Flap Technique for Periodontal Bone Implants

Papilla Preservation Technique

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A NEW FLAP DESIGN FOR PLACEMENT of implants into osseous defects has been described. The flap design can be used in anterior and posterior areas of human subjects. Photographs of representative cases are presented. Wound healing always occurred by primary intention and without evidence of immediate graft exfoliation. Interdental soft tissue craters did not develop, making it easier for patients to maintain optimal oral hygiene. This type of flap design can also be used without grafts in order to improve postoperative soft tissue contour.

During the last decade, considerable attention has been given to the use of bone grafts in order to improve the amount of new connective tissue attachment and bone regeneration in vertical defects. Various types of autografts, allografts and xenografts[1-4] have been used over the years with mixed results. Recently, with the advent of commercially available hydroxylapatite and B-tricalcium phosphate, the use of alloplastic implants became popular among many clinicians.[5-8] While there are individual cases where autografts and alloplastic implants have resulted in successful treatment of periodontal defects there is no predictable material currently available to clinicians. There is general agreement that the surgical techniques used for osseous grafts are quite specific for these materials and are apparently very critical for successful therapy. However, there has not been a detailed description of the surgical approach to osseous grafting procedures.

Excluding minor individual variations, all grafting techniques follow a similar management sequence which has been well documented in the literature.[9] Various authors mention the use of an internal bevel full thickness mucoperiosteal flap or the modified Widman flap[1,6,10,11] to preserve a maximum amount of tissue for graft coverage.

The most common postoperative problem associated with grafting procedures is the immediate, partial or complete exfoliation of the implant materials.[12] This is most often due to a surgical technique that results in incomplete tissue coverage of the graft material in the interproximal areas. Even if there is an apparent tissue approximation at the time of surgical closure, the tissue contraction associated with wound healing will often expose the graft material during the postoperative period.

If primary flap closure is not accomplished, the graft survives only if a blood clot over the graft is organized by connective tissue ingrowth and subsequent epithelialization of the wound. During this process, the importance of excellent plaque control becomes crucial. However, the regular internal bevel flap design or the modified Widman flap design often heals with interdental soft tissue craters. This creates difficulty for the therapist and patients in the performance of plaque control procedures. In these situations, plaque retention, persistent soft tissue inflammation and/or delayed sequestration of implant materials are often observed postoperatively. It is apparent that proper flap design, atraumatic management of tissue and appropriate suturing techniques are essential if osseous defects are to be successfully treated with grafting procedures.

Based on these observations, the *papilla preservation technique* was developed for use in conjunction with implants in periodontal osseous defects.

Techniques similar to the papilla-preservation method have been described by App[13] in 1973 and by Genon and Bender[14] in 1984. The App technique[13] utilizes split thickness flaps and has not been generally used for reconstructive surgery. Genon and Bender[14] recommend the method mainly for esthetic surgery in the anterior area.

In the papilla preservation flap the facial surface is prepared with a sulcular incision around each tooth with no incisions being made through the interdental

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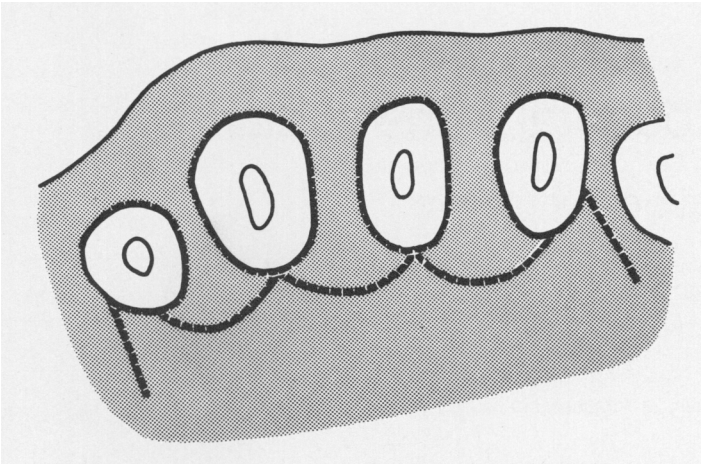

Figure 1. *Schematic view of incision lines at dento-gingival level. The semi-lunar incision is made with the scalpel perpendicular to the outer surface of the gingiva.*

papilla (Fig. 1). The lingual or palatal flap design consists of a sulcular incision along the lingual or palatal aspect of each tooth with a semilunar incision made across each interdental papilla. This semilunar incision dips apically from the line-angles of the tooth so that the papillary incision line is at least 5 mm from the gingival margin. This allows the interdental tissue to be dissected from the lingual or palatal aspect so that it can be elevated intact with the facial flap.

We have used the papilla preservation flap alone and also in combination with a conventional flap design in order to compare, clinically, the healing process after both techniques.

DESCRIPTION OF THE TECHNIQUE

Presurgical Preparation. *Initial Mouth Preparation.* The gingiva, especially the interdental papilla, must be relatively free of inflammation and firm. Effective oral hygiene procedures and particularly interdental cleaning must be carefully taught by the clinician and scrupulously followed by the patient.

Surgical Technique. *Flap Design and Incisions.* After anesthetizing the area, the extent of the bone defect is determined by probing. The extension of the osseous defect to the palatal or lingual aspect of the interdental papilla will determine the position of the semilunar incision. This incision must be at least 3 mm apical to the margin of the interproximal bony defect. This will ensure that the flap margin is well away from the area to be grafted and that the graft material will be completely covered by intact papillary tissue at the time of suturing. In situations where the osseous defect has a large extension onto the palatal or lingual surface the papillary preservation procedure is modified so that the semilunar incision is on the facial aspect. The incisions extend to the alveolar crest. When making the incisions in the interdental areas, the tip of the scalpel blade remains in contact with the root surface. This avoids compromising the blood supply to the interdental papillae and ensures a maximum amount of tissue interdentally. In posterior areas with a narrow interdental space, it may be necessary to trim off the tip of the papilla in order to effect the intact papilla through the embrasure space. The semilunar incision is made with the scalpel perpendicular to the outer surface of the gingiva and extends through the periosteum to the alveolar process.

Reflection of Flap. After completing the incisions the flaps are reflected. A curette and/or interproximal knife is used to carefully free the interdental papilla from the underlying hard tissue. It is important that the interdental tissue, which is a part of the facial or lingual flap, is completely free and mobile before proceeding to the reflection of the papilla. The detached interdental tissue is carefully pushed through the embrasure with a blunt instrument so that the flap can be easily reflected with the papilla intact. A full-thickness flap is reflected with a periosteal elevator on both facial and lingual (or palatal) surfaces. Once both flaps are reflected, access to the interdental bony defect will be obtained. While holding the reflected flap, small back-action chisels are used to scrape the margins of the flap, including the interdental tissue until firm connective tissue is reached (Fig. 2). This will remove all of the pocket epithelium and excessive granulation tissue. Any remaining excess granulation tissue is trimmed from the underside of the interdental tissue using fine tissue scissors (Fig. 3). However, the remaining thickness of the interdental tissue must be at least 2 mm to ensure an adequate blood supply and to provide the graft materials with an adequate thickness of tissue over their coronal surface. In anterior areas where there is horizontal bone loss, the trimming of granulation tissue is minimal in order to maintain the maximum thickness of tissue so that postoperative gingival recession is minimized. The

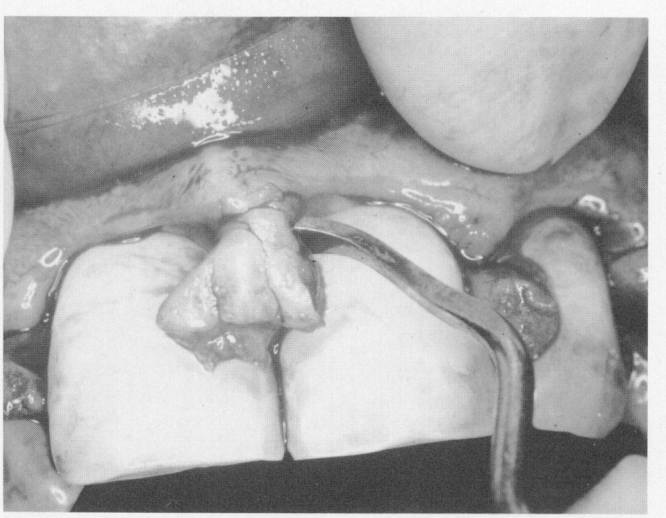

Figure 2. *After incision and total freeing of the tissue, the papilla is pushed through the embrasure so that the total papilla will be in one of the flaps. At this time the flap margin is scraped to eliminate the pocket epithelial lining.*

J. Periodontol.
April, 1985

bony defect is cleaned out using curettes, and the roots are thoroughly scaled and root-planed.

Placement of Implant Material and Closure of Flap. Implant materials may be used in granular or solid forms. In both cases retention of the material in the defect while the suture is being placed may present some difficulties. In these cases a cross mattress suture is placed prior to the insertion of the implant. This suture is kept very loose (Fig. 4) prior to the placement of graft material into the defect. This suturing prior to graft placement prevents dislodgement of the graft during the suturing procedure. The cross mattress sutures result in optimal flap closure without having suture material in direct contact with the graft material. This reduces the risk of graft reflection with subsequent exfoliation. The defect is filled with the graft material and the flaps are replaced over the graft. The sutures are now tightened to bring the two flaps in intimate contact along the incision lines. A soft, surgical dressing is placed over the surgically treated area. A surgical dressing is necessary in all graft surgeries as it reduces the likelihood of postoperative flap displacement by

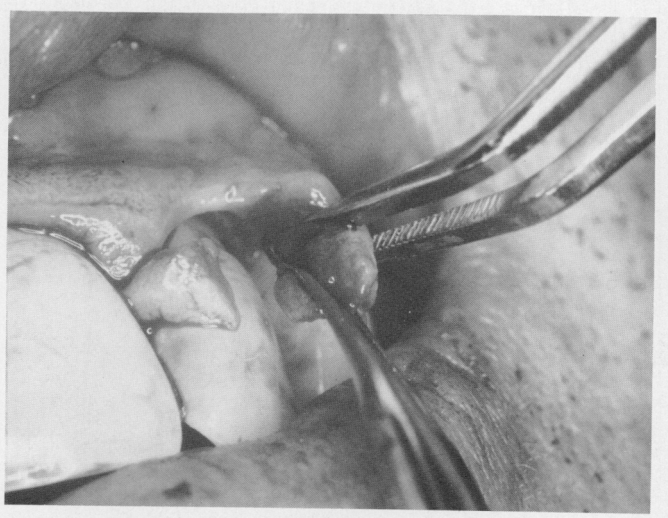

Figure 3. *Excess granulation tissue can be trimmed off from under the flap.*

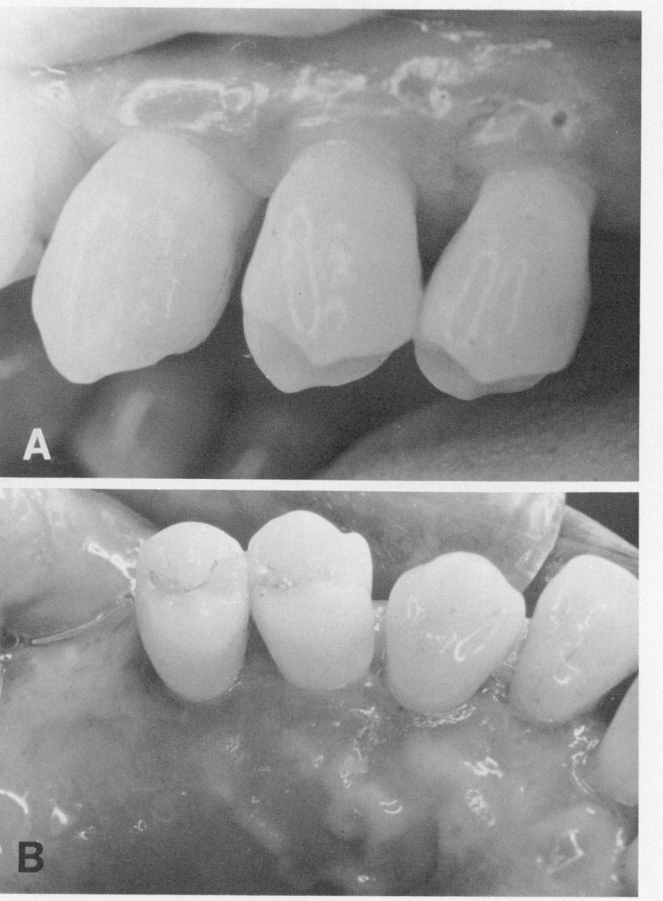

Figure 5. *Facial and palatal views of surgical site.*

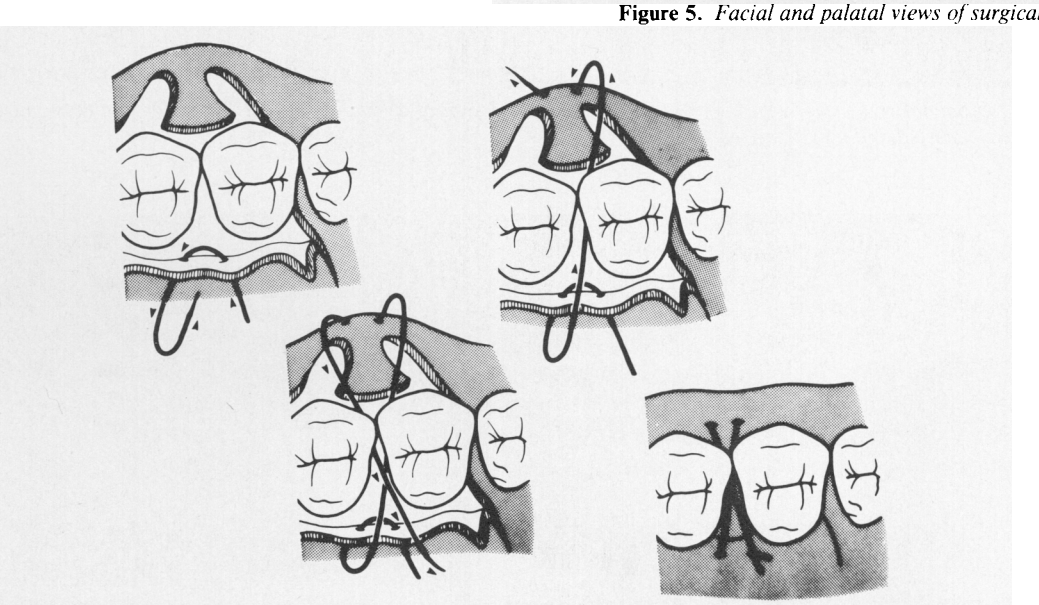

Figure 4. *Steps in placement of the cross mattress suture. Upper left, suture through palatal flap; upper right, suture through facial flap; lower left, suture completed but left loose. Graft material is placed and then, lower right, suture is tightened.*

mastication, tongue action or accidental tooth brushing.

Sometimes the outlined loose mattress suturing of the flap may not be needed. A direct suture of the semilunar incisions can be done in these cases as the only means of flap closure.

In order to reduce the possibilities of postoperative complications, the patients are usually given antibiotics. It seems logical that the use of antibiotics may enhance the chances of success when seeking reattachment and bone regeneration. However, there is no research to support this contention.

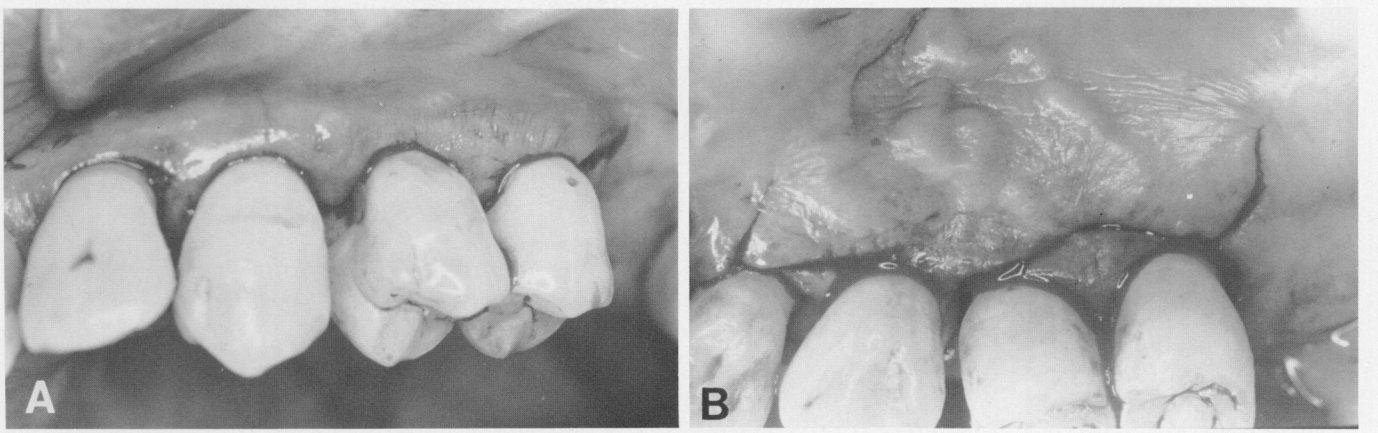

Figure 6. *Facial and palatal views of incision lines. Note that between the canine and first premolar a conventional flap was made.*

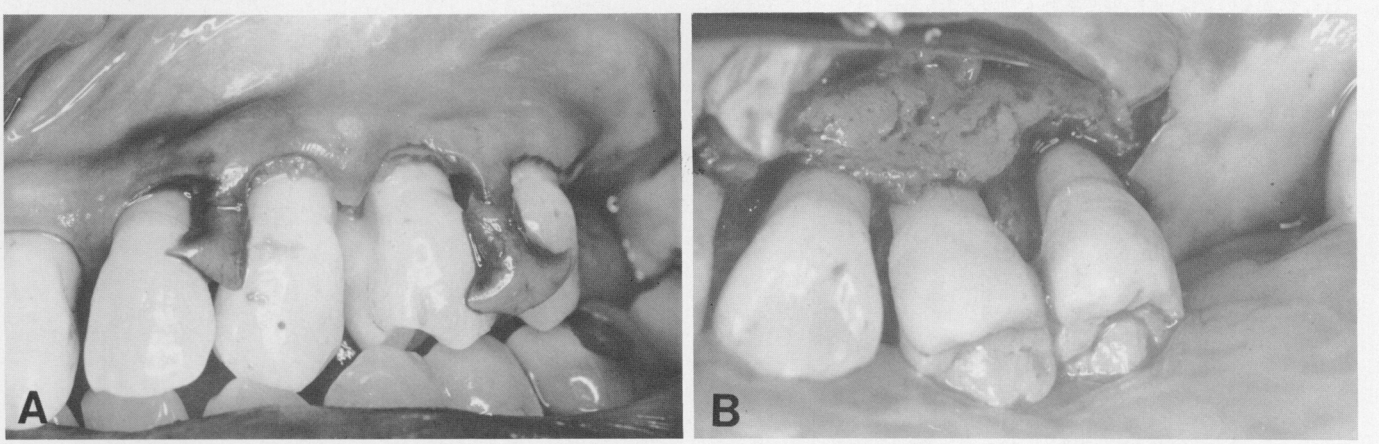

Figure 7. *Facial and palatal views after reflection of flaps and degranulation of defects. Note that facial flap contains entire papillae between premolars and between cuspid and lateral incisor.*

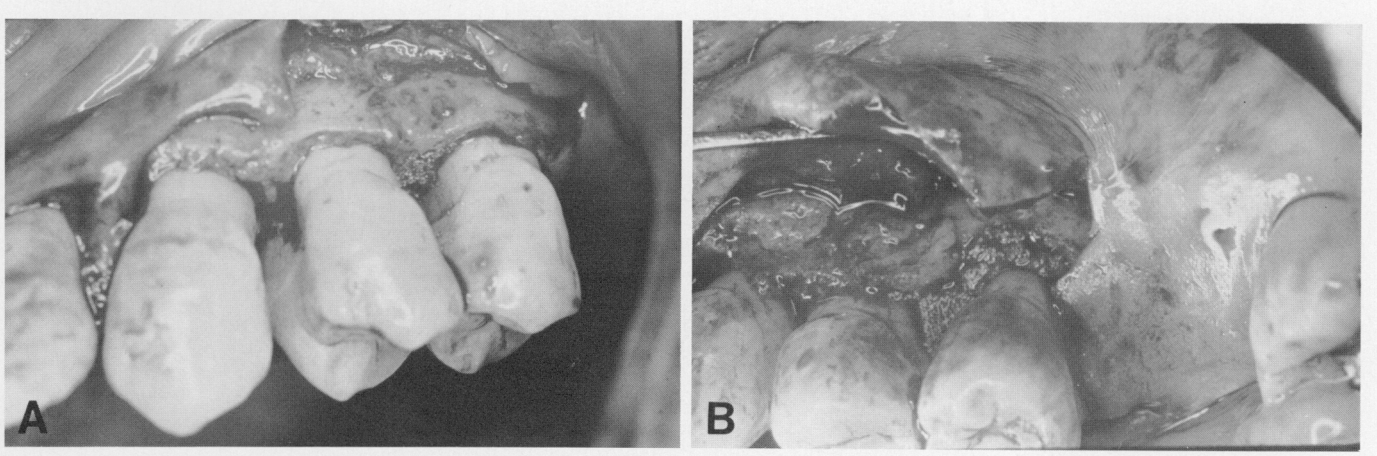

Figure 8. *Facial and palatal views of synthetic implant placed in the defect. In this case, the implant (Interpore 200®) was placed prior to suturing.*

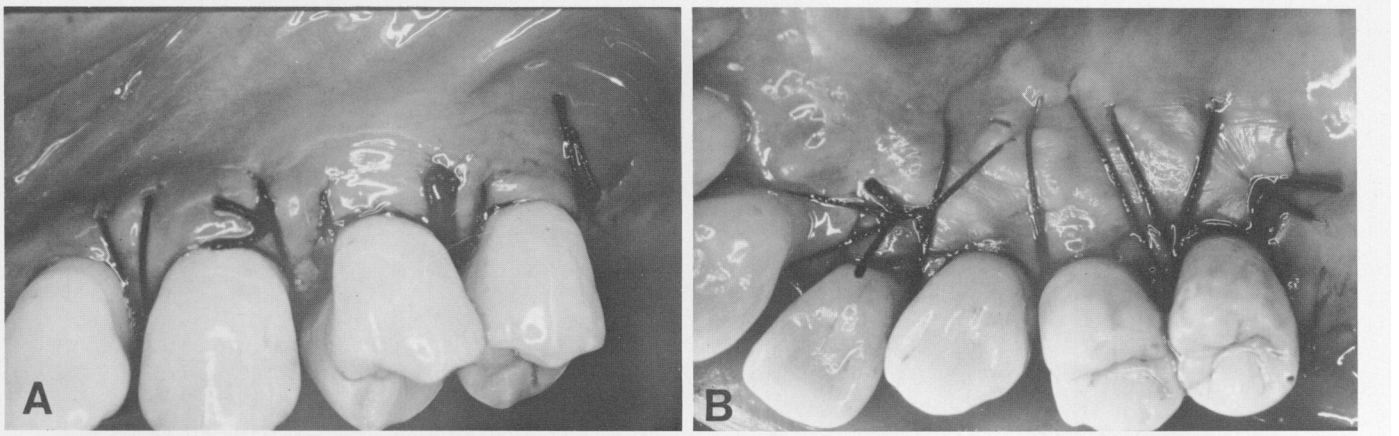

Figure 9. *Facial and palatal views of completed cross mattress suturing.*

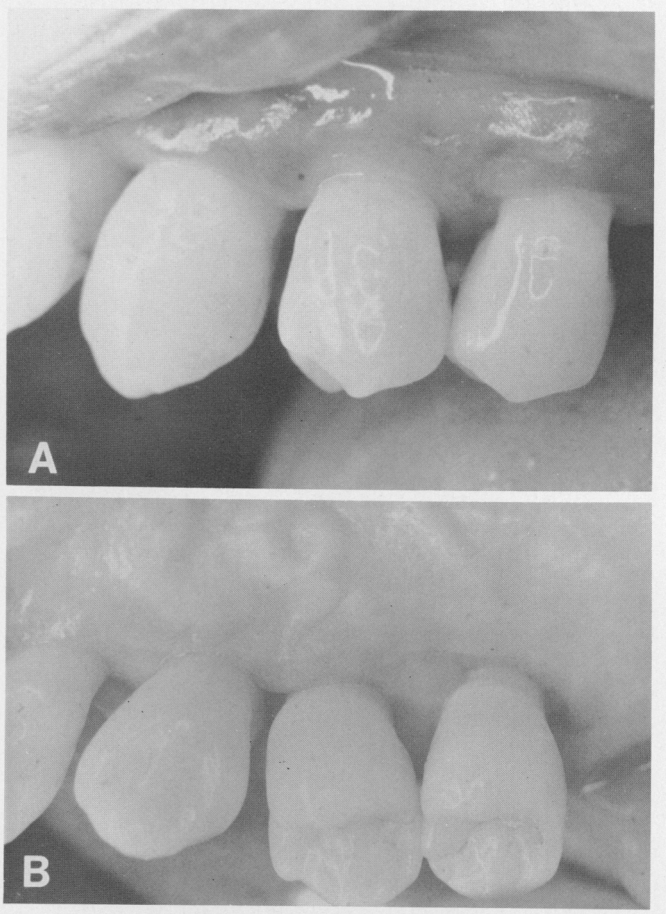

Figure 10. *Three-month postoperative healing. Note that between canine and first premolar where a conventional flap design was carried out, an interdental soft tissue crater is still evident.*

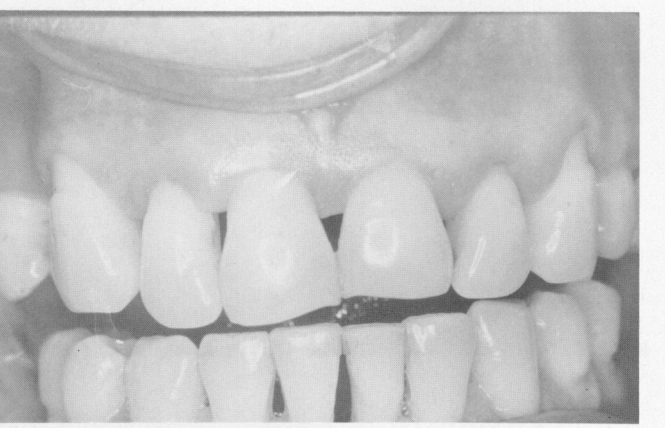

Figure 11. *Another case showing surgical site prior to surgery.*

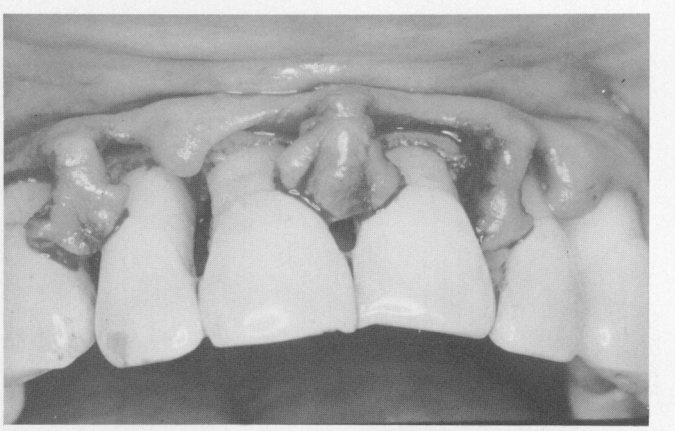

Figure 12. *Flap reflected, with interdental papillae as part of the facial flap, except in space between right lateral and central incisors (#7 and 8) and between left lateral and cuspid (#10 and 11) where a conventional flap was made.*

Postoperative Care. The dressing is replaced at 7 days postsurgery at which time the sutures are removed. The surgical area is gently cleansed with saline and the new dressing is left in place for another week. Two weeks after surgery the dressing is removed and the area cleaned with peroxide. Oral hygiene instructions are reinforced at this time. The pockets should not be probed until at least 3 months after the surgical proce-

dure in order to avoid disrupting the initial reattachment.

Figures 5 through 16 show the procedure in clinical cases.

DISCUSSION

This surgical approach has been used in a total of 25 cases, in anterior as well as posterior areas. In most instances it has been used in connection with a solid implant (Interpore 200®) but it can also be used with granular type materials or without implants. The patients have been followed up postoperatively for 6 months or more. All wounds healed by primary intention, and there was no evidence of graft exfoliation.

In several cases we have compared the results of a conventional flap design with the papilla preservation flap. In the area where the new technique was used, interdental soft tissue craters did not develop after the suture removal, and it was easier for the patients to maintain optimal oral hygiene. The 6-month result in all cases was a normal pyramidal-shaped interdental papilla with healthy gingiva covering the area of the grafts. In areas where the regular flap technique was employed, there developed a small crater in the tip of the papilla which, in some cases, made interdental cleaning more difficult.

The papilla preservation flap can also be used in the anterior area of the mouth to obtain a better esthetic result. Variations of the technique for cosmetic purposes will be described in a separate paper.

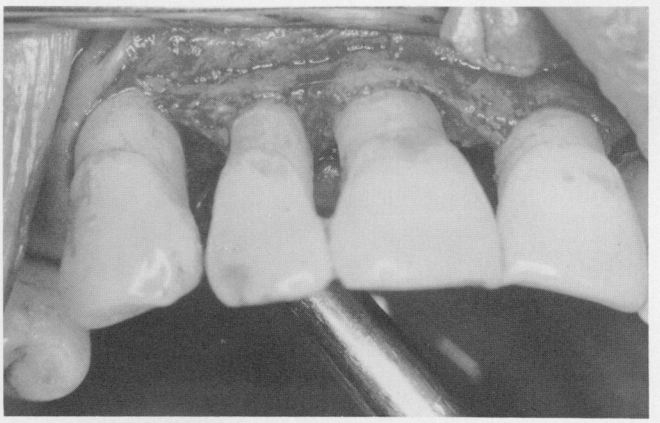

Figure 13. *After reflection of the flap the defects are degranulated.*

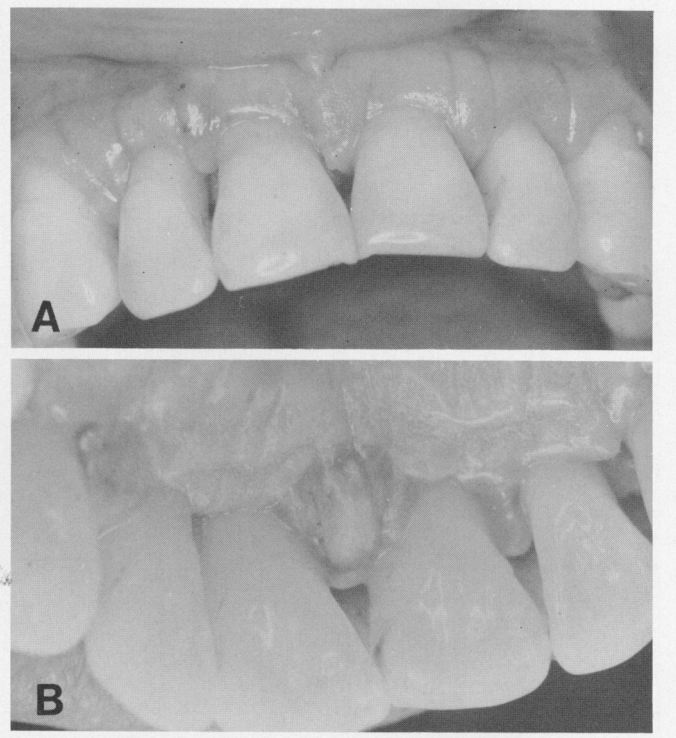

Figure 15. **A,** *Facial view of 1 week postoperative healing.* **B,** *Palatal view of healing after 1 week. Note the shape of the interdental papillae. Between Teeth #8 and 9 and between #9 and 10 a papilla preservation technique was performed and the papillae are pyramidal in shape. Between Teeth #10 and 11 where the conventional technique was performed a crater has formed.*

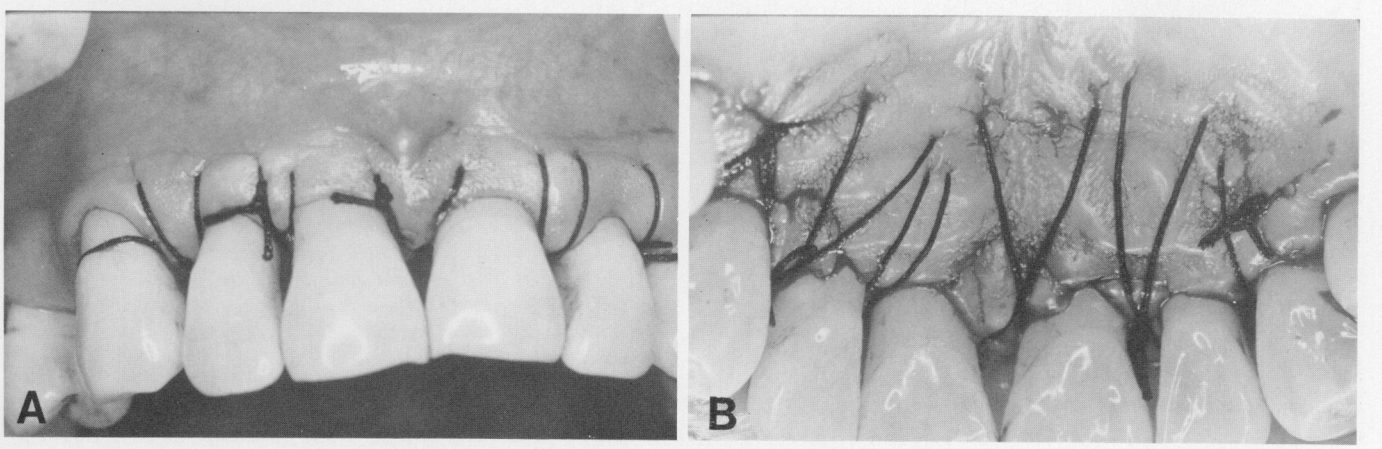

Figure 14. *Facial and palatal views of completed cross mattress sutures.*

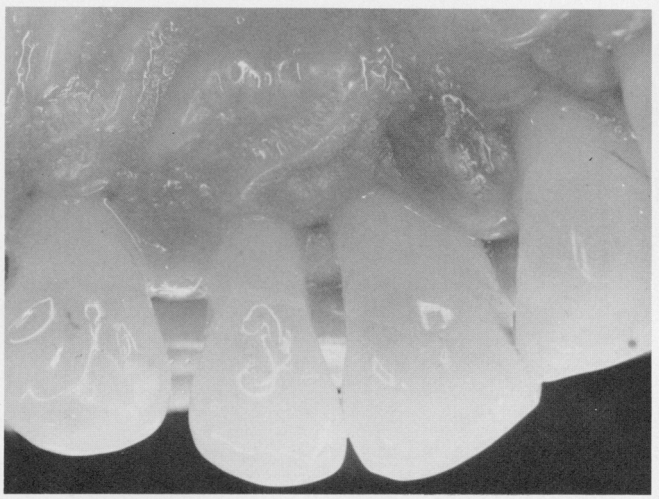

Figure 16. *Palatal view of 2 months of healing on the left side. Conventional technique performed on papilla between Teeth #7 and 8. Papilla preservation between #6 and 7 and between #8 and 9. Note the shape of the papillae.*

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Abstracts

Radiographic Assessment of Periodontitis. A Study of 800 Unreferred Patients

Jenkins, W. M. M., and Mason, W. N.
Br Dent J **156:** 170, March 10, 1984

In an orthopantomographic radiographic study of 800 adult dental outpatients, it was revealed that 85% of the 16 to 19 year-old patients displayed some form of marginal bone loss. In older age groups, up to 100% of all the individuals were affected. Bone loss greater than 25% of optimum height occurred in less than 1% of the 16-to-19 year olds but 1 to 2% of the teeth in the 45-and-older age group exhibited bone loss in excess of 75%. The number of teeth involved and the amount of destruction that occurred varied greatly among this patient population. Less than 2% of all teeth of all age groups presented bone loss greater than 50% of the optimum height which makes periodontal treatment of some kind that much more amenable. *University of Glasgow Dental Hospital and School, 378 Sauchiehall Street, Glasgow G2 3JZ.* Dr. Craig Goodman

Calcium and Periodontitis: Clinical Effect of Calcium Medication

Uhrbom, E., and Jacobson, L.
J Clin Periodontol **11:** 230, April, 1984

To study the clinical effect of calcium medication on periodontal disease, 66 persons were prescribed calcium (1 g) daily during a period of 180 days. The control group received placebo tablets. The periodontal condition was examined at 0 day and at 180 days using a plaque index, gingival index, probing depth, tooth mobility and furcation involvement as parameters. At 0 day and 180 days the data revealed there were no statistical differences between the test and control groups in the periodontal parameters. Therefore calcium supplementation for 180 days did not influence the periodontal status, and patients with low calcium diet did not differ from the others. This study could not support the hypothesis that calcium deficiency is a main cause of destructive periodontal disease. *Örebro County Periodontal Clinic, V. Nobelgatan 2, S-703 55 Örebro, Sweden.* Dr. Taleb Al-Sarraf