Flap Curettage:
Rationale, Technique,
and Expectations

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A revival of interest in curettage, both conventional and open (flap
 curettage), has occurred in recent years because of dissatisfaction with
the results of current surgical procedures, questions about the relation
of certain surgical objectives to successful treatment, and renewed in-
terest in reattachment or regeneration of lost periodontal attachment.

Ramfjord et al.6,7 and others11-13 have published longitudinal
clinical data which document and contrast the results of curettage
procedures with other surgical techniques. Their data suggest that
minimal differences are obtained by the various surgical modalities if
certain parameters are measured. It would seem appropriate, therefo-
ree, to review the use of flap curettage in periodontal therapy, to
assess the results of recent investigations, and to use current infor-
mation to define a rational series of objectives and therapeutic expec-
tations for the application of surgical curettage.

Historical Background

The utilization of a flap approach to provide access to underlying
structures is fundamental in most fields of surgery. Periodontal surgery
is no exception. Although the first person to utilize the flap approach
for the treatment of periodontal disease is not known, there can be lit-
tle doubt that one precipitating reason was the inability to visualize and
to effectively perform the meticulous removal of calculus and debris
from the deep periodontal pocket.

From the beginning (therapeutic efforts of Fauchard), technical
problems were noted with the closed approach to surgery (curettage)
The advent of the "necrotic bone" concept and the espousal of a need to remove such "infected bone" insured that the most predictable means of securing access to calculus, debris, and the marginal bone would be adopted. Black (1886), Robicsek (1884), Gieskyński (1914), Widman (1916), and Neumann (1921) all described modes of access to calcific deposits, root surfaces, and marginal bone. Excellent reviews of the development of these procedures have been published by Sanchez-Corea and Johnson et al.², ³

From a simple beginning, embellishments in mode of access, type, and placement of incisions, placement of the flap, as well as elaborate claims of success, have provided the basis for arguments regarding the relative merits of the various modes of flap surgery. Theorists have attempted to rationalize flap curettage on the basis of certain theories or by quoting clinical successes which were stated to be unattainable by other methods.⁴ ⁵ ⁶ ⁷ ⁸ ⁹ ¹⁰ ¹¹ ¹² ¹³ ¹⁴ ¹⁵

The error of basing surgical therapy upon such observations and claims has been well identified by Bloom.⁷ Only in recent years have clinician-researchers taken relatively precise longitudinal measurements of the therapeutic results obtained by the use of various surgical procedures upon well characterized periodontal patients.⁸ ⁹ ¹⁰ ¹¹ ¹² ¹³ ¹⁴

**Goals and Objectives of Periodontal Surgery**

The fundamental goal of all periodontal therapy is the retention of the natural dentition in a relative state of health, comfort, and function for the life of the patient. Successful treatment is based, therefore, upon the ability of the therapist to formulate, accomplish, and maintain a series of therapeutic objectives which contribute to the accomplishment of the fundamental goal. To the extent that surgical procedures contribute to these objectives, they have validity. Commonly accepted surgical goals are: (1) elimination of the pocket and root surfaces of local irritants; (2) elimination of the periodontal pocket; (3) maintenance or establishment of an adequate functional band of attached gingival tissues; (4) production of a common and form (architecture) to the periodontium which is readily maintained by the patient and/or the therapist, and which will be less susceptible to further periodontal breakdown.

While it is possible to establish detailed lists of sub-objectives to further characterize the above goals, a superficial examination of surgical results reveals that all surgical procedures do not accomplish all or even some of the above objectives. Indeed, the need to accomplish many of these objectives in order to obtain periodontal health and to preserve the dentition is open to question. Certainly the best means of obtaining the objectives has not been clearly determined. Arguments over the relative merits of specific surgical procedures, therefore, are commonly based upon the ability of the procedure to accomplish certain objectives.
The rationale and objectives for the use of flap curettage is basically related to accessibility, debridement, repair, and patient comfort. The advantages of the procedure have been stated at various times by: (1) elimination of excess access for better visualization of the periodontal defect, the root surfaces, and the margins of the alveolar bone; (2) facilitation of instrumentation because of access, thus permitting a more thorough removal of the epithelial lining of the pocket, calculus, and granulomatous tissues; (3) facilitation of reattachment by the regeneration of new tissues; (4) preservation of periodontal support; (5) elimination or reduction of periodontal pockets by reattachment, regeneration, or shrinkage; (6) minimization of postsurgical trauma, pain, root sensitivity, and esthetic shock; and (7) promotion of better bone care by the patient.

The extent to which flap curettage accomplishes the objectives stated above is still a point of contention among periodontal therapists. Such debate and a desire to place surgical therapy upon a more concrete basis have led to the implementation of clinical experiments designed to define the effects of various surgical procedures upon measurable parameters and to assess the ability of each procedure to accomplish stated objectives. Data from such longitudinal experiments have recently been made available. The study of the data from these experiments, careful clinical examination of patients after treatment, and experimentation with modifications of the technique utilized have provided periodontists with more realistic expectations of the advantages of flap curettage. The clinical circumstances in which its use is indicated and the technical aspects of performance for the most predictable results have also been better defined.

**Technique**

Although a variety of approaches to the performance of open curettage have been described, the procedure we have found to produce the most favorable clinical results is described.

Adequate anesthesia is obtained by block, by infiltration, or both. Using a Bard-Parker No. 15 blade or other suitable surgical blade, an inverse bevel incision is made on the buccal or lingual from the distal of the most terminal teeth in the surgical area anteriorly. The incision follows the contour of the necks of the teeth and is placed approximately 1 mm lateral to the apex of the free gingival margin to produce a thinned and scalloped flap (Fig. 1). This initial incision should be
The surgical blade is directed horizontally to the papilla in a uniform distance.

As second stage, the surgical blade is directed in a horizontal direction until the papilla is elevated. The incision is then made at the gingival margin to produce a thinned and scalloped edge.

Figure 2: The surgical blade is directed horizontally to the papilla in a uniform distance.

As second stage, the surgical blade is directed in a horizontal direction until the papilla is elevated. The incision is then made at the gingival margin to produce a thinned and scalloped edge.
made on the buccal and lingual from the distal area anteriorly. The incision follows the contour minimally 1 mm lateral to the apex of the free flap.

alveolar bone, score the periosseum, knife is directed in a horizontal direction thickness (Fig. 2). Alternatively, if the incision is taken from the interproximal area, the tissue is avulsed from its embrasure, trimmed off with surgical scissors or

Figure 3. The mucoperiosteal flap is carefully reflected away from the necks of the teeth to expose the bony margins of the defects.

Sufficient surgical access is usually obtained by extension of the flap approximately 1 to 1½ additional tooth widths mesially and distally to the surgical area. An excellent discussion of the placement of incisions is contained in Dahlberg. If extension of the incisions is undesirable, vertical relaxing incisions may be placed into the alveolar mucosa to effectively relax the flap for access and visualization. These vertical incisions should be placed at the line angles of the tooth so as to allow the reflection of an entire papilla from the interdental area.

Using blunt dissection, the mucoperiosteal flap is carefully reflected away from the necks of the teeth to expose the bony margins of the defects. The pocket wall and interproximal granulation tissues are still attached to the necks of the teeth at this stage (Fig. 3).

The prime advantage to the open curettage procedure is the production of excellent access for both visualization and instrumentation of the teeth and bony defects. It seems inappropriate, therefore, to rely upon minute buttonhole entries or upon elevation of only the attached gingival tissues.

It has been suggested that the reflection of small localized flaps of the gingival tissues results in post-surgical loss of bone and post-surgical pain, and enhances the opportunities for reattachment. There is little evidence to substantiate these claims. Our experiences suggest that these advantages may be imaginary. Indeed, a careful study of results obtained with graduate and undergraduate students indicates that the most likely result of insuficient surgical access is inadvertent production of an unnecessary amount of surgical trauma, an increase in operating time because of poor visibility, inadequate removal of local irritants, and an initially poor post-surgical procedure.
Management of the Palatal Flap

The approach to elevation of the palatal flap is similar to that described for buccal and lingual flaps with the exception of placement of initial incisions. The anatomy of the palatal tissues precludes the effective repositioning of the palatal mucoperiosteal flap. Therefore, the extent to which the initial incision is placed medially to the sulcus and the flap is thinned will dictate the extent to which immediate surgical reduction of the pocket will be accomplished.

The usual procedure is to exaggerate the amount of palatal scalloping, as compared with the buccal, and to preserve the buccal band of attached gingiva and yet insure complete coverage of the interproximal defects. In the patient with advanced bone loss, it is usually advantageous to thin the palatal flap to minimize the immediate postsurgical depth of the sulcus.

The more shallow the pockets presurgically, the nearer to the sulcus the incision can be placed and the less the flap must be thinned to accomplish a sulcus of minimal depth immediately postoperatively. It has been suggested that the thinning of the flaps will reduce the potential for connective tissue reattachment and therefore result in a greater loss of attachment apparatus on the teeth. This has not been our observation.

Debridement of the Wound

Following elevation of the buccal and lingual (palatal) flaps, the tissues which remain are severed from the necks of the teeth by placing a suitable periodontal knife such as the Orban No. 1–2 into the sulcus and cutting circumferentially. The bony defects are then thoroughly curetted free of all granulomatous tissues, any residual transseptal fibers are removed, and the root surfaces of all teeth in the surgical field are meticulously curetted and planed free of calculus to a smooth hard consistency using sharp curettes (Fig. 4).

An effective means of accomplishing a rapid but thorough debridement of the surgical field is the ultrasonic scaler. Used on lower power with a sterile saline lavage, this instrument facilitates the removal of calculus and debris. No adverse effects have been observed to follow its use and measurable differences in patient comfort, healing, and postoperative results have been detected after five years of routine use.

Recent reports have suggested that retention of residual Sharpey fibers which are attached immediately coronal to the alveolar bone may facilitate reattachment and thus result in the preservation of greater quantities of periodontal attachment. Although the retention of these tissues is readily accomplished on the buccal and lingual (palatal) surfaces, it is much more difficult to retain this attachment interproximally. This is particularly true when deep interproximal defects are present.
The flap curettage technique is similar to that used for lingual flaps with the exception of placement of the palatal tissues. The exposure of the palatal mucoperiosteal flap is accomplished by releasing the amount of palatal tissue to be buccalized and to preserve the buccal sulcus to ensure complete coverage of the mucosal surface with advanced bone loss. It is usually preferable to use a fold of mucosal tissue under the flap to minimize the immediate postoperative edema.

The vestibule is surgically created by incising the mucosa and lingual (palatal) flaps, the tissue from the necks of the teeth by placing a small incision at the gingival margin. The bone defects are then thoroughly débrided of all soft tissues, and the residual transepithelial soft tissues of all teeth in the surgical field are protected free of calculus and tartar. The bone is then curetted (Fig. 4), using an ultrasonic scaler or ultrasonic curettage instrument. Used on lower power settings, these instruments facilitate the removal of bone without heat generation and water cooling.

It is possible that the retention of the buccal and lingual connective tissue attachment, combined with poor flap adaptation, may result in a greater differential attachment levels between the radicular and interproximal tooth surfaces. If this is so, then one would expect that the buccal sulcus depths would be increased interproximally, as compared with the lingual sulcus, and that the lingual aspects of the tooth would be lost. This could potentially compromise the post-surgical result.

**Closure of the Flaps**

Upon completion of the débridement of the surgical area, the surgical area is carefully flushed with sterile saline and the flaps are sutured together. The sutures are removed in 7 to 10 days.

To obtain maximal repair (reattachment of bone defects by this procedure and to allow the most favorable tissue architecture) it is essential to minimize the coronal placement of the flap margins, and yet provide an intimate contact between the connective tissue surfaces of the flap, the roots of the teeth, and the bone margins. Although total coverage of the defects may not be essential to eliminate all of the defect (Pichard's work on the three-wall infrabony lesion was performed through gingivectomy access), an intimate adaptation has been suggested to facilitate connective tissue reattachment to the roots of the teeth.
Figure 3. Surgical area is flushed with sterile physiologic saline and the flaps are positioned and sutured.

Although it has been demonstrated that flaps may be coronally placed with the resultant formation of a long epithelial attachment, ease of maintenance by the therapist and the patient appears to contraindicate such placement of the flaps in most surgical areas. An exception is the anterior area of the mouth where coronal flap placement may minimize post-surgical esthetic shock, as was suggested by Ingle in 1952.

Optimal results appear to be obtained when the flap is placed to just cover the buccal and lingual (palatal) bone margins. Such placement has been followed in our study by a rebound of the interproximal tissues and a relatively stable buccal position of the tissues. Recession and loss of attachment have not been observed one year postoperatively.

The coronal placement of thick flaps generally results in increased pocket depth post-surgically, a slow recession of the gingival margin to a position which is related to the bony architecture and tooth to tooth relationships, and increased difficulty in post-surgical management by the therapist.

This is not to suggest that the depth of the sulcus five years postoperatively will necessarily be directly related to the thickness of the flap which was originally elevated, but merely to indicate that a successful postoperative result is commonly related to the ability of patient and therapist to perform plaque removal and maintenance. A gingival sulcus of minimal depth will facilitate post-surgical instrumentation by the therapist and home care performance by the patient.

The use of individual or continuous vertical mattress sutures allows an optimal placement of the margins of the flap and yet insures an intimate adaptation of the tissues in the interproximal areas. Interrupted sutures may also be utilized as described by Ramfjord. Failure to obtain tight interproximal closure and adaptation of the flaps has been suggested to be a potential source of failure of the procedure. A comparison of areas in which the interdental tissues were lost with those
in which tight closure was maintained does not reveal statistically significant differences postoperatively regarding attachment level. This is not to excuse poor operative technique, and primary closure of the flap is warranted for other clinical reasons.

Upon completion of the suturing, the flaps are adapted to the bony tissues and necks of the teeth by the application of pressure for three minutes with surgical sponges which have been dampened with warm saline.

Postoperative Care

Upon completion of the surgical procedure, the area may be dressed or left uncovered based upon the surgeon’s preference. We have observed a minimal amount of postoperative discomfort in open curettage procedures. The majority of patients are comfortably maintained by the use of a mild analgesic such as acetaminophen (600 mg).

A distinct advantage of omitting the surgical dressing is the immediate reestablishment of effective home care. Within 48 hours most patients are able to begin plaque removal with a softened tooth brush. By five days the patient can be carefully flossing to the gingival margin. This rapid return to home care prevents accumulation of debris and retards development of significant degrees of clinical inflammation in the tissues. It is our impression that a concomitant decrease in post-surgical sensitivity also results from the patient’s home care performance.

At five to seven days, the sutures are removed, the surgical area carefully cleansed of any debris, and the gingival sulci are carefully curetted. This pattern of post-surgical maintenance is continued for three weeks at which time the interval between post-surgical visits may be lengthened.

Conclusions

The motivation for research into flap curettage is that a significant loss of periodontal attachment may occur with other surgical procedures, that the initial surgical benefits may not be enduring, and that regeneration of the periodontium benefits would be preferable to restoring the results of disease.

Data obtained from such studies indicate that distinct differences may be detected in regard to certain parameters such as pocket depth, level of epithelial attachment, etc., when recently performed periodontal surgical procedures are compared. However, after a five year follow-up of three surgical procedures (curettage, modified Widman and pocket elimination) Ramfjord et al. could report little difference among the three procedures. The most favorable results of all three procedures were obtained interproximally.

Whereas subgingival curettage gave the most favorable result regarding the preservation of attachment level, it gave the least predictable pocket elimination. Surgery was more effective in pocket elimin-
tion, but this was accomplished at the cost of increased loss of attachment. The modified Widman procedure gave results somewhat in between the other two procedures. Neither procedure gave regeneration of support in amounts that could be concluded to be clinically significant. Ramfjord's conclusions essentially were that there was little to choose between the procedures and that although differences were detectable, they were not significant. Therefore, he states "the clinician may make his choice of procedure on basis of convenience of performing the procedures, esthetics, root exposure, and potential for oral hygiene maintenance."

Our experiments also document differences in surgical result with flap curettage and osseous resection, but differences in experimental design and analysis may be the basis for our observations. Trends similar to those observed by Ramfjord are seen, but how substantial differences in architecture will result in measurable long-term alterations in periodontal disease cannot be stated at this time. However, based on examination of data obtained from frequent use of various surgical procedures, we believe open curettage approach to be indicated as follows:

The Patient with Advanced Periodontal Disease. The efficacy of resective surgical procedures is certainly open to question in these patients. The application of such procedures can lead to the elimination of the band of attached gingiva, produce mucogingival problems, remove an unwarranted amount of attachment, produce elevated mobility levels for extended periods of time, and predispose the patient with an inadequate home care to root caries.

Because of the unusual anatomic conformations of the pockets and the exposure of furcations and fluting, subgingival curettage is exceedingly difficult to perform in the patient with advanced periodontal disease. It takes unusual levels of skill and substantial amount of time to adequately perform the removal of all concretions from the root surfaces of the teeth. Indeed it has been the experience of many clinicians who have surgically treated a flap on patients who have been "maintained by curettage" for years, to find substantial deposits of hard plaque-like calculus upon the roots and in the furcations of these teeth. There is great efficacy in any technique that provides sufficient exposure to allow thorough debridement of the periodontal defect with minimal effect on the patient.

Regeneration. Flap curettage is a useful procedure in areas where defects anatomically favorable to regeneration are present, although a definite correlation with the anatomy of the defect and the success of fill has been observed. The periodontal literature is replete with documentation of report of certain bony defects. It is not the purpose of this paper to discuss regeneration, but we have observed the same correlation of local anatomy of the defect and success of fill as reported by others. It should be sufficient to say that few periodontal surgeons
Today treat every defect in every surgical area with the same surgical procedure. The art of successful periodontal treatment consists of selecting the appropriate procedure for optimal results. When the anatomy is favorable to regenerative procedures, they should be attempted.

**Esthetics.** When deep infrabony pockets exist in the maxillary anterior regions, regressive procedures are contraindicated because of esthetic considerations. Successful therapy involves more than pocket elimination or the accomplishment of certain objectives by the therapist. The satisfaction of the patient is of prime importance. A surgical procedure may be completely successful in the eyes of the therapist, but may be a total failure in the eyes of the patient if he perceives himself to have been mutilated esthetically.

**Initial Preparation of the Patient.** Flap curettage is indicated preceding the performance of orthodontic movement in the patient with moderate to advanced periodontal disease. The combination of tooth loss, periodontal pockets, and extensive restorative needs frequently calls for adult tooth movement to effect a totally satisfactory restoration of form and function. The removal of all calculus, the translucency of the apparatus, and planning of the root provide an environment in which the maximal beneficial changes in the bony architecture may occur via remodeling and regeneration.

**Summary**

It is well accepted that the success of any surgical procedure is based not only upon the skill and effectiveness of the surgical application, but upon the careful postoperative management of the patient during the healing phase. When combined with sound diagnosis and reasonable expectations, flap curettage is a valuable portion of the periodontal surgical armamentarium.

**REFERENCES**


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