Cosmetic periodontal surgery (Part 4A):

Barriers of success

By David L. Hoexter, DMD, FACD, FICO, Editor in Chief

Part 4A of this series on cosmetic periodontal surgery deals with various barriers that have historically been used to aid periodontal regeneration. This article is limited to the use of barriers to achieve predictable regenerative coverage of aesthetic root recession using the guided tissue regeneration (GTR) technique with resorbable barriers. It also includes a case study on the use of a polytetrafluoroethylene (ePTFE) membrane to regenerate gingival root coverage where root recession is clinically noted.

Periodontal disease leads to destruction that causes a void in which undesired cells have diminished the supportive periodontia. Proper periodontal surgery to correct this hinders on proper regeneration of lost periodontia.

Restoration of the lost periodontia involves regenerating the lost supporting structures, including alveolar bone, connective tissue, keratinized epithelium, periodontal ligament and cementum. By placing a barrier to inhibit the undesired cells — and enabling the desired progenitor cells to procreate — we can selectively guide the desired restoration of the lost periodontia.

For the past 50 years or so, regeneration of the periodontia, including both osseous and soft tissue, has been achieved successfully by the use of barriers. The most popular barrier to date is a membrane, although there have been several other barriers used as the technique has developed.

A barrier should create and maintain a sufficient space where an adequate blood supply can form to enable regeneration to occur. The space must be preserved for a certain period of time, and the barrier should be immobile for that same period. The barrier needs to preserve this space while preventing epithelial cells and connective tissue cells from migrating into it. But the barrier also must be porous; so that metabolites can penetrate through it to keep the underlying developing regrowth alive.

With the GTR technique, popularized by Dr. Nieman, we can inhibit the causal factors of the periodontal disease, thus preventing recocurrence and enabling proper cellular regeneration.

This technique involves forming a porous barrier membrane that excludes the undesired cells, yet allows nutrient through its porous membrane to aid the selective population by undifferentiated mesenchymal — advancing the regenerative goal.

Historically, different materials were developed as barriers for use in the GTR technique. Initially, nonresorbable membranes were used. A Teflon barrier expanded polytetrafluoroethylene (ePTFE) membrane that was porous was popularized by Gore. This ePTFE, like its more economical equal, Sarotorus, as well as other nonresorbable barriers, such as Millipore filters, worked well. However, because they are nonresorbable, they required a second surgical procedure after the healing process was complete, usually months later, to remove the nonresorbable membranes. This second procedure required another round of local anesthetic and another uncomfortable healing period.

Other Teflon membranes, which were nonporous and nonresorbable, also were available, but they were not recommended for GTR because their lack of porosity inhibited essential nutrition from passing through, thus blocking newly forming blood supply from regenerating. These Teflon membranes have, in fact, the same regenerative properties as a rubber dam and should not be used or contemplated for GTR.

The limitations of these early barriers prompted companies to develop resorbable barrier membranes that eliminated the necessity of a second surgical procedure, much to the appreciation of patient and practitioner alike. These membranes have all the desired qualities of the nonresorbable group but do not need a second surgical procedure to be removed. Different materials lead to different rates of absorption time, resulting in different times of inhibition of epithelium and/or connective tissue invagination. Different materials may result in different consistency of results.

The resorbable membrane barriers used most frequently in cosmetic root recession coverage are divided into three main groups, based on the materials: 1) polyglactin acid, 2) polyactic acid, and 3) collagen.

The polyglactin and polyactic membranes are similar except that polyactic acid membranes contain a citric acid ester that enables them to be malleable. Resorbable polyactic barrier membranes were the first popular resorbable membranes approved by the FDA. Produced under the commercial name of Guidor, the product was developed for GTR procedures, and its malleability made clinical handling easier. The resorption of this material is through hydrolysis. Results show no soft-tissue reactions during healing, and yet, there are reduced probing depths during healing, and a definite gain of clinical attachment. This article is limited to the use of GTR specifically in recession-covereage regeneration.

Membrane barriers of polyglactin acid were still used after Guidor received approval from the FDA. However, one of the principles of a regenerative membrane is its period of longevity. It is accepted that the barrier should be stable and present in the desired position for at least six to eight weeks. The polyglactin barriers of the era resorbed inconsistently. Reports of resorption varied in ranges of time. The barriers were not present long enough to consistently meet the time required for success. Therefore, this article limits its focus to the use of poly lactic membrane, which consistently meets the required time period for retention.

Case presentation

The patient, a 32-year-old male, presented at my office with gingival recession. His chief complaint was his gingival recession in his upper left cuspid (#11). There was no sensitivity to temperature change. He was aggressive in his oral hygiene, especially with his brushing. Noted was the abrasion of #11 at the recessed root exposed area. He was concerned with the appearance of looking older than he was and with the probability of living with the longer appearing tooth (#11). The upper left first bicuspid (#12) also had recession and root exposure; although it was not noticeable to the patient. Both the #11 and #12 were asymptomatic, but only the more noticeable #11 bothered the patient visually (Fig. 1). Local anesthetics were administered. Then, using a #15 blade, the sulcular incision was performed from the gingiva to the osseous crest (Fig. 3). This is done to preserve the keratinized gingiva necessary for our final goal.

Buccal flap reflection, using the Hoexter

Fig. 1: Recession of the upper left cuspid #11 is of primary concern to the patient. Also present is the recession of the #12, which is of no esthetic concern to the patient. After discussion about treatment options, the patient opts not to use a membrane barrier in the treatment of the #11. Photos/Provided by Dr. David L. Hoexter

Fig. 2: The incised surgical area is seen following administration of local anesthetic and initiation of the procedure. Prior to surgery, no sensitivity to temperature change is confirmed in tooth #11 and #12. Also determined is that aggressive oral hygiene, especially with brushing, is a primary contributing factor to the recession.

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periosteal elevator by Hu-Friedy, revealed the extent of the recession of both the cuspids and the bicuspid buccally. Most important is the preservation of the interproximal tissue. Keeping the interproximal gingiva is paramount for the blood supply of the interproximal tissue. This avoids loss of interproximal tissue, which would result in dark-appearing interproximal voids, referred to as “black diamonds.”

Placement of the Guidor membrane covering the recessed labial root of #11 is done next (Fig. 4). The labial recession of #12 was left without a membrane. No scaling was done nor chemicals applied to either root.

Next, the coronal repositioned flap technique was performed. This coronally repositions the gingival tissue, especially the preserved keratinized gingiva. The tissue was then sutured in the desired position. The tissue now will cover all the recession as well as the membrane (Fig. 5).

Figure 6 shows how the color of the newly attached keratinized gingiva achieved on the previous recessed root of #11 blends in with the symmetrical background tissue, giving the esthetic appearance desired while restoring health. Note also that #12, without using the barrier GTR, does not regenerate gingival coverage and returns to the original recession level.

The patient was thrilled with the results and continued to maintain his oral hygiene with our professional help. The results remained consistent for more than 11 years before the patient changed locations.

Conclusion

Root recession coverage using the GTR technique (with a polylactic barrier by Guidor in this case study), resulted in regeneration of the gingival coverage of the recessed root. In the same patient on an adjacent tooth, using the same technique but without the barrier utilized on the first tooth, the technique resulted in the recession returning to its original level.

It should be noted that, before doing any root coverage technique, the cause of the recession, such as toothbrush abrasion or other oral-hygiene habits (especially occlusal trauma), or any local causes that might have led to the recession, should first be addressed. In this case, with cosmetic periodontal surgery, the patient was thrilled with the results.