A Clinical Study on the Effects of Osteoplasty

by

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Osteoplasty as defined is the reshaping of bone that is not a part of the attachment apparatus. Included in this meaning are such procedures as thinning marginal crests, grooving and tapering interradicular septa, and flattening and coning of craters if present. Except for the analysis of the management of intraosseous defects in human beings, there appears to be little, if any, related documentation in the literature on the effects of contouring the alveolar bone profile in the absence of intraosseous defects. In view of this, a study in split-mouth therapy in human beings was undertaken in the Department of Periodontics, Northwestern University Dental School to assess such effects with respect to pocket elimination, the location of the epithelial attachment and the alveolar bone height.

Review of the Literature

Almost 20 years ago Saul Schluger (1949) presented his paper on "ossous resorption" in which he cited instances where he thought gingivectomy failed and attributed these failures to the presence of bony irregularities: ledges, reverse architecture, one-wall defects, and craters. These irregularities, he believed, were not compatible supports for the gingival form that returns following gingival resection. The soft tissues being more fluid-in nature could not adapt to the angular patterns of bone loss. He suggested thinning bone, making gentle curves and establishing plateaus interproximally to provide a suitable base for the soft tissues. He also advised against its over-application. These principles were further advanced by Friedman (1955) and Ochsnebin (1958), respectively, who recommended that wherever possible, ideal bony architecture should be restored when such architecture was destroyed by periodontal disease; that is, one should not only render gentle curves to the marginal crests and create plateaus interproximally, but one should contour the alveolar bone into fashion scalloped contours, recreate interradicular grooves, and taper the interproximal bone into cones. This concept was again presented a decade later by Ochsnebin and Ross (1969). Friedman and Levine (1964) gave a preliminary report on one individual in whom one tooth had osteoplasty and found only 0.3 mm crestal bone loss 70 days postoperatively.

Within the last decade, a number of wound healing studies have been reported which have documented the marked lability of bone. Wilderman (1960, 1963) demonstrated in dogs that the denudation and partial denudation of bone caused alveolar bone resorption. The degree of alveolar bone loss was dependent on the amount of supporting bone present even when soft tissue covering was retained. Similarly, Ramfjord and Costich (1968) reported on the marked lability of bone in two human studies; one with the denudation of alveolar bone, and the other with periosteal retention. Both papers stated that while the epithelial attachment had the capacity to reattach, or close to, its previous level, the alveolar bone does not always have this potential to restore itself.

A biometric study in human beings was done by Donnenfeld and Glickman (1964) in which they evaluated the apically repositioned flap over a three month period and found that the latter procedure contributed to alveolar bone loss (0.6 mm). In another study in human beings, Pfeiffer (1965) demonstrated the susceptibility of alveolar bone to osteoclasia when exposed by flapping. He showed histologically that by employing a full thickness flap, osteoclastic activity could be seen along side the vestibular plate for as long as seven days postoperatively. This activity, however, was superseded in 21 days with the formation of new bone. Although he also noticed no bone resorption with a split-thickness flap, he stated that where the covering was thin, or where bone was nicked, osteoclasia and resorption occurred. Caffesse, Ramfjord, and Nasji (1968) investigating the healing of reverse bevel periodontal flaps in monkeys also observed that if bone was nicked or chiseled during flap procedures, superficial necrosis and slight resorption followed. They stated however that this loss would regenerate back to the preoperative level within ten weeks provided there was good flap replacement.

As for the effect of grinding on bone itself, Lobene and Glickman (1963) observed considerable alveolar bone loss in dogs 28 days following the use of rotary stones under a water spray and stated one could not artificially create an ideal bony architecture. Matherson and Zander (1963), however, in another study in monkeys reported that bony contours created by osteoplastic procedures maintained themselves six months postoperatively. In a more recent study by Fennel, King, Wilderman, and Barron (1967) in which measurements were made on 34 teeth in 20 patients, the authors found 0.54 mm of bone resorption following the re-

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removal of 1.0 mm of crestal bone. One other article that appeared pertinent to the subject of osteoplasty was by Patut and Glickman (1962) in which they evaluated the management of intrasosseous defects. They observed over a 3 to 12 month period that nature attempted to resolve osseous irregularities through a remodeling process, which consisted of the rounding off of peaks and the filling in of concavities.

**METHODS AND MATERIALS**

Four patients in general good health with generalized chronic periodontitis between the ages of 24 and 49 were selected at random for split-mouth therapy. In three patients, the maxillary posterior segments were utilized, and in one patient, the mandibular posterior segments. For each patient, one side served as the experimental and the other as the control. Each segment for each patient had similar pocket depths and osseous changes. Care was taken not to complicate the study by selecting patients with gross intrasosseous defects.

The operative procedures for the control and experimental segments were, as follows: Full thickness mucoperiosteal flaps, utilizing reverse bevel incisions, were elevated, all granulations were removed, and root surfaces were sealed of deposits and planed smooth.

On the experimental side, utilizing round carbide steel burs and diamond stones at low speed with water spray, alveolar bone margins were thinned, and interradicular septa grooved and tapered as necessary. While no attempt was made to treat intrasosseous defects other than through complete debridement, where reverse architecture or inconsistent margins were present, efforts were made to establish smooth rounded curves including the plateauing of craters without jeopardizing radicular bone support or exposing furcation areas. For both the control and experimental sides, flaps were sutured tightly and coronally against the root surface and not repositioned at the level of the alveolar bone. Periodontal dressings protected the surgical area for two weeks with a change in between. All segments were subsequently reexamined in six months for further evaluation. All surgical procedures were done under aseptic conditions and all patients were surgically covered with antibiotics. Every effort was made during the operative procedure to minimize the period of bone exposure. Initial and postoperative therapy consisted of root scalings, instruction in oral physiotherapy, and occlusal adjustments.

**Measurements and Records**

The following measurements were made at the time of the initial and six-month postoperative surgical visit to assess reliable differences between the control and the experimental sides. All measurements less than 1 mm were rounded off to the nearest millimeter. For the location of the epithelial attachment and the height of the interradicular bone, measurements were made with a standardized William’s periodontal probe from a notch scored on the mesial aspect of the tooth adjacent to the contact point. All measurements were read to the lowest part of the notch. In all instances, including measurements of pocket depth, the probe was held parallel to the long axis of the tooth and not angulated to reach the most apical measurement. In order to avoid marring the teeth further, no distal interradicular measurements were made; and as the cementoenamel junction was often obscured by soft tissue, no attempt was made to measure the location of the epithelial attachment on the radicular aspects. The mesial alveolar bone height, however, was scored from the cementoenamel junction for all patients following the elevation of the mucoperiosteal flap. All bony measurements on the experimental side were made following osteoplastic correction. All registrations, that is, for pocket depth, location of the epithelial attachment, and height of bone as well as the surgical procedures themselves were performed by the same investigator.

In addition to these measurements, the following pre and postoperative records were obtained: study models to ascertain differences in gingival contour; study casts of the exposed alveolar bone during each surgical procedure to allow for comparative analysis; and standardized radiographs utilizing a parallel technic and X-C-P film holders with compound stabilizers for duplicating films with similar projections as described by Patut and Glickman (1962). Throughout the six-month experimental period, photographs were taken as necessary to illustrate visually the changes observed.

**RESULTS**

For both the control and experimental sides the operative procedure was followed by uneventful healing. At the end of two weeks when the periodontal dressings were removed, all patients were able to perform oral physiotherapy. These patients were then observed at one-week intervals for a one month period during which time coronal scalings, instruction in oral physiotherapy, and occlusal adjustments were given as necessary. At the end of this period, except for one three-month recall, none of the patients were seen again until the investigation was completed. At this six-month postoperative visit, three of the four patients submitted for a re-entry surgical procedure for evaluation of the bony contours and for the taking of measurements and records as outlined in the study. The fourth patient could not be persuaded to submit for additional surgery.

Analysis of the data, based on three patients for a total of 22 teeth, was as follows:
TABLE 1
Pocket Depth
Pocket Depths on Mesioseptal Tooth Surface, Buccal and Lingual (in Millimeters)

<table>
<thead>
<tr>
<th>Control</th>
<th>No.</th>
<th>Patient</th>
<th>Teeth</th>
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<th>24</th>
<th>Md (0-24)</th>
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<tr>
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<td>3.3</td>
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TABLE 2
Location of Epithelial Attachment
Distances from Notch on Mesioseptal Tooth Surface, Buccal and Lingual, to the Epithelial Attachment (in Millimeters)

<table>
<thead>
<tr>
<th>Control</th>
<th>No.</th>
<th>Patient</th>
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TABLE 3
Height of Interradicular Bone
Distances from Notch on Mesioseptal Tooth Surface, Buccal and Lingual, to the Alveolar Bone Margin (in Millimeters)

<table>
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<tr>
<th>Control</th>
<th>No.</th>
<th>Patient</th>
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<table>
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<th>Md (0-24)</th>
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<tr>
<td>Mean</td>
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<td>7.1</td>
<td>7.7</td>
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Pocket Depth
All pockets were eliminated for all teeth, control and experimental, in all patients (Table 1). The mean pocket depth at the time of the experiment (0 weeks) for the controls was 3.3 mm and at the end of the experiment, it was 2.0 mm for a mean difference of 1.3 mm. Similarly, on the experimental side, there was a mean reduction in pocket depth from 3.5 mm to 2.1 mm for a mean difference of 1.4 mm.

Location of the Epithelial Attachment (Distance from Notch on Mesioseptal Surface, Buccal and Lingual, to Base of Gingival Sulcus)
In all patients, for both the control and experimental teeth, there was a apical shift in the epithelial attachment 24 weeks following the initial operative procedure (Table 2). For the control segment there was a mean apical shift of 0.6 mm and for the experimental, 1.0 mm. In no instance was there a coronal relocation of the epithelial attachment for any of the teeth.

Height of Interradicular Bone (Distance from the Notch on Mesioseptal Surface, Buccal and Lingual, to Interradicular Bone Margin)
As with the relocation of the epithelial attachment, there was also a comparable loss in interradicular bone height 24 weeks following the initial operative procedure (Table 3). This loss occurred both for the control teeth as well as for the experimental. The mean loss for the control teeth was 0.4 mm and for the experimental 0.6 mm.

Height of Radicular Bone (Distance from CEJ, Buccal and Lingual, to the Midradicular Bone Margin)
Both control and experimental teeth demonstrated a mean loss respectively of 0.8 mm and 1.0 mm in radicular bone height at the six-month reevaluation period (Table 4). The loss on the radicular surfaces was slightly greater than that which was observed for the interradicular bone.

In comparing the pre and postoperative measurements (0-24 weeks) for pocket depth, location of the...
epithelial attachment, and height of interradicular bone, it was observed that for all these landmarks, there was a consistent mean difference between the control and experimental sides with the experimental showing the greater loss of periodontal attachment (Table 5).

**Statistical Analysis**

The various measurements of the teeth on the control side for the location of the epithelial attachment, height of interradicular and radicular bone for each patient were pooled and averaged. The average differences for all these measurements between “0” and “24” weeks were found to be significantly greater than zero (P < .01, “t” test). The respective “t” values obtained for 21 degrees of freedom were as follows: epithelial attachment, t = 3.00; height of interradicular bone, t = 2.87; and radicular bone, t = 3.75. The differences in measurements obtained on the experimental sides were of similar if not of greater magnitude than the controls and were likewise considered to be significant. In order to determine whether there was a significant difference between the control and experimental sides, an analysis of variance was done. The findings showed that there was no significant difference between the control and

<table>
<thead>
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<th>Control</th>
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<tbody>
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<td>Patient No.</td>
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**Table 5**

Differences in Mean Measurements at Time of Operation and 24 Weeks Postoperatively for and Between Control and Experimental Sites

<table>
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<th>Measurements</th>
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</tr>
<tr>
<td>Location of EA</td>
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<td>1.0</td>
<td>0.4</td>
</tr>
<tr>
<td>Interradicular bone margin</td>
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<tr>
<td>Radicular bone margin</td>
<td>0.8</td>
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**Figures 1 and 2 (Above).** Patient 1. Preoperative photograph (mirror view) and cast demonstrating contour of alveolar bone on left side (control).

**Figures 3 and 4 (Below).** Preoperative photograph (mirror view) and cast demonstrating contour of alveolar bone on right side (experimental).
photographs before, during and after the procedures, it was evident that other changes occurred which were not revealed by the Table of Measurements. These changes were peculiar for each patient and can best be reported on an individual basis.

Patient I

Photographs and casts (Fig. 1, 2, 3 and 4) showed that both the control and experimental sides had similar osseous alterations at the time of initial surgery. There was moderate edging of the marginal crests and a tendency toward reverse architecture. On the experimental side, grinding was directed toward thinning of the marginal crests and grooving and flattening of the interradicular septa. The surgical cast demonstrated that in attempting to achieve these ends, a notch was inadvertently created between the maxillary right first molar and second bicuspids (Fig. 5).

Six months postoperatively when these areas were again exposed, both the control and experimental sides showed remodeling of the alveolar bone (Fig. 6, 7, 8 and 9). On the control side, there occurred in the absence of grinding thinning of crests, introduction of grooving and a tendency toward scalloping. A transverse section of the surgical cast through the maxillary left second bicuspid shows the manner in which nature attempted to thin and round the bony margins (Fig. 10). Another transverse section between the maxillary left first molar and second bicuspid shows how the reparative process narrowed the interradicular septa, rounded off interproximal peaks and filled in concavities in the attempt to flatten the interproximal craters (Fig. 11).

Other Records and Photographs

In analyzing both pre and postoperative study models, pre and postoperative casts of the surgical sites, and

FIGURES 6 AND 7 (ABOVE). Patient I. Postoperative photograph (mirror view) and cast of the left side (control) six months following mucoperiosteal flap procedure alone.

FIGURES 8 AND 9 (BELOW). Photograph (mirror view) and cast of the right side (experimental) six months following mucoperiosteal flap procedure and bone contouring.
In comparing both the initial and reentry bony areas on the experimental side, it was apparent that the contour that was established originally underwent subsequent unrelated resorptive changes, including the smoothing out of the notch that had been created. Also, in examining a transverse section of the surgical cast through the midaspect of the right first maxillary molar (Fig. 12), it was observed that the combined effect of grinding and the subsequent remodeling changes that followed contributed to greater loss in bone width than would have occurred without grinding.

Patient 2

Intraoral photographs of both the control and experimental sides showed the presence of relatively thin buccal bone (Fig. 13 and 14). On the experimental side, the grinding procedures were confined only to grooving interradicular concavities and thinning of crests where possible (Fig. 15). When these areas were again examined six months postoperatively, both sides showed considerable alveolar bone...
FIGURES 16 AND 17. Patient 2. Postoperative photographs (mirror view) showing marked bony resorption and dehiscence of the maxillary first molars in both the control and experimental sides, respectively.


FIGURE 19 (CENTER). Preoperative bony cast of the alveolar bone contour on the experimental side. Note for both the control and experimental sides the presence of heavy bone with lingual groove architecture.

FIGURE 20 (BELOW). Bony cast of the right mandibular posterior quadrant immediately following osseous contouring.

FIGURE 21 (ABOVE). Patient 3. Postoperative photograph (mirror view) of the mandibular left posterior alveolar bone (control) following mucoperiosteal flap procedure alone. Note the degree of remodeling that occurred through natural repair.

FIGURE 22 (BELOW). Postoperative photograph (mirror view) of the mandibular right posterior alveolar bone (experimental) following mucoperiosteal flap procedure and bone contouring.

This patient had the most severe osseous alterations of the sample studied. Examination of bony casts (Fig. 18...
and 19) demonstrated that both the control and experimental sides had dense cortical bone with heavy ledging of the crests and reverse architecture. On the experimental side, grinding procedures were directed toward thinning the crests and establishing smooth gliding curves. In the area of the mandibular right second bicuspid where there was reverse architecture, the marginal bone was contoured. However, in order to avoid furcation involvements of the molars, such alteration in contour was confined only to the radicular surfaces and not the furca areas (Fig. 20).

As was seen with the previous patients, both the control and experimental sides showed considerable remodeling six months later (Fig. 21 and 22). On the control side there was marked thinning of the bony margins, establishment of gliding curves, and a reversal of contour to a more compatible form. The extent to which this occurred was remarkably similar to that which was sought through grinding procedures on the experimental side. It was also interesting to observe that these changes occurred despite the presence of very dense bone. Similarly, the experimental side showed little resorptive bone changes. In addition, in the area of the mandibular right first molar where the bone had been thinned, there was seen to occur a Class II furcation exposure on the buccal aspect which was apparently due to loss in bone height.

Relative to gingival contour and sulcus depth for all patients at the six-month recall, none of the investigators could tell by clinical observation or by examining the study models which side was the control or which was the experimental. This was particularly evident for Patient 3 who showed the severest osseous alterations and yet managed to obtain acceptable gingival health (Fig. 23 and 24).

**Discussion**

The objective of this study was to assess osteoplastic procedures in human beings, specifically to analyze the need for and the effect of artificially thinning bony ledges, grooving and coning interradicular septa, and establishing smooth gliding curves in the presence of reverse architecture. Accepting these as the only variables within the model system of this investigation, the findings were meaningful in terms of clinical healing at the end of a six-month period.

It was observed that for the sample of patients studied pocket elimination could be achieved in all three patients by employing muco-periosteal flap procedures with or without osteoplastic intervention. Although the architectural pattern of the alveolar bone was only mildly to moderately poor in Patients 1 and 2, the bony alterations in Patient 3 were pronounced and reverse architecture was present. For all three patients at the six-month termination of the investigation, neither the control nor the experimental sides could be identified on the basis of gingival contour or sulcus depth as to which side had the bone grinding without reference to clinical records.

That the need for grinding to establish an ideal bony architecture did not appear to be a requisite for gingival health was apparently related to the remodeling process that followed basic debridement procedures. It was observed that in the control segments of all three patients, there was thinning of the marginal crests, tapering and rounding of the interradicular bone, and a tendency toward scalloping and/or formation of smooth gliding curves. All these changes seem to indicate that the resorptive process that occurs postoperatively alters the alveolar bone form in the horizontal, vertical and sagittal planes. This over-all impression was supported directly by the vertical measurements and indirectly by the examination of the pre and postoperative visual photographs and bony casts of the patients examined. Furthermore, this remodeling process which accompanies natural healing was seen to occur in such a fashion as to provide a compatible base for the soft tissue. The extent to which this takes place...
It was also of interest to observe from the data that the unseparated mucoperiosteal flap procedure contributed to no new attachment in any of the patients. Rather, it alone was largely responsible for the apical shift of the epithelial attachment and the loss in height of interradicular and radicular bone. On the control sides for all three patients, there occurred a mean shift of 0.6 mm for the epithelial attachment, and for the interradicular and radicular bone, a mean loss in height of 0.4 mm and 0.8 mm, respectively. While these changes were not considered clinically significant, they were found to be statistically significant with the probability of a chance finding occurring in less than 0.01 ("t" test). Similarly, it was observed that for the experimental sides where grinding procedures were done there occurred postoperatively a mean apical migration of the epithelial attachment (1.0 mm) and loss of alveolar bone (interradicular, 0.6 mm; radicular, 1.0 mm). While these changes were of a slightly greater magnitude than those which had occurred on the control sides, they were not found to be significantly different (analysis of variance).

It would appear from these findings that grinding procedures alone apparently do not cause any more loss of tissue support than that which would normally occur following a mucoperiosteal flap elevation. Although this finding does seem to minimize the effects of osteoplasty, it does not however obviate the overall effect of osteoplasty on the bony housing. Rather, the data showed that the combined effect of removing bone

**Figure 25.** A demonstrates the manner in which bone remodels (R) itself following a mucoperiosteal flap procedure. B demonstrates that provided the bone housing is sufficiently wide (W), osteoplasty (O) will not contribute to any further reduction in bone height (H) other than which would occur through natural resorption. C shows that if the housing is thin, osteoplasty can contribute to additional loss in bone height.

**Figure 26 (left).** Patient 3. Pre and postoperative radiographs of mandibular right posterior segment (experimental).

**Figure 27 (right).** Pre and postoperative radiographs of mandibular left posterior segment (control).
through grinding and the subsequent remodeling that follows can contribute to a greater reduction in bone support than would occur through a flap procedure alone. Furthermore, the data showed that this additive effect can become clinically significant when the full bony dimensions and the reaction of the bony template itself are not predictably ascertainable. This principle can be seen in Fig. 25 where the resorption "front" that occurs following a flap procedure is found with osteoplastics procedures on bone housing of different widths. Where the bone is thick, grading may only contribute to an additional reduction in width; but, where it is thin, it can also bring about a reduction in height. This untoward finding was particularly evident in Patient 3 who had advanced periodontal disease. On the experimental side in which grading procedures were done to reduce a heavy ledge in the area of the right first mandibular molar a furcation involvement developed because of bone loss in height as well as in width. On the control side that demonstrated similar bony changes preoperatively, no such postoperative lesion developed. Pre and postoperative radiographs clearly show this change (Fig. 26 and 27).

As for seeking to establish ideal contours through bone grinding procedures, the study also demonstrated that the bone contour that is created does not maintain itself during the healing process, but rather reflects resorptive changes that are governed wholly by the bone housing itself. This latter finding was particularly evident in Patient 3 who had advanced periodontal disease. On the experimental side in which grading procedures were done to reduce a heavy ledge in the area of the right first mandibular molar a furcation involvement developed because of bone loss in height as well as in width. On the control side that demonstrated similar bony changes preoperatively, no such postoperative lesion developed. Pre and postoperative radiographs clearly show this change (Fig. 26 and 27).

While these findings again demonstrate the liability of bone, they should in no way be interpreted to dispute the need for flap procedures and osteosurgical intervention. There is sufficient clinical evidence to support the importance of visualizing intrabony defects and introducing such techniques as are necessary for their management. Also, there are apparent clinical situations where, in the presence of gross bony profile deformities, artificial recoating can and does facilitate the remodeling process. What the study does demonstrate is that bone reshaping is part of the healing response, and for the cases studied in this report, natural repair accomplished much of which osteoplasty sought. Furthermore, it also pointed out that the resorptive process continues after osteoplasty and the extent to which it occurs could not wholly be anticipated among the patients observed. In view of this and in order to maintain maximum periodontal support, nature's own ability to achieve a bony form compatible with gingival health should, in all clinical instances, receive primary consideration previous to any decision for artificial recoating procedures. 

Summary and Conclusions

Three patients with moderate to severe generalized chronic periodontitis submitted to a six-month study in split-mouth therapy in order to evaluate the effects of osteoplastics procedures through bone grading. In each patient both the control and experimental sides had similar osseous alterations in bony contour.

The operative procedure consisted of unrepurposed mucoperiosteal flap procedures for pocket elimination. On one side, grading procedures were employed for thinning marginal crests, grooving and coating interradicular septa, and establishing scallops and/or smooth gliding curves; the other received no contouring procedures and served as the control. All patients responded well to the procedures. Six months later they returned for a reentry procedure for reevaluation of changes, if any, to the bony profile.

Based on clinical measurements, photographs, bony casts, study models and radiographs of the sample studied, the following conclusions were made:

1. Mucoperiosteal flap procedures were capable of eliminating periodontal pockets without the intervention of osteoplasty in the sample of subjects studied.

2. Mucoperiosteal flap procedures contributed to apical migration of the epithelial attachment and loss of alveolar bone. These changes were found to be statistically significant (P < .01, "t" test).

3. The alveolar bone profile undergoes favorable remodeling changes following mucoperiosteal flap procedures. The pattern of the bony architecture that is established appears to be compatible with gingival health.

4. Similar remodeling occurs after osteoplasty. The amount of bone loss was not found to be statistically different from that which occurred following mucoperiosteal procedures. The combined effect of bone grinding and the resorptive process that follows contributes to greater bone loss than that which would follow mucoperiosteal procedures alone.

Bibliography


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**Announcements**

**HELP WANTED!**

On September 8th a fire totally destroyed the office of Dr. Arthur Gold, Chairman of the Subcommittee on Journal Subscriptions. Among the destroyed items was the list of all individuals who have slides of the front cover of the Journal and are, we hope, showing them at lectures to stimulate Journal subscriptions.

Also destroyed was a list of volunteers developed during the past year of individuals located throughout the United States who had agreed to contact lecturers and clinicians at regional meetings to encourage them to use the slide to promote Journal subscriptions.

It will be greatly appreciated if those who volunteered to serve in this endeavor notify, Dr. Arthur Gold, 1793 Main Street, Suite 202, Springfield, Massachusetts, 01103, of their continued willingness to serve. Mail contact will then be established to activate the program which it was hoped would be active at the Philadelphia meeting.

It will also be appreciated if those individuals presently using slides notify Dr. Gold. This will avoid their being contacted again when it is noted that they are giving presentations before various dental groups.

**NEW JERSEY COLLEGE OF DENTISTRY**

The New Jersey College of Dentistry announces the following continuing education courses:

- **April 22, 1970**
  - Periodontal Therapy: The Management of Gingival, Maco-Gingival and Ossous Problems
  - Drs. J. Fransetti and T. Lenick
  
  For information write to Dr. Daniel L. S. Sei, Director of Continuing Education, New Jersey College of Medicine and Dentistry, 201 Cornwall Avenue, Jersey City, New Jersey 07304.

**COLUMBUS HOSPITAL DEPARTMENT OF DENTISTRY**

Columbus Hospital Department of Dentistry announces the following continuing education courses:

- **May 8, 1970**
  - Tooth Movement in Restorative Dentistry
  - Dra. Cecalove, Libassi

- **April 17, 1970** (Friday)
  - The Role of the Dental Hygienist in Periodontal Therapy
  - Dr. Frank Fischetti

- **April 24, 1970** (Friday)
  - Practical Radiography for the Dental Hygienist
  - Dra. Libassi, Pollock

For further information contact Dr. A. C. Cacelove, Director of Postgraduate Dental Education, Columbus Hospital, 227 East 19th Street, New York, New York 10003.