

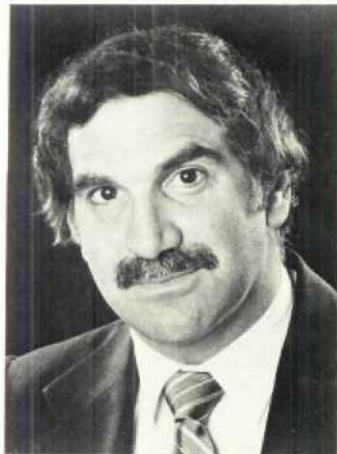
Gingival Recession: Prevalence, Etiology, Prevention, Treatment

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Periodontal disease resulting in progressive loss of periodontal attachment is currently the leading cause of tooth loss in the adult population in the United States. This loss of attachment has been shown to occur in periods of active breakdown alternating with periods of remission. Often this breakdown progresses without pain and can therefore go undetected unless professionally diagnosed. However, what frequently brings a patient with progressive periodontal disease into a dentist's office is not pain, but rather the objectionable aesthetics caused by the disease. Patients may notice bleeding or reddened gingiva, migration or extrusion of a tooth/teeth, halitosis, unsightly recession or "more spaces between my teeth."

All of the above may be secondary to loss of attachment and osseous support. But these cosmetic problems are the patients' chief complaint and the motivation behind their seeking dental care. Conventional periodontal treatment including scaling and root planing combined with proper home care (plaque control) procedures have been shown in many well-controlled studies to reduce inflammation. In accomplishing this there is a decrease in redness, bleeding, and exudate along with gingival shrinkage, all of which improve gingival aesthetics.

In the past, periodontal surgery consisted mainly of resective procedures, i.e., gingivectomy, ostectomy and apically positioning of the gingival margin, which predictably resulted in pocket and gingival inflammatory reduction. Unfortunately, this was often accomplished with a resultant increased recession and root exposure. Root sensitivity, a potential for root caries and most of all aesthetic complications ("long teeth") caused many patients to question whether the cure was worse than the disease. Moreover, the treatment for existing gingival recession and gingival clefts consisted of surgery designed only to prevent further recession, not to correct or reverse the existing condition. Thus, "periodontal surgery" and "aesthetics" were almost a



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contradiction in terms. Advertising referring to "painful unaesthetic periodontal surgery," designed to promote practice growth (by offering unproven "alternatives" to surgery) propagated the belief that periodontal surgery could only result in cosmetic compromises for a patient. In fact, these "alternatives" did very little to improve aesthetics beyond what scaling, root planing and improved home care accomplished. Dentists were still confronted with patients complaining of recession, "spaces," and roots or crown margins exposed by apical migration of the marginal gingiva.

Over the last two decades prompted by a greater understanding of the dynamics of healing along with an increased awareness of aesthetics on the part of the public and profession, various periodontal procedures have been introduced over the last two decades to deal with the problems of gingival recession. Knowledge has increased regarding the incidence and prevalence, etiology, prevention and treatment of gingival recession. This article will attempt to address these findings.

Gingival recession, which may be generalized to an entire arch or area or localized to a single tooth, has been defined as the partial denudation of the root surface due to apical migration of the gingival margin. A localized gingival recession is referred to as a gingival cleft.

Incidence and Prevalence

Several studies have shown that approximately 80% of the subjects examined had 1.0 millimeter or more of root exposure on one or more teeth. Two separate studies found 60.4% and 62% of subjects under 29 years old exhibited gingival recession. Moreover, the occurrence of recessions was found to increase with age.

Studies have also shown that the mandibular central incisors and maxillary cuspids and first premolars are the teeth most often affected by localized gingival recession.

Etiology

The exact etiology of gingival recession is not fully understood. However, there are several factors that have been found to be related to and may be responsible for its cause.

Two predisposing factors are tooth malposition and the anatomic tooth to alveolar bone relationship. Studies have shown that where the shape and position of teeth (i.e., a prominent root or buccally malposed tooth) results in a thin alveolar bone housing these areas are predisposed to fenestrations, dehiscences, and gingival recession. Other etiologic factors that have been implicated are toothbrushing trauma, mechanical trauma including biting habits, local irritants including plaque and calculus, iatrogenic restorations, associated high frenum attachments and periodontal disease.

Even conservative periodontal treatment including scaling and root planing results in some degree of recession. It has also been shown that individuals with good oral hygiene show greater recession than those with poor oral hygiene. Lastly, various periodontal surgical procedures utilizing a resective approach may also result in gingival recession.

Prevention

Any procedure which interferes with an etiologic agent can prevent recession. Proper home care procedures which include avoiding overbrushing any area predisposed to recession will in many cases prevent its occurrence. This includes the use of a soft toothbrush and a less abrasive toothpaste. Proper restorations, placed supragingival where possibly with proper gingival contour can prevent iatrogenic recession. Thorough removal of local irritants and control of noxious soft tissue trauma, i.e., nail and pencil biting, can help control recession. Finally, elimination of high frenum attachments when associated with progressive recession may be indicated as a preventive measure.

Much controversy exists regarding the ability of teeth with minimal bands of attached gingiva to maintain attachment and gingival health. Studies to date claim this is possible even with the barest minimum of attached gingiva. However, recent findings suggest that the placement of restorations subgingivally in sites with a narrow zone or lacking keratinized gingiva in the presence of plaque favors the apical displacement of the marginal gingiva. Thus where restorations are to be placed subgingivally, either for aesthetic reasons or because of caries extension, establishment of an adequate band of attached gingiva would appear to be necessary to prevent post-restorative gingival recession.

Surgical procedures designed for reattachment rather than resection can eliminate pathological pockets while minimizing or preventing recession. These procedures allow access for debridement of the root and bony defect while maintaining aesthetics. They include palatal approach procedures, the curtain procedure, the modified Widman flap, the retained interdental papillae procedure and the use of any of the above with osseous augmentation grafts. Each of these procedures will be briefly discussed as to indication, technique and limitation.

Palatal Approach Procedure

Indication—Minimize buccal recession and eliminate pathological periodontal pockets.

Technique—Surgical entry is accomplished from the palatal aspect with minimal disruption of the buccal bone and buccal gingiva. All osseous recontouring is performed from the lingual aspect.

Limitations—Cases where the intrabony defects extend toward the facial aspect.

Curtain Procedure

Indication—Minimize buccal recession in the maxillary anterior area—and eliminate pathological pockets.

Technique—The incision and flap reflection retains the labial gingiva and releases the lingual and interproximal two-thirds from the labial third. Interproximal and lingual defects are recontoured utilizing a palatal flap.

Limitations—Cases where the intrabony defects extend toward the facial aspect.

Modified Widman Flap

Indication—Treatment of periodontal pockets and osseous defects on any aspect of the tooth.

Technique—Internal bevel incisions are made, buccal and palatal flaps reflected, accretions removed from the root and bony defects, exposed root cementum thoroughly planed and the

flap repositioned at or close to the presurgical position. An attempt is made to approximate buccal and lingual papillae with interrupted sutures. There is no osseous reshaping or recontouring of the alveolar bone.

Limitation—Excellent plaque control is required to maintain the post surgical long junction epithelium and prevent repocketing. Moreover, since the interproximal tissue is often removed during debridement, soft tissue interproximal craters may result post surgically.

Retained Interdental Papillae

Indication—Treatment of interproximal pockets and defects in the anterior portion of the mouth while minimizing aesthetic defects. Especially useful in the treatment of teeth with periodontal defects that are prepared for full coverage.

Technique—Internal bevel incisions are made to the bone around the mesial buccal and distal aspects of the tooth retaining the interdental gingival tissue with the facial flap. A palatal straight lined or scalloped incision is made severing the interproximal gingiva on the palatal aspect of the interdental tissue. Full thickness reflection retains the interproximal tissue with the labial flap and exposes the interproximal defects. Osseous correction is carried out as needed, roots and defect debrided, the flap replaced and sutures tied on the palatal aspect. A periodontal pack is not used.

Limitations—For optimum results this procedure requires wide interproximal spaces and maximum presurgical gingival health.

Osseous Grafting Procedures

Indication—Treatment of intrabony defects when regeneration of lost periodontium (or osseous fill) is desired. Successful osseous fill will minimize post surgical gingival cratering.

Technique—Any of the above mentioned periodontal flaps may be utilized. However, instead of just debriding the defect (Modified Widman Flap) or performing osseous recontouring (palatal approach) the defect is filled with an autogenous or allongenic osseous graft. The flap is replaced and sutured at or close to the presurgical position.

Disadvantages—Osseous grafts are not as predictable as resective procedures for complete elimination of the osseous defect. Therefore, a second procedure is sometimes required. If using an autogenous osseous graft, a second surgical donor site is required.

Treatment Of Gingival Recession

In the past, mucogingival surgery was limited to procedures which attempted to establish adequate bands of attached gingiva and thereby contain the recession. Today our goal is twofold: to establish an adequate width of attached gingiva and obtain root coverage where possible. There are three techniques which have been shown to be the most successful in predictably accomplishing these goals: pedicle flaps, free soft tissue grafts and coronally repositioned flaps. A combination of the last two, together with alteration of the tooth to tooth contact points, has been shown to be very effective in reversing gingival recession and reestablishing the receded interdental papillae. All of these procedures will briefly be discussed with reference to indications, predictability, technique and limitations.

Pedicle flaps (Fig. A and B)

Indication—To cover root surfaces denuded by gingival recession and increase the zone of attached gingiva on the adjacent donor tooth/teeth and healthy interproximal bone.

Performing a Coronally Repositioned Flap

If there is not a sufficient zone of attached gingiva a free soft tissue graft is performed.

Following healing of the graft (approximately 4-5 weeks) a bonded resin is employed to apically position the adjacent contact points of teeth bordering the recession. The interdental papillae are anesthetized with infiltration of a local anesthetic. Crestal sounding is performed by probing through the papillae to the crest of the bone. Coronal reshaping is performed with mounted stones or a high speed diamond bur. A bonded resin is then applied to reduce the contact point to crestal bone distance to 5 mm or less. The restoration is finished and polished smooth.

A coronally repositioned flap is performed.

TECHNIQUE

(1) Following application of local anesthesia, two vertical incisions are made bordering the papillae adjacent to the recession area.

(2) A reverse bevel scalloped incision is made along the gingival margin connecting the vertical incisions. Care is

taken to create the new papillae to the shape that will fit their future locations.

(3) The remaining marginal gingival and any adjacent granulomatous tissue is removed with sharp cures.

(4) A full thickness muco-periosteal flap is elevated to expose the root surfaces and the most coronal alveolar bone.

(5) The exposed root surfaces are debrided and any superficial caries and accretions thoroughly root planed. The root may be recontoured with cures or rotating stones with copious irrigation. The goal is to decrease root prominence.

(6) To facilitate coronal displacement of the flap, a split thickness, sharp, dissection is performed apically separating the flap from the periosteum and connective tissue.

(7) The flap is then pulled coronally and sutured in the desired position with 4-0 silk sutures. First, the lateral borders of the flap are sutured. Then interrupted sutures engage the flap and

pass interproximally through the buccal and palatal tissue and are returned to be tied buccally.

(8) The flap is firmly adapted with moist gauze and finger pressure for 5-10 minutes. Care is taken to establish hemostasis before the dressing is applied.

(9) A periodontal dressing may or may not be used. If one is used it should be applied so as not to dislodge the flap.

(10) Sutures (and dressing) are removed 10-14 days later and the area lightly scaled. Patients are instructed in proper home care and reappointed weekly for one month, then every 2-3 weeks for 3 months. At each of the visits the area is irrigated and lightly scaled.

After 3 months of healing, the need for additional bonding to obtain maximum aesthetic results is evaluated. Quite often, the coronally repositioned flap by itself is sufficient to obtain root coverage and no bonding is needed at all. ■

Predictability—This is a very predictable procedure with one study reporting 72% root coverage after nine months. Another study reported 25 of the 27 cases treated resulted in successful root coverage over denuded roots. Biometric studies report an average of 2.5 to 3.5 mm of new soft tissue coverage over denuded root surfaces.



A: before flap procedure.

Technique — Following scaling and root planing of the affected teeth, two vertical incisions are made on each side of the defect extending apically to the base of the recession. These two vertical incisions are connected at their base by a horizontal incision, and the collar of inflamed gingiva bordering the recession is excised.

Another vertical incision is made one to two teeth distal to the recession at the line angle and extended apically into the alveolar mucosa. The flap should be one tooth wider than the recession and wider at the base. A full thickness flap is raised adjacent to the recession and split thickness dissection performed apically and distally. This donor flap is reflected and laterally positioned over the denuded root area. The flap should have adequate mobility enabling placement without tension. The flap should lay flat and firm prior to any suturing. If any tension remains the vertical incisions should be extended. The flap is fixed with interrupted sutures to the adjacent attached gingiva and pressure is applied with a moist gauze to remove clots and "dead space." In some cases when the alveolar bone of the donor site is thin a free soft tissue graft is utilized as

coverage to prevent necrosis of bone. A suspensory suture is placed around the involved tooth to prevent the flap from moving apically. A periodontal noneugenol dressing is applied.

Limitations—The lateral repositioned flap requires that an adequate band of attached gingiva exist on the donor site. There is post surgical recession on the donor site that varies from 0.5 mm to 1.5



B: after flap procedure.

mm (and usually averages 1.0 mm).

Free Soft Tissue Grafts

Indications—To increase the width of attached gingiva (at times prior to a coronally repositioned flap) and to cover denuded root surfaces. In specific cases, this procedure is often indicated when there is a minimal zone or complete lack of keratinized tissue in an area where a restoration is to be placed subgingivally. The procedure is of great value when a large area of attached gingiva is required.

Predictability—This procedure is highly predictable for establishing an adequate band of attached gingiva and deepening the vestibular fornix. However, it is not as predictable in covering denuded roots. Coverage of narrow-shallow lesions (less than 3 mm wide and 3 mm deep) is more predictable than over wide, deep lesions. Treatment of defects less than 3 mm in width and 3 mm or less in depth with free soft tissue grafts has been shown to yield approximately 70% root coverage. Wide-deep defects have been shown to result in an average root coverage of only 13%.

Technique—The recipient site is prepared with 2 verticle beveled incisions beginning on each side of the affected area and extending through the interproximal papillae (at the line angle of the adjacent teeth) through the alveolar mucosa. A horizontal incision joins the vertical ones. At the gingival margin a sulcular scalloped incision is made and extended from one vertical incision to the other. Partial thickness dissection is performed starting at the base of the vertical incisions and extending coronally. The flap consisting of epithelium and connective tissue is removed. All loose connective tissue and muscle fibers are also removed leaving a bed of immovable periosteum and connective tissue. (Some practitioners advocate complete denudation of the buccal alveolar bone. However, this is contraindicated if this bone is thin since it may result in necrosis). The base of the recipient site is then sutured with 4-0 or 5-0 resorbable suture material. The exposed cementum is thoroughly root planed and a moistened gauze placed over the recipient site.

A template may be used to measure the size of the required graft. The favored donor site is the posterior half of the hard palate or a well formed edentulous ridge. The donor area is swabbed with Betadine to avoid placing the graft "epithelial-side down" during graft placement. The graft is removed with a scalpel or dermatome-like knife (Paquette knife) obtaining a graft of uniform thickness (approximately 0.75 mm to 1.25 mm in thickness). Care should be taken to avoid glandular and fatty tissue from being included in the graft. The graft is then immobilized at the recipient site with interrupted sutures laterally. A horizontal mattress suture using 4-0 resorbable gut is placed through the periosteum apical to the graft and then (without engaging the graft) directed through the interproximal papillae, swung

lingually around the tooth, and tied in the vestibule. This suture adapts the graft to the receptor bed. Finger pressure with a moist gauze is applied for 5-10 minutes to reduce the space between the graft and the bed. A noneugenol dressing is then applied to the graft and donor site.

Limitations—This type of graft relies on revascularization from the adjacent gingival complex and has limited success when the area of recession is wide and deep (greater than 3 mm root exposure in a horizontal and vertical direction).

Coronally Repositioned Flap

Indications—To cover denuded roots in cases of generalized marginal periodontitis where there is a sufficient zone of attached gingiva available pre-operatively.

Predictability—Studies report the average reduction of gingival recession to be approximately 75% soft tissue coverage of denuded roots. It has been shown that the one month postoperative result permits an accurate evaluation of the success or failure of the technique.

Technique—(See sidebar).

Limitations—An adequate width of attached gingiva must be present prior to this procedure. This procedure may also result in a decreased vestibule.

Combination Free Soft Tissue

Graft And Coronally Repositioned Flap.

(Fig. C & D)

Indications—To establish an adequate band of attached gingiva and obtain predictable coverage of denuded roots.

Predictability—An average of approximately 75% soft tissue coverage of the gingival recession has been obtained. In about 1/2 of the teeth treated, 100% root coverage was obtained.

Technique—A free soft tissue graft from the palate is performed in order to increase the height of the attached

gingiva. Two months later a coronally repositioned flap is performed (see sidebar).

Limitations—This technique requires two surgical procedures.

Altering Tooth-To-Tooth Contact Relationships

Indications—To reestablish a receded interdental papillae which has been lost because of periodontal disease, as a result of periodontal surgery, or as a result of an extracted tooth. This technique is especially useful when anterior teeth require full restorations or when there is a missing tooth requiring a pontic replacement.



C: before graft/flap.

Technique—A study completed at N.Y.U. Dental Center showed that the interproximal vertical measurement from the alveolar crest to the base of the contact point can determine the presence or absence of the interdental papillae. If this distance is 5 mm or less, an interproximal papillae is always present. If the distance

is 6 mm, a papillae is present 50% of the time. If the distance is 7 mm the papillae is present only 25% of the time. Based on this information it is possible to establish



D: after graft/flap.

an interdental papillae by contouring full coverage restorations or bonding natural teeth to decrease the distance from the base of the contact point to the alveolar crest. This distance can be determined by sounding (probing) through intact anesthetized tissue to determine the position of the crest of the bone.

Limitations—Altering an unprepared tooth in an occlusal apical direction may require bonded restorations or full coverage of adjacent teeth. At times the alveolar bone has receded so far apically as to limit the adjustment of the contact point making the appropriate extension impossible.

A combination of the last three procedures has been found to be very predictable in reversing gingival recession,

establishing an adequate band of attached gingiva and creating or maintaining a healthy interproximal papillae. (Figs. E and F).

The order of treatment in over 50 cases that have been successfully treated is as follows:

(1) Where an adequate band of attached gingiva is lacking (the marginal gingiva remains inflamed or shows progressive recession) a free soft tissue graft is first performed. The graft is taken from the palate or edentulous ridge, placed on the recipient bed, beveled and blended to contour to the adjacent tissue.

(2) Following graft healing (4-5 weeks) tooth-to-tooth contact points are altered with the use of bonded resins to extend the contact area apically. The resins are highly polished so as to reduce



E: before combination therapy.

plaque accumulation. This step is only necessary if the interproximal papillae have been lost.

(3) Two weeks after the bonding (and 3 months) after the free soft tissue graft a coronally repositioned flap is performed. This full/split thickness flap together with the interproximal papillae are coronally positioned and sutured.

Following healing and adequate home care procedures, adjustments are made with the bonding material, where necessary, to



F: after combination therapy.

reduce any residual interproximal spacing.

Utilizing the aesthetic periodontal surgical techniques discussed in this article can serve 2 purposes. First, it allows the integration of periodontics and restorative procedures to improve aesthetics as well as the health of the teeth and supporting structures. Second, by allowing the patient to see an improvement in the appearance of their dentition and gingiva they are more easily motivated to accept total dental treatment and preventive care. ■

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