OSSEOUS RESECTION—A BASIC PRINCIPLE IN
PERIODONTAL SURGERY

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A CAREFUL survey of all the techniques for gingivectomies has revealed that each of these named operations has its special application in which it is peculiarly the best; but none of them has such a universal application as to be suitable for exclusive use in the field of periodontal surgery. The principal aim of this report is to present yet another concept in surgery which will meet some of the objections and overcome some of the shortcomings of all present known operations. This concept will suggest new techniques which will be dealt with in this report.

Before going into detail on the principles in question, some clarification may be necessary on the general objectives of gingivectomies and resections. Surgery should be resorted to only when the pocket cannot be eliminated by conservative means or when time is an important factor in treatment. It is not the purpose of this study to create more controversy where much of it has existed in the past, but it is better to set down at this point the general conception of treatment of a patient with periodontal disease to eliminate any possible misunderstanding. Where conservative treatment is feasible it is preferable to surgery, but the one constant in treatment must be pocket elimination by any means before a patient may be dismissed as cured. It is, of course, well known that some of our most accomplished periodontists limit themselves to a great extent to the conservative approach, and, in those patients who do not yield pocket closure as a result of treatment, will keep teeth in use for many years which have considerable crevicular depth. These patients frequently break down rapidly, need constant and meticulous office treatment, and present at times a waiting and potential nidus for reinfection. The retention of teeth with deep sulci militates against that point of view as a basis for treatment.

The Named Operations

We have at hand the gingivectomies for the elimination of the pocket. In performing a gingivectomy we attempt to create a selective recession where there exists a deeper than normal sulcus. All gingivectomies should be judged by the ease with which this selective recession is achieved and by the permanence of the result.

Since we are dealing with the gingivectomies, certain surgical periodontal techniques cannot be properly included in this study because they are designed

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Read for the Section on Periodontia, American Dental Association, Chicago, September, 1948.
Received for publication Oct. 22, 1948.

316
to promote reattachment and a reorganization of the affected tissue. Reference is made to the operation devised by Barkann and a differing one by Beube.

Barkann attempts to excise the epithelial lining of the pocket surgically. The rationale of this procedure is to permit the deeper connective tissue to lie in direct contact with the previously prepared root surface. In this way, it is claimed, some reattachment may be possible before the epithelium grows down into the pocket to prevent it.

Beube, on the other hand, limits his interdental tissue resection to the interproximal pockets only. It consists, essentially, of excising a wedge-shaped plug of interproximal tissue extending to the base of the pocket. By exercising judicious control of the granulation tissue, an entirely new interproximal connective tissue mass is formed on healing, which, Beube stated, is more likely to be firmly adherent to the root than is tissue not so surgically prepared.

Neither of these techniques is designed to eliminate the pocket by recession, but they are surgical aids in a conservative direction. They both aim to achieve pocket elimination by closure rather than by creation of a predetermined recession. Thus they do not properly fall within the scope of this report.

The gingivectomies in general, however, consist of a careful resection of unsupported soft tissue to the level of remaining bone. There is some distinction made between the base of the pocket and the bone level in some techniques as far as the depth of the resection is concerned, but they are almost exclusively directed toward the excision of soft tissue only. The Ward, Crane-Kaplan, Kirkland, and Black operations are well described in the literature and serve as examples of this type of surgery. There is no attention paid to the bony outlines of the pocket with the exception of some recommendation for the removal of spicules and spines in sharply localized areas that may be exposed by the soft tissue resection.

The one fault common to all these operations is the lack of adequate diagnosis. While the extent of soft tissue involvement is adequately noted, little if any interest is shown the form and status of the bone in the operative field. It is true that in the gingivectomies soft tissue is resected to this bony profile, but the profile itself is not altered in the classical descriptions of these named operations by their authors. Goldman and Orban recognized single specific indications for correction of the bony profile, but they did not come to a general conclusion which could be more broadly applied.

It has often been observed that there is a postresection regrowth of soft tissue beyond the crevicular depth regarded as normal. This regrowth occurs interproximally and, under certain conditions, on the bucal or lingual as well. No explanation has ever been offered for this regrowth—and a loss or compromising of the desired result—beyond the usual one of a possible lack of adequate home care on the part of the patient. Inadequate postoperative home care will allow the proliferation of tissue to take place which will negate the beneficial results of the gingivectomy; however, all cases of proliferation cannot be explained on that basis. In too many cases sharply selective areas of gingivae behave in this manner which are easily accessible to and receive their
share of adequate postoperative care. An objective appraisal will demonstrate that we cannot attribute all proliferation to faulty hygiene, especially so because frequently the proliferated tissue is firm and of good color and shows none of the inflammatory changes clinically usually associated with poorly maintained soft tissue hygiene. It must be borne in mind that this proliferation prevents the recession we desire. A deep, though clean, gingival sulcus is not a successful surgical result. A similar result may be obtained by skillful curettage.

If we observe the bony configuration of the alveolar bone, we can readily see that sharp geometric configuration is frequently found wherever periodontal destruction is localized to a small section or sections of an area. This loss of bone is not a regular pattern but presents sharp deviations from the expected bone profile. It is at times sharply localized, even about portions of a single small root. Bone, being a hard, inelastic tissue, seems to have no difficulty in maintaining these deep, geometric, almost jagged variations in form on a permanent basis. Superficial gingival tissue, on the other hand, does not follow such an outline permanently.

**Osseous Resection**

**Methods.**—The material from which this report was developed was obtained from the school clinic and from office practice over a period of ten years. The techniques described were used with gratifying results over a long enough period of time to evaluate them as a corrective for the defects encountered in the soft tissue gingivectomies.

In order to provide a sound base upon which the resected gingiva could heal and be maintained, it became necessary to make alterations in the bone profile in certain cases. The degree of variation between levels of bone of adjacent teeth and the exact outline of the pocket must be determined and made part of the record in order to decide preoperatively when bony resection is required. In this way the operator can determine if the variation in bone levels is slight enough (approximately 30° or less) to be maintained by the gingival tissue after resection, or if the variations are great and must be made less so surgically. In patients in whom an involved root is prominent buccally, an angle of 60° can be easily tolerated. Surgical judgment must be used in these patients. Therefore, in those patients who present deep isolated pockets, the incision must begin and end mesially and distally enough in relation to the pocket to permit a graceful, gradual rise and fall in the proposed bony profile with the greatest curvature of the are at the deepest point of the pocket.

In opening the bony operative field, there are two methods that may be pursued. In the first and simplest method, a long, sweeping, curving incision is made from one end of the area to the other, slightly apical to the deepest extent of the pockets in the field. After the removal of the soft tissue has been accomplished, the exposed bone is then resected to conform to a gradual rise and fall in profile, with the depth of the involved bone converted to a short plateau or even a crest. This method leaves some bone exposed and gives rise to more postoperative pain than the procedure to follow.

A second and more satisfactory though more difficult method consists of performing a simple soft tissue gingivectomy first and then reflecting the
remaining gingiva and performing the necessary bone resection. The short flap is then replaced to cover exposed bone. Surgical dressing is applied and the case carried forward in the usual manner.

**Indications.**—Case 1 presented in Fig. 1 illustrates an indication for this type of operation. The patient was a 32-year-old man who had lost all the posterior teeth of the upper left side because of recurrent periodontal abscesses prior to his presentation for treatment. The same condition was beginning to appear on the buccal gingivae of the upper right first and second premolars. He gave a history of fairly recent treatment which consisted of occlusal adjustment and a gingivectomy exposing the unsupported root surfaces. Clinical examination revealed no recession where the gingivectomy was performed. The gingiva was at the same level as that on the adjacent teeth. The reason for this was not difficult to determine. On the buccal aspect of the two premolar roots in question there was narrow (about 1.5 mm.), deep (7 to 8 mm.), slightly spiral bone loss. Soft tissue resection over these areas consisted of deep, almost vertical excisions of the unsupported soft tissue. This presented a gingival line with deep, jagged peaks and valleys. The soft gingival tissue did not conform to such a line and thus defeated the purpose of the operator, namely, pocket elimination. The result shown in Fig. 1 was achieved by resecting the buccal bone, as well as the soft tissue, and including the buccal aspect of the interproximal bony septum so as to make possible a gradual rise and slope in the bone over the affected area. The overlying gingiva conformed to that line, thus successfully eliminating the pockets.

![Fig. 1. Postoperative result in a patient with recurrent periodontal abscesses treated by osseous resection. This patient was treated previously with a soft tissue gingivectomy which did not achieve the selective recession desired because of the precipitousness of bone loss.](image)

A second indication for the operation is found frequently on the mesial aspect of tilted second molars where the lower first molar had been lost and unreplaced. These tilted second molars frequently show deep pockets on their
mesial aspect. In such an area the pocket has a hard bony saddle area mesial to it. The pocket is almost always a sudden, precipitous, deep one. The diagram in Fig. 2 illustrates this type of pocket. Soft tissue will not contour itself permanently to the sudden dip in the bone level. Such soft tissue resections have repeatedly failed in my hands. However, if the angle of bone forming the deep, almost vertical pocket is removed so as to form a gradual descending slope to the very depth of the pocket instead of the sudden precipitous drop, a more permanent result may be expected. Fig. 3 illustrates the bony resection line to be made to create the desired result. Fig. 4 approximates the end result.

Fig. 2.

Fig. 3.

Fig. 2.—This type of pocket is common on the mesial aspect of tilted second molars. Note the sudden angular dip in the bone profile to the base of the pocket. See Fig. 3.

Fig. 3.—Recommended line of incision in the bone in the case presented in Fig. 2. The soft tissue should be reflected to permit this reduction.

A third indication for osseous resection, and an uncommon one, occurs when there is a deep isolated pocket interproximally on a single tooth in an area where the adjoining teeth have normal bone support. Such a case is illustrated in Fig. 5. In this case the upper right cuspid presented an 11 mm. pocket on
the distal aspect of the tooth with its greatest involvement on the distalabial line angle. The pocket was interproximal. This case presented a rather mixed problem. Sacrificing the cuspids was no solution since the first premolar was equally involved. Sacrificing both the cuspids and the first premolar would have required a complicated restoration. The patient had a rather long pendulous upper lip and a very low high lip line. It was decided to perform an osseous resection in the area after a soft tissue resection failed to eliminate the pocket. (See Fig. 6.) The result was satisfactory in all directions except for the cosmetic factor (see Fig. 7).

FIG. 4.

Fig. 4.—Same case as Figs. 2 and 3 with the bone reduced to a gradual slope to eliminate the pocket.

Fig. 5.—Illustration of an extremely deep pocket interproximally between the right cuspids and first premolar. The dotted line represents the line of incision to be followed in the bone and soft tissue. Note the clinical case presented in Figs. 6 and 7.

A fourth indication for osseous resection may be found in some deep buccal and lingual pockets. Here the general bone profile when viewed from the buccal or the lingual aspect may very well be gradual enough to make the
periodontist expect a permanent result, even using the standards outlined in this report. Occasionally it will be found in these areas that the buccal or the lingual gingiva proliferates after the gingivectomy has been performed. A careful diagnosis of the area will show that the underlying bone ended in a thick ledge, or even in a concavity, at the margin of the bone when seen in cross section (see Fig. 8). Here, too, it will be found that the soft tissue will not

follow such a bony contour closely but will proliferate above it in an effort to achieve a knife-edge margin. The extent of that proliferation is determined by the thickness of the bony edge, and the resultant crevicular depth depends upon the amount of proliferation. A simple thinning of the bony margin to a knife-edge will insure a tightly adhering knife-edge of soft tissue above it.
A fifth example is the case of the saucer-shaped interproximal pocket. We have known for some time that to allow the buccal and lingual spines of bone to remain interproximally means the almost immediate proliferation of tissue to a level coronal, to the crests of the spines. This, of course, means the almost immediate establishment of a crevicular depth far beyond what is desired. These bony spines must be leveled so that the interproximal bone is flat or convex, permitting permanent pocket elimination.

Fig. 8.—Illustrating a deep buccal pocket with a thick bony ledge on the buccal aspect with the gingiva proliferating above it. The dotted line represents the line of incision in both soft tissue and bone to reduce the pocket permanently. Note that no supporting bone is lost.

Technique.—If the fluid characteristics of soft tissue are understood, the general objective of osseous resection becomes clear. The technique is a logical application of commonly known instruments to achieve a gradually variable bone profile. Mention has been made previously of the two alternate methods of opening the bony operative field. The method of choice is that which allows a short flap to remain to cover the bone postoperatively. The difference in postoperative pain is so great that the slightly more difficult procedure becomes clearly the more desirable one.

The armamentarium consists, besides the usual instruments necessary for a soft tissue resection, of a round surgical bur, a right angle periosteal elevator, a small bone file, bone gouges and chisels, and small tissue retractors.

After the bony field has been exposed, the interseptal bone is best treated first. The minimum line of curvature is established and the bone is to be adapted to this line. The round bur is excellent to reduce interseptal bone up to but not including the exposure of the roots of the teeth. If a very thin layer of bone is allowed to cover the roots, this is then easily removed with the chisels and gouges by hand pressure alone. If the bur is used for this purpose, the cementum is very likely to be nicked and scoured.

The buccal and lingual bone may be removed with chisels or, if the plate is heavy, by the use of the bur followed by the chisel. In those cases in which it is desired to establish a thin knife-edge to a heavy buccal plate of bone, the coarse
surgical file becomes the ideal instrument for this purpose. There are times when such a file may be slipped under the flap without retraction in this type of case.

Another area in which the bone file is useful appears in the sharply angled ledges of bone that stand mesial to deep pockets in tilted lower second molars. The bone may be reduced by file entirely, or the bulk of the angle reduced with the chisel and mallet and the finishing and contouring of the remaining bone done with the bone file.

Full use should be made of the topographical location of bone destruction. For example, if the pockets are interproximal it is often possible to use the lingual approach, and by reducing the lingual plate to conform to the standards mentioned previously, it frequently becomes possible to slant the interseptal bone so that little or no supporting bone is removed on the labial. On occasion it is the labial bone that must be sacrificed, but it is rare to find a case in which both plates must be altered. Surgical experience and judgment are valuable aids in balancing esthetics against physiologic requirements in these cases.

Surgical dressing is applied to all patients. Care must be taken that any short flap that remains not be forced away from the bone in the application of the dressing. The pack should be allowed to remain in place for one week; then it is removed, the area inspected, and a new dressing applied. On occasion a third pack will be necessary at the end of the second week, but these cases are not common.

In those patients who have postoperative pain, penicillin troches are useful in reducing discomfort. They are applied in the usual manner without disturbing the dressing. The same systemic precautions should be taken with the use of troches here as would be taken with their use in ulcerative gingivitis.

**Discussion**

The pattern of behavior of the soft tissue is conditioned by the hard tissues with which it is in contact. That is not to say that bone is such a rigid tissue that it will never round out its jagged edges or thin out its blunt margins. That is not the case. These changes are so slow, however, that the soft tissue overlying such bone will degenerate and become pathologic long before the changes can take place. It is for this reason that we must treat the problem clinically as if the bony form were permanent or nearly so. Heretofore, we have contented ourselves with soft tissue surgery with minor or inconsequential attention to the bone limited to the reduction of spicules. Many of us have watched the steady regrowth of tissue in some cases so that the depth of the gingival sulcus grew deeper than we would have had it. Too many compromises have been made with the end result. It is granted that much of this tissue looked and behaved as healthy tissue looks and behaves, but the same result may be achieved by skillful curettage without resort to surgery. The only reason for surgical management of a given ease is the certainty of the elimination of the pocket.

This does not mean that all periodontal surgery must include bone resection and reshaping as well. In fact, this is usually not the case. What is meant is that a considerable minority of cases require more than a simple gingivectomy
—it requires a careful attention to the architecture of the supporting bone and the careful reshaping of that bone to conform with the rigid behavior of soft tissue. It is exactly the opposite conception from that now held in the field. We now accept the existing bone profile, hoping that the resected gingivae will conform, but experience has proved that they do not conform unless the bony profile is altered in the manner described in this report.

Certain precautions must be taken before deciding to employ this method. If too much vital bony support must be sacrificed on sound teeth in order to retain a neighboring affected tooth, it may be better to sacrifice the involved tooth. Or, if bisection exposure is possible because of an extensive sacrifice of bone, it may be a better and sounder risk to accept a deep gingival crevice. All deep pockets are not surgical material per se.

These concrete cases illustrate the indications, techniques, and principles implied in attaining the desired result. If it is determined that the destruction involved militates against using radical surgical techniques, the compromise in case management can be made before any useless halfhearted soft tissue surgery is attempted rather than after it has failed.

References


30 JOURNAL SQUARE.