Subepithelial Connective Tissue Graft Versus Tunneling Technique with Subepithelial Connective Tissue Graft in Isolated Recession Type 2; Randomized Clinical Trial - Part I

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**ABSTRACT:**

**Objective:** This study aimed to identify the effectiveness in terms of patient related outcomes between laterally closed tunnel technique versus modified coronally advanced tunneling technique in the treatment of RT 2 gingival recession.

**Participants and methods:** The current randomized controlled clinical trial included 26 patient that were randomly divided into two groups: Either the control group - Modified Coronally Advanced Tunneling (MCAT) with subepithelial connective tissue graft (SCTG), or test group - Laterally Closed Tunnel (LCT) with SCTG. Patient related outcomes as pain scores were evaluated for the first 7 days postoperatively, while root coverage esthetic score and patient satisfaction were evaluated after 6 months.

**Results:** In the LCT group all outcomes showed statistical significance after 6 months. Likewise, in the MCAT group patient related outcomes appear to be statistically significant after 6 months. When comparing between LCT and MCAT techniques, all outcomes showed non-statistically significant at all time points ;with LCT group showing higher values in root converge and patient satisfaction outcomes than MCAT group.

**Conclusion:** LCT was proven to be a new promising surgical approach with satisfactory results in periodontal plastic surgeries that aim to treat single recession using the tunneling approach. LCT and MCAT techniques showed improvements that were statistically significant over time. On the other hand, results showed no statistically significant differences between both techniques when compared over the course of this study, suggesting that both techniques should be suitable for the treatment of RT2 defects with comparable results.

**Keywords:** Gingival Recession, Tunneling, Lateral Closed Tunnel, Modified Coronally Advanced tunnel, Periodontal Plastic procedure.
INTRODUCTION

Gingival recession is defined as the apical displacement of the soft tissue related to the cemento-enamel junction (1). This apical migration can lead to compromised esthetics, root sensitivity, root caries and/or pulp hyperemia (2).

Several surgical procedures have been in literature for the treatment of gingival recession including different kinds of soft tissue grafts as well as a variety of regenerative procedures (3)(4). For cases of isolated mandibular gingival recessions several surgical approaches were conducted for treatment of such condition as the usage of fully or partially epithelialized free gingival grafts (FGG) or SCTG that is associated with different flaps design according to the necessities of each case as; double pedicle flap, coronally positioned flap and tunnelling (5).

Cases of mandibular located recession presented a continuous challenge to surgeons to perform surgical procedures in terms of goals to achieve tension free flaps and ensure proper manipulation of tissues to avoid any flap perforations during surgical approach. Those challenges arise from the anatomical considerations related to the mandibular region such as muscle and frenula pull, thickness of the surrounding soft structures as well as vestibular depth and position of the tooth in relation to the mandibular arch (6).

To avoid such challenges related to cases of isolated recession especially in the mandibular region, several techniques have been proposed (7). Tunneling was introduced as a surgical technique to treat multiple gingival recession defects that preserved the interdental papilla. Several modifications have been done to the tunnelling technique to treat various recession defects. For the treatment of isolated mandibular recession in Miller class I, II, III recessions modifications such as MCAT (8) and LCT (5) has been introduced. LCT provides predictable results for the treatment of deep isolated mandibular Miller Class I, II, and III gingival recessions with up to 60% in class III defects (5).

Moreover, in a study conducted to assess the effect of using MCAT or LCT in treatment of recessions in mandibular and maxillary sites in conjunction with hyaluronic acid and SCTG.
The authors concluded that both these techniques can provide a favourable root coverage of RT1 and RT2 recession cases (9).

Therefore, this study aims to assess the patient related outcomes on MCAT with SCTG versus tunneling technique with LCT in treatment of RT2 defect in isolated recession sites. Furthermore, after thorough research it was brought to our attention that up till now there are few randomized clinical trials that has been involved with RT2 defects and treated with tunneling technique and coronal advanced flap.

**PARTICIPANTS AND METHODS**

**Ethical consideration and approval:**

The study protocol was approved by the Ethics Committee of Scientific Research, Faculty of Dentistry, Cairo University. The details of the surgical procedure and follow up periods were clearly described to all the patients who participated in this clinical trial. Informed consent was obtained from all the participants who agreed to join the study, which was approved from Faculty Research Ethics Committee (REC) committee under the number 18109.

**Study design:**

The current study is a parallel group, randomized controlled clinical trial that included 26 patients all showing Cairo recession type II (10). The study was conducted in the Oral Medicine and Periodontology department at the Faculty of Dentistry, Cairo University and the patients were recruited from the outpatient clinic of the department from October 2019 to December 2020.

Patients were randomly assigned into two groups:

- Control group - MCAT with subepithelial connective tissue graft (SCTG); or
- Test group - LCT with SCTG.

Screening of patients was carried out until the target sample was achieved. Finding and recruiting potential subjects was achieved through a patient database.

**Sample size estimation:**

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Power analysis was performed based upon the results of Zuhr et al (11) using recession depth (RD) reduction as the primary outcome. The effect size (d) was (1.31). Using alpha level = 0.05 and β level = 0.20 (80% power); the minimum estimated sample size is a total of 22 subjects. Sample size was increased to 26 subjects (13 subjects per group) to compensate for a drop-out rate of 15%. Sample size calculation was performed using G*Power (Version 3.1.9.2).

**Participant’s selection:**

The current study is a parallel group, randomized controlled clinical trial that included 26 patients all showing Cairo RT2 defects. Two patients dropped out from the control group during the follow up making a total of 13 in intervention and 11 in the control group. The study was conducted in the Oral Medicine and Periodontology department at the Faculty of Oral and Dental Medicine, Cairo University and the patients were recruited from the outpatient clinic of the department from October 2019 to December 2020.

The patients were placed into two groups: The first group included patients receiving a lateral closed tunnel with subepithelial connective tissue graft (Group A) or the second group the patients receiving tunneling technique with subepithelial connective tissue graft (Group B).

Screening of patients was carried out until the target sample was achieved. Finding and recruiting potential subjects was achieved through a patient database.

**Allocation concealments:**

The two groups were equally prepared for both surgical procedures. The decision regarding which group will receive (LCT with SCTG) and which will receive (MCAT with SCTG) was taken according to the randomized numbers placed in opaque sealed envelopes. The numbers were then picked by the co-supervisor before performing any surgery.

The outcomes measured included post-Operative Pain that was measured using visual Analogue Scale (VAS) with numbers from 0 to 10 ('no pain' to 'worst pain imaginable') were measured daily for the first 2 weeks postoperatively was assessed after 1 week of the treatment. Secondly a 3-item questionnaire was asked after 6 month follow up to assess the patient’s satisfaction regarding the surgical procedure. The patients used a 7-point answer scale, as described
previously by (Kiyak et al, 1984). The included “would you carry out this procedure again?”
“Would you recommend it to others?” and “are you satisfied with the results?”. Finally, clinical
photographs were taken at baseline, during surgery, 1 month, 3 month and 6 months follow ups.

**Treatment Protocol**

**Pre-Operative**

Initial examination of the case including full mouth probing and radiographic
examination were carried out for the selected patients. Full mouth supragingival as well as
subgingival debridement were performed using ultrasonic device\textsuperscript{1} with a supragingival inserts\textsuperscript{2}
followed by Gracey curettes\textsuperscript{3} for proper debridement if needed. Patient preparations were
complete in a single visit. Patients were given clear instructions on oral hygiene measures
including proper toothbrushing technique (modified bass technique) as well as flossing.
Afterwards, 0.12 % chlorhexidine HCL mouthwashes \textsuperscript{4} were prescribed daily for 2 weeks.

**Surgical Intervention**

Surgical Technique for Intervention (Laterally Closed Tunnel)(5). Local anesthesia to the area of
interest was applied. Root planing of the exposed root surface using Gracey curettes was done.
Intrasulcular incisions are slightly bevelled using 15c blades or microsurgical blades and a
mucoperiosteal pouch (tunnel) was prepared using tunnelling knife. The tunnel was performed
through the recession defect and extended apically beyond the mucogingival line and mesially
and distally by undermining the facial surface of the interdental papillae. Muscles and collagen
fibres inserting apically and laterally at the inner surface of the pouch were released using
conventional and microsurgical blades as well as Gracey curettes until tension-free mesial and
distal displacement of the pouch margins was achieved. Special attention was paid to avoid
disrupting the interdental papillae or perforating the flap. As a result of this procedure, the

\textsuperscript{1} Woodpecker UDS-P with LED, China
\textsuperscript{2} EMS Woodpecker ultrasonic scaler tip, Woodpecker, China.
\textsuperscript{3} HuFriedy Gracy’s curette; HuFriedy, Chicago, USA.
\textsuperscript{4} Hexitol: Chlorhexidine HCL mouthwash, The Arab Drug Company for pharmaceutical & CHEM. IND. CO.
Cairo-Egypt.
Margins of the pouch could be approximated without tension mesially and distally to cover completely or cover the greater part of the exposed root surface. A palatal SCTG of 1 to 1.5 mm thick was harvested by the de-epithelialized free gingival graft (as discussed in the donor section). Using either single or mattress sutures, the SCTG was pulled through the created pouch using sutures passed through the pouch and attached to the graft then fixed mesially and distally at the inner aspect of the pouch. The graft was then adapted to the CEJ by a sling suture. However, in case the approximation of the edges was insufficient for graft coverage, additional coronal advancement was done using horizontal sutures and composite stops on the buccal surface to obtain maximum coverage. The margins of the pouch were sutured together over the graft by interrupted sutures. Care was taken to make sure that suturing was tension-free as well as the graft being completely or partially covered.

**Control Group – Modified Coronally Advanced Tunnel (8)**

Administration of local anaesthesia was done followed by root planing of the exposed root surface was performed with Gracey curettes. Intrasulcular incisions were done, and flap separation was extended and then carried out with a tunnel knife–elevator instrument (12). Tunneling was extended up to the mucogingival junction (MGJ) and extended mesially and distally as well as releasing underneath the papilla, so that the flap could be moved in a coronal direction without tension. Muscle fibres and any remaining collagen bundles on the inner aspect of the flap alveolar mucosa were cut using Gracey curettes with extreme care to avoid perforation of the flap and to obtain a passive coronal positioning of the flap and the papilla. A palatal SCTG of 1 to 1.5 mm thick was harvested by the de-epithelialized free gingival graft (as discussed in the donor section). Using either single or mattress suture the SCTG was pulled through the created pouch using sutures passed through the pouch and attached to the graft then fixed mesially and distally at the inner aspect of the pouch. The pouch was then moved coronally and fixed in position using composite stops on the buccal surface or around the interproximal surface.

**Donor Site**

A connective tissue graft was harvested from the palate using de-epithelialized graft protocol(13). The donor site is confined to the area between the distal line angle of the canine and the mesial line angle of the first molar. Sites were selected based on the quality (decided by
the soft tissue resistance) and the thickness (determined by the thickness of the soft tissue) of the soft tissue. Following the administration of local anaesthesia, an incision was made. The side in which the graft was harvested was based on the same site of surgery. The outline of the graft was done using two horizontal incisions (the coronal incision was performed 2 mm away from the soft tissue margin of the region that the graft was taken from and two vertical incisions. The size of the graft was measured using the periodontal probes based on the amount necessary for root coverage. Along the coronal horizontal incision, the blade was oriented almost perpendicular to the palate and upon reaching a sufficient thickness of soft tissue thickness the blade was rotated to be almost parallel to the superficial surface. The thickness of the graft was maintained uniform while proceeding apically with the blade. Care was taken not to remove the periosteum protecting the underlying bone. Palatal wound was protected with gel foam, which was placed and supported by compressive sling 5-0 sutures anchored to the soft tissue apical to the palatal wound area. The graft was de-epithelialized with a 15c blade. The graft was positioned on a sterile gauze, or a surgical cloth and its surface was made wet with a saline solution. A light was oriented to be perpendicular to the graft. Upon graft separation, fatty tissue (yellow in colour) was removed. Removal of the epithelium was done by keeping the blade parallel to the external surface. This was achieved due to the difference in consistency of the graft in which the epithelium is more reflective, harder and rougher while the connective tissue is matte (less reflective), softer and smoother) allowed removal of the epithelium when cutting with the blade kept parallel to the external surface.
Post Operative instructions included medications (600 mg Brufen upon requested if needed) every 6 hours as an analgesic. 1,000 mg amoxicillin and clavulanic acid \(^5\) every 12 hours for 7 days) to prevent infection as an antibiotic.

Oral Hygiene instructions given to the patients were not allowed to brush the surgical sites for 14 days postoperatively and were advised to use a 0.1% chlorhexidine-di gluconate mouth rinse twice a day for 1 minute for the first 21 days post-surgery. Patients were instructed to resume tooth brushing 14 days after surgery away from the surgical site and 3 weeks at the surgical site using roll technique to avoid damaging the site). The palatal sutures were removed 7 days after surgery, while those from the treated sites were removed 14 to 21 days postoperatively. At that time, patients were instructed in mechanical tooth cleaning of the surgical sites using an ultra-soft manual toothbrush with the roll technique, gradually returning to regular oral hygiene habits at 1-month post-surgery. Recall appointments including professional tooth cleaning and individually oriented oral hygiene instructions were scheduled at 1, 3, and 6 months postoperative

**RESULTS:**

**Root coverage esthetic score**

There was no statistically significant difference between mean root coverage esthetic scores in the two groups.

There was good agreement between the two examiners with Cronbach’s alpha reliability coefficient = 0.685 and Intra-Class Correlation Coefficient = 0.521.

**Table (1) Descriptive statistics and results of Mann-Whitney U test for comparison between root coverage esthetic score in the two groups**

<table>
<thead>
<tr>
<th>Intervention (n = 13 sites)</th>
<th>Control (n = 11 sites)</th>
<th>95% CI for the mean difference</th>
<th>P-value</th>
<th>Effect size (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean 6</td>
<td>1.55</td>
<td>Mean 6.15</td>
<td>1.99</td>
<td>-1.69</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td>SD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: Significant at \( P \leq 0.05 \)

\(^5\) Augmentin, GlaxoSmithKline
There was no statistically significant difference between mean post-surgical questionnaire scores for pain in the two groups.

*Table (2) Descriptive statistics and results of Mann-Whitney U test for comparison between post-surgical questionnaire scores in the two groups*
### Question

<table>
<thead>
<tr>
<th>Question</th>
<th>Intervention (n = 13 sites)</th>
<th>Control (n = 11 sites)</th>
<th>95% CI for the mean difference</th>
<th>P-value</th>
<th>Effect size (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Lower limit</td>
</tr>
<tr>
<td>Q1</td>
<td>6</td>
<td>1.26</td>
<td>5.69</td>
<td>0.85</td>
<td>-0.59</td>
</tr>
<tr>
<td>Q2</td>
<td>6.09</td>
<td>1.22</td>
<td>5.69</td>
<td>0.85</td>
<td>-0.48</td>
</tr>
<tr>
<td>Q3</td>
<td>6.18</td>
<td>1.25</td>
<td>6</td>
<td>1.08</td>
<td>-0.8</td>
</tr>
<tr>
<td>Overall score</td>
<td>6.09</td>
<td>1.2</td>
<td>5.79</td>
<td>0.91</td>
<td>-0.6</td>
</tr>
</tbody>
</table>

*: Significant at P ≤ 0.05

#### Pain scores (VAS)

**Comparison between the groups**

There was no statistically significant difference between mean pain scores in the two groups at all follow up periods except after seven days where intervention group showed statistically significantly lower mean score than control group (P-value = 0.012, Effect size = 0.99)
**Table (3) Descriptive statistics and results of Mann-Whitney U test for comparison between pain scores (VAS) in the two groups**

<table>
<thead>
<tr>
<th>Time</th>
<th>Intervention (n = 13 sites)</th>
<th>Control (n = 11 sites)</th>
<th>95% CI for the mean difference</th>
<th>P-value</th>
<th>Effect size (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Lower limit</td>
</tr>
<tr>
<td>Day 1</td>
<td>8.36</td>
<td>1.5</td>
<td>8.77</td>
<td>2.62</td>
<td>-2.26</td>
</tr>
<tr>
<td>Day 2</td>
<td>5.36</td>
<td>2.2</td>
<td>7</td>
<td>3.08</td>
<td>-3.95</td>
</tr>
<tr>
<td>Day 3</td>
<td>4.18</td>
<td>2.96</td>
<td>6.23</td>
<td>3.37</td>
<td>-4.76</td>
</tr>
<tr>
<td>Day 4</td>
<td>3</td>
<td>2.14</td>
<td>4.15</td>
<td>1.95</td>
<td>-2.89</td>
</tr>
<tr>
<td>Day 5</td>
<td>2.64</td>
<td>1.96</td>
<td>3.62</td>
<td>1.89</td>
<td>-2.62</td>
</tr>
<tr>
<td>Day 6</td>
<td>1.82</td>
<td>1.33</td>
<td>2.85</td>
<td>1.72</td>
<td>-2.35</td>
</tr>
<tr>
<td>Day 7</td>
<td>1.18</td>
<td>0.6</td>
<td>2.54</td>
<td>1.76</td>
<td>-2.51</td>
</tr>
</tbody>
</table>

*: Significant at P ≤ 0.05

**Figure (3) Bar chart representing mean pain scores (VAS) in the two groups**

**Changes within each group**

As regards intervention group; there was a statistically significant change in mean pain scores by time (P-value <0.001, Effect size = 0.858). Pair-wise comparisons between time periods revealed that there was a statistically significant decrease in mean pain scores at day two, from day two to
day three as well as day three to day four. From day four to day five; there was no statistically significant change in pain scores followed by a statistically significant decrease in pain scores from day five to day six. From day six to day seven; there was no statistically significant change in pain scores.

As regards control group; there was a statistically significant change in mean pain scores by time (P-value <0.001, Effect size = 0.854). Pair-wise comparisons between time periods revealed that there was a statistically significant decrease in mean pain scores at day two followed by non-statistically significant change from day two to day three. From day three to day four; there was a statistically significant decrease in pain scores followed by non-statistically significant change from day four to day five. From day five to day six; there was a statistically significant decrease in pain scores followed by non-statistically significant change from day six to day seven.

Table (4) Descriptive statistics and results of Friedman’s test for comparison between pain scores (VAS) at different times within each group

<table>
<thead>
<tr>
<th>Time</th>
<th>Intervention (n = 13 sites)</th>
<th>Control (n = 11 sites)</th>
<th>P-value</th>
<th>Effect size (w)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Day 1</td>
<td>8.36 A</td>
<td>1.5</td>
<td>8.77 A</td>
<td>2.62</td>
</tr>
<tr>
<td>Day 2</td>
<td>5.36 B</td>
<td>2.2</td>
<td>7 B</td>
<td>3.08</td>
</tr>
<tr>
<td>Day 3</td>
<td>4.18 C</td>
<td>2.96</td>
<td>6.23 B</td>
<td>3.37</td>
</tr>
<tr>
<td>Day 4</td>
<td>3 D</td>
<td>2.14</td>
<td>4.15 C</td>
<td>1.95</td>
</tr>
<tr>
<td>Day 5</td>
<td>2.64 D</td>
<td>1.96</td>
<td>3.62 C</td>
<td>1.89</td>
</tr>
<tr>
<td>Day 6</td>
<td>1.82 E</td>
<td>1.33</td>
<td>2.85 D</td>
<td>1.72</td>
</tr>
<tr>
<td>Day 7</td>
<td>1.18 E</td>
<td>0.6</td>
<td>2.54 D</td>
<td>1.76</td>
</tr>
</tbody>
</table>

*: Significant at P ≤ 0.05, Different superscripts in the same column indicate statistically significant changes by time
Comparison between amounts of change in pain scores in the two groups

There was no statistically significant difference between mean amounts of change in pain scores in the two groups through all observation periods.

Table (5) Descriptive statistics and results of Mann-Whitney U test for comparison between amounts of change in pain scores (VAS) in the two groups

<table>
<thead>
<tr>
<th>Time</th>
<th>Intervention (n = 13 sites)</th>
<th>Control (n = 11 sites)</th>
<th>95% CI for the mean difference</th>
<th>P-value</th>
<th>Effect size (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Lower limit</td>
</tr>
<tr>
<td>Day 1 – Day 2</td>
<td>-3</td>
<td>2.32</td>
<td>-1.77</td>
<td>1.3</td>
<td>-2.79</td>
</tr>
<tr>
<td>Day 1 – Day 3</td>
<td>-4.18</td>
<td>3.06</td>
<td>-2.54</td>
<td>2.37</td>
<td>-3.94</td>
</tr>
<tr>
<td>Day 1 – Day 4</td>
<td>-5.36</td>
<td>2.34</td>
<td>-4.62</td>
<td>1.8</td>
<td>-2.5</td>
</tr>
<tr>
<td>Day 1 – Day 5</td>
<td>-5.73</td>
<td>2.2</td>
<td>-5.15</td>
<td>2.03</td>
<td>-2.37</td>
</tr>
<tr>
<td>Day 1 – Day 6</td>
<td>-6.55</td>
<td>2.02</td>
<td>-5.92</td>
<td>2.22</td>
<td>-2.43</td>
</tr>
<tr>
<td>Day 1 – Day 7</td>
<td>-7.18</td>
<td>1.4</td>
<td>-6.23</td>
<td>2.42</td>
<td>-2.67</td>
</tr>
</tbody>
</table>

*: Significant at P ≤ 0.05
Figure (5) Bar chart representing mean amounts of change in pain scores (VAS) in the two groups

Comparison between percentages of change in pain scores in the two groups

There was no statistically significant difference between mean percentages of change in pain scores in the two groups through all observation periods except for the change after seven days where intervention group showed statistically significantly higher mean percentage reduction in pain scores than control group.

Table (6) Descriptive statistics and results of Mann-Whitney U test for comparison between percentages of change in pain scores (%) in the two groups

<table>
<thead>
<tr>
<th>Time</th>
<th>Intervention (n = 13 sites)</th>
<th>Control (n = 11 sites)</th>
<th>95% CI for the mean difference</th>
<th>P-value</th>
<th>Effect size (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean %</td>
<td>SD</td>
<td>Mean %</td>
<td>SD</td>
<td>Lower limit</td>
</tr>
<tr>
<td>Day 1 – Day 2</td>
<td>-35.08 24.85</td>
<td>-25.45 22.87</td>
<td>-29.84 10.58</td>
<td>0.264</td>
<td>0.461</td>
</tr>
<tr>
<td>Day 1 – Day 3</td>
<td>-49.96 33.86</td>
<td>-33.14 28.01</td>
<td>-43 9.36</td>
<td>0.169</td>
<td>0.579</td>
</tr>
<tr>
<td>Day 1 – Day 4</td>
<td>-64.15 23.26</td>
<td>-54.1 14.54</td>
<td>-26.19 6.1</td>
<td>0.217</td>
<td>0.513</td>
</tr>
<tr>
<td>Day 1 – Day 5</td>
<td>-68.17 20.29</td>
<td>-59.68 14.98</td>
<td>-23.44 6.45</td>
<td>0.128</td>
<td>0.633</td>
</tr>
<tr>
<td>Day 1 – Day 6</td>
<td>-77.27 16.04</td>
<td>-67.76 14.9</td>
<td>-22.62 3.6</td>
<td>0.241</td>
<td>0.487</td>
</tr>
<tr>
<td>Day 1 – Day 7</td>
<td>-85.77 5.91</td>
<td>-70.83 16.12</td>
<td>-25.61 4.27</td>
<td>0.017*</td>
<td>1.091</td>
</tr>
</tbody>
</table>

*: Significant at $P \leq 0.05$
Discussion:

Esthetics is gaining a lot of interest and is becoming an integral element of periodontal practice, with most patients worldwide seeking esthetics as their prime request in the dental office. Dental esthetics is one of the key aspects of overall facial beauty, which not only involve procedures related to teeth but also involve procedures related to the surrounding soft tissue and gingiva, which is collectively known as pink esthetics.

Gingival recession not only causes esthetic concerns but also is usually accompanied by dentin hypersensitivity, bacterial biofilm accumulation, root caries lesions and inflammation of the gingiva. All those concerns have emerged in the search for different approaches for the correction of gingival recession (14).

There are several techniques that can be utilized for the treatment of recession depending on the type of existing recession (4). RT 1 (formerly known in Miller’s classification as class I and II) gingival recessions can be covered completely in a predictable manner while RT 2 (formerly known in Miller’s classification as Class III recessions) can only be partially covered.
in an unpredictable manner (15,16). In addition, donor grafts can either be epithelized or subepithelial connective tissue grafted or can involve a combination of both techniques.

There are several challenges that might affect the predictability of recession coverage, including anatomical considerations such as the vestibular depth, the position of the tooth and the muscle pull. Due to deep isolated mandibular recessions located in the anterior area, tension-free coronal displacement of flaps can be extremely difficult and may result in decreased vestibular depth and flap dehiscence due to increased flap tension.

Tunneling was first employed by Allen; the tunnel procedure and was known as supraperiosteal envelope (17). Tunneling resulted in better esthetic outcomes due to the technique avoiding any vertical incisions whilst also preserving the papilla. Moreover, the tunneling technique shows less morbidity due to limited flap reflection that is done, as well as better healing in comparison to other root coverage procedures (18).

Tunneling has shown superior esthetic outcomes as well as the ability to achieve complete root coverage in Miller class III recession when compared to coronally advanced flap (19). Furthermore, tunneling was found to be highly effective for the treatment of single and multiple recession defects. However, other factors might affect the outcome such as the operator’s experience, as tunneling is technique-sensitive, as well as the interproximal attachment loss (20).

Regarding patient related outcomes, patients in the LCT group reported statistically significant less pain scores in the first week of the treatment than those of MCAT group and by comparing the two techniques the pain scores showed no statistical significance, with low pain complaints from patients in general in both groups. This can be hypothesized due to the minimum invasive technique of LCT and MCAT that doesn’t comprise any vertical releasing incisions, which have been advocated to result in low postoperative pain (21).

Recession esthetic score showed no statistically significant difference between the mean of the two groups. RES was 6± 1.55 in the LCT group and 6.15 ±1.99 in the MCAT group. However, those scores were not as high as those reported in other tunneling studies as (22). This could be due to RT 2 defects being more challenging (23) in achieving complete root coverage, and 60% of the total RES score depends on the coverage of the gingival margin (20).
In terms of patient satisfaction, questionnaire was used to collect data regarding the overall satisfaction. The comparison between the two groups in the post-surgical questionnaire didn’t show any statistically significant difference. Which was also confirmed clinically by the patients as almost all patients were quite satisfied with their post-surgical outcomes.

**CONCLUSIONS:**

LCT was proven to be a new promising surgical approach with satisfactory results in periodontal plastic surgeries that aim to treat single recession using the tunneling approach. LCT and MCAT techniques showed improvements that were statistically significant over time. On the other hand, results showed no statistically significant differences between both techniques when compared over the course of this study, suggesting that both techniques should be suitable for the treatment of RT2 defects with comparable results.

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