A Comparison of Mandibular Lingual Surgical Flaps with and without a Vertical Releasing Incision*

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The purpose of this study was to evaluate the short-term postoperative pain for surgical flaps with mandibular lingual vertical releasing incisions (ML-VRI) compared with envelope flaps and to observe the postoperative clinical healing of ML-VRI. Using a split mouth design, 12 adult periodontal patients received bilateral posterior mandibular surgery with an envelope flap on one side and a flap with an ML-VRI on the contralateral side. Surgical procedures were performed at separate appointments, varied in order, and performed an equal number of times on the right and left sides. Postoperative pain was scored by the patients, and scores for each technique were compared using an analysis of variance and covariance with repeated measures. Photographs were used to assess postoperative clinical healing of ML-VRI with various degrees of initial closure. Results indicated no significant statistical difference (P > 0.05) between pain levels for the two surgical techniques. There was complete clinical healing despite variations in the degree of closure of ML-VRI.

The findings of this study support the use of ML-VRI. They are indicated in areas with flat contours or with slighty ledges and inferior concavities. ML-VRI are contraindicated in areas with prominent ledges and inferior concavities and in areas with exostoses. Suturing the vertical incision is unnecessary and may be detrimental to the tissues. A "step down" incision that preserves attachment levels in nondiseased sites is discussed.

Animal and human studies on the response of alveolar bone to periodontal flap surgery show resorption of crestal bone followed by varying degrees of regeneration. Bone resorption begins in 3 to 4 days at the periodontal ligament and crestal surfaces and occurs later at a periosteal surface. The amount of osseous regeneration is related to the thickness of the alveolar bone. Thin areas composed of two cortical plates with little medullary bone may not regenerate to presurgical levels. Therefore, exposure of alveolar bone during flap procedures may result in a sustained loss of attachment.

During periodontal surgery, the envelope flap is the traditional approach to gain access on the lingual aspect of the mandible. In order to obtain adequate access, the envelope flap must be carried two or three teeth beyond the surgical site to avoid tearing or excessive stretching of the flap. This approach involves additional exposure of alveolar bone and a potential for loss of attachment around healthy teeth.

Surgical flaps with vertical releasing incisions (VRI) provide equivalent access for surgery while avoiding exposure of bone in nondiseased areas. Other advantages of VRI include (1) there is no impairment of circulation, which may occur with envelope flaps due to excessive tension during flap reflection; (2) the flap can be positioned apically, coronally or laterally; and (3) nondiseased areas with minimal attached gingiva or a bony dehiscence can be excluded from the surgical procedure.

Selepsky, Dalberg, and others do not advocate the use of mandibular lingual vertical releasing incisions (ML-VRI), stating that (1) they do not close well, (2) healing is slow and painful, (3) they may damage anatomic structures distal to second molars and in the floor of the mouth, (4) they are difficult to suture, (5) they are not necessary on the lingual due to the ease with which a flap on the inner aspect of the mandible is released, (6) incisions of adequate length...
Mandibular Lingual Releasing Incisions

may not be possible due to mandibular lingual contours and proximity of the floor of the mouth, and (7) there is a possibility of infection of the floor of the mouth and an extension of the infection along fascial planes.

The purpose of this study was to evaluate the short-term postoperative pain for flaps with ML-VRI compared with envelope flaps and to observe the postoperative clinical healing of ML-VRI.

MATERIALS AND METHODS

Twelve adult patients, 7 males and 5 females, participated in this study. All patients had moderate to severe periodontal disease with bilaterally similar mandibular lesions that required the same type of surgery as part of their periodontal therapy. The mean age was 46 years with a range of 27 to 65 years. Subjects were selected from the patient population of the Periodontic Service, Tingey Army Dental Clinic, Fort Gordon, Georgia. Patients were excluded if they had (1) mandibular lingual exostoses, (2) an immune deficiency disorder, (3) diabetes, (4) antibiotic or steroid therapy within 3 months, (5) a bleeding disorder, or (6) allergy or intolerance to acetaminophen or codeine. All patients received initial flaps that included oral hygiene instructions and suture removal and root planing. The surgical treatment plan was determined after assessing the results of initial therapy. The study was explained to each subject and informed consent was obtained.

A split-mouth technique was used with a full-thickness mucoperiosteal envelope flap on one side and a similar flap with a ML-VRI on the contralateral side. All surgical procedures were performed distal to the cuspid and consisted of debridement alone or debridement plus osseous recontouring, including osseous recontouring near the site of the ML-VRI. Each procedure was performed during a separate appointment, and an equal number of each flap technique was performed on the right and left sides. The sequence of the two procedures was varied to decrease the subjective influence of a patient's first experience with periodontal surgery and the patient was unaware of the type of flap used for each surgery. The surgical sites were closed with interrupted 4-0 silk sutures. The most superior margins of the flaps were sutured while the length of the ML-VRI was not sutured. Periodontal dressing was placed for 1 week postoperatively but no attempt was made to cover the entire length of the ML-VRI. Written postoperative instructions were given to each patient and were reinforced verbally. All patients were prescribed six tablets containing 300 mg acetaminophen and 30 mg codeine and were instructed to take one tablet every 4 hours only if needed for pain. Antibiotics were not prescribed.

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<th>SYMPTOM DATA LOG</th>
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<td><strong>FILLED OUT BY THERAPIST</strong></td>
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<td>Patient name</td>
<td>0 = no pain</td>
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<td>SSN</td>
<td>1 = mild pain</td>
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<td>Date of Surgery</td>
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<td>Type of surgery (A or B)</td>
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<td>Site</td>
<td>4 = excruciating pain</td>
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**Post-op day No.** | **Day of week** | **Highest symtom level** | **No. pills taken** | **Post-op day No.** | **Day of week** | **Highest symptom level** | **No. pills taken** |
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**COMMENTS:**

![Figure 1. Symptom Data Log.](image-url)
All subjects were given a Symptom Data Log (Fig. 1) to complete each day for the first 14 postoperative days. They rated their highest level of pain for each day on a scale of 0 to 4 (0 = none, 1 = slight, 2 = moderate, 3 = severe, or 4 = excruciating). They also recorded the total number of prescribed tablets taken each day. Patient responses were statistically evaluated using analysis of variance and covariance with repeated measures to determine whether differences existed between envelope flaps and flaps with a ML-VRI.

Color intraoral photographs (Professional Ektachrome 64) were taken of seven patients after suturing and at the 1- and 2-week postoperative visits. The photographs were used to assess differences in postoperative clinical healing of ML-VRI in surgical sites with various degrees of initial closure of the ML-VRI after suturing.

RESULTS

All patients completed the symptom data log properly. Two patients reported swelling 3 days after the periodontal surgery. This swelling was confined to the facial site and did not involve the lingual surgical site. Analysis of variance for pain levels indicated no significant difference (P > 0.05) between the two surgical techniques (Fig. 2). The photographs revealed that complete clinical healing occurred in all seven cases despite variations in the degree of closure of the ML-VRI immediately after suturing. A ML-VRI with 1 mm of exposed bone healed rapidly without apparent defect (Fig. 3).

DISCUSSION

The findings of this study indicated that the ML-VRI is a valid surgical procedure. The pain intensity experienced by the patients was similar for both procedures and the ML-VRI healed without sequelae. The ML-VRI maximized access to a desired surgical site while avoiding nondiseased areas. Since access and flap reflection on the mandibular lingual can often be difficult, the use of a ML-VRI is indicated in appropriate sites.

Although the degree of closure of ML-VRI did not affect the outcome of healing in this study, anatomic characteristics of the surgical site appeared to affect the healing pattern. These anatomic characteristics are useful in determining the use and placement of ML-VRI.

Specific guidelines should be followed when using mandibular lingual vertical releasing incisions. They should be made at line angles rather than through the interdental papilla or midradicularly, in order to avoid uneven margins or creasing of the papilla or gingiva over the root prominence. They can be placed mesial or distal to the papilla, depending upon the access desired. ML-VRI must extend beyond the mucogingival junction into the alveolar mucosa to allow adequate release of the flap. They should not be made distal to second molars. A shallow vestibule is not a contraindication for an ML-VRI.

Observation and careful palpation of the lingual of the mandible are essential, as the mandibular lingual contours are the primary determinants of the indications, contraindications, and location of ML-VRI. These contours are either flat, are composed of a ledge with an inferior concavity, or have exostoses. Areas next to extraction sites may be completely concave. Flat contours (Fig. 4A) and slight ledges with slight concavities (Fig. 4B) are suitable for ML-VRI in all regions as they present minimal hazard for tissue management. Pronounced concavities, pronounced ledges with pronounced concavities and areas with exostoses...
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Figure 3. Healing of an ML-VRI with poor flap coaptation. A. Day of surgery: bone exposed. B. One week postoperative. C. Two weeks postoperative. Excellent healing of ML-VRI.

Figure 4. Lingual contours. A. Flat contours. B. Slight ledge with slight concavity inferior to the ledge. C. Prominent ledge with prominent concavity inferior to the ledge in the molar region and slight ledge with slight concavity inferior to the ledge in the premolar and canine regions. D. Prominent ledge with prominent concavity inferior to the ledge in both the molar and premolar regions and slight ledge with slight concavity inferior to the ledge in the canine region.
are not suitable for ML-VRI in any region due to the difficulty of tissue management. Many mandibles have a combination of contours: A mandible with a pronounced ledge and concavity in the molar region and a flat contour or a slight ledge and slight concavity in the premolar and canine regions (Fig. 4C) may receive an ML-VRI in the premolar region. A mandible with a pronounced ledge and concavity in both the molar and premolar region with a flat contour or a slight ledge and slight concavity in the canine region (Fig. 4D) may receive a ML-VRI in the canine region. In this circumstance, if the proposed surgical site is limited to the molar area, the flap must be extended forward to the cuspid region to perform a ML-VRI. This forward extension of the lingual flap may compromise premolar attachment levels. An alternate flap design is possible in areas with a wide zone of attached gingiva in the lingual premolar region (approximately 4 mm) (Fig. 3). The lingual incision is extended forward from the molar area, is "stepped down" between the molar and premolar, and is continued forward to the canine, bisecting the attached gingiva in the premolar area. The ML-VRI is then placed in the cuspid region. This incision is similar to that introduced by Gropp. Its presence attaches the lingual premolar area and does not disturb facial premolar and cuspid areas.

Suturing the vertical extent of the ML-VRI is usually avoided as the tissue on the lingual of the mandible is often thin and could therefore be easily traumatized or the circulation could be compromised. If the lingual surface of the mandible is thinned, sutures in the ML-VRI may pull the tissue away from the bone, resulting in poor flap adaptation and creation of a dead space. Only the superior margin of the ML-VRI is sutured, using a suspensory suture anchored two teeth distant to the ML-VRI (Fig. 6). This type of suture draws the flap anteriorly, superiorly and facially, affording better coaptation and adaptation of the tissue against the bone.

Mandibular lingual vertical releasing incisions may be safely used in periodontal surgery if the practitioner adheres to the above guidelines. This approach to flap design preserves attachment in healthy sites while providing better access to the surgical site.

ACKNOWLEDGMENT
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REFERENCES
Abstracts

Mandibular Anterior Crowding and Periodontal Disease
El-Mangoury, N.H.; Gasik, S. M., and Mostafa, Y. A.
Angle Orthod 57: 33, January, 1987

A group of 30 adult males with mandibular anterior crowding were compared with 30 adult males without crowding. Criteria for selection included no history of orthodontic treatment, no systemic disease, and Angle’s Class I malocclusion. The crowding was determined by measuring the combined mesiodistal width of the six mandibular anterior teeth and subtracting the space available for them. Plaque and gingival indices were determined, and complete scaling and subgingival curettage performed. The indices were repeated one, two and four weeks posttreatment. Participants were asked not to change their daily oral hygiene. Pretreatment plaque and gingival indices were significantly higher for the crowded than the control group. The one, two- and four-week posttreatment gingival indices were not significantly different for the two groups, nor were the one- and two-week plaque scores. The four-week plaque index difference was again statistically significant, showing a return to the pretreatment level in the crowded group. It was pointed out that crowding is a predisposing factor brought on by difficulty in carrying out oral hygiene procedures, improper proximal contacts with narrowing of embrasures, and changes in the anatomy of the tooth.