

Perimplant Disease Complications

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Abstract

Reconstructive surgery is performed on abnormal structures of the body caused by congenital defects, developmental abnormalities, trauma, infection, tumors or disease. It is generally performed to improve function, but may also be done to approximate a normal appearance. Nowadays, the hard tissue and soft tissue augmentation procedures are done routinely. One of the soft tissue grafting with promising results is the connective tissue grafting which we would be discussing in the paper. We would also be reviewing the prevalence, pathogenesis, classification and predictability of the grafting procedures.

Keywords: connective tissue graft, subepithelial connective tissue graft, root coverage

Introduction

Periodontal reconstructive surgery consists of a variety of mucogingival procedures including root coverage, tooth exposure, crown exposure, vestibular deepening, papilla reconstruction, ridge augmentation, and ridge preservation. While the primary goal of these procedures is to benefit periodontal health through the reconstruction of lost hard and soft tissues or by preventing additional loss, they also enhance the patient's appearance. Each procedure can be performed using a variety of surgical techniques that are selected based on their advantages and disadvantages relative to the specific clinical presentation of the defect.

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Review & Discussion

Recession Prevalence and Pathogenesis:

There are two types of gingival recession, one due to periodontitis and the other primarily related to mechanical factors, especially toothbrushing. [1] Recession due to periodontitis can affect all tooth surfaces and is irreversible. In contrast, facial recession due to mechanical factors is often reversible, or partially reversible, with periodontal reconstructive procedures. In general complete coverage of facial recession defects can be achieved when there is no loss of interproximal bone or soft tissue. [2] Facial recession occurs in patients with a high level of personal and professional dental care, while chronic periodontitis, with its more generalized recession, is a disease associated with plaque and calculus. Other factors that can predispose to gingival recession include tooth malposition; bone dehiscence; thin marginal soft tissue; high frenulum attachment; inflammation; inflammatory viral eruption; and dental restorative, orthodontic, or periodontal treatments. [3]

Recession increases with age and studies show a substantial increase for each decade of life. By age 60 almost 90% of Americans have at least one site with

e"1 mm of recession, while about 40% have atleast one site with e"3 mm of recession. [4] Sites with recession are likely to progress. [13] Untreated recession sites in patients not receiving regular dental care are more likely to progress than sites treated with a gingival augmentation procedure. [5]

Recession Defect Classification

There have been several attempts to classify recession defects. The two most enduring classifications have both assessed recession defects with respect to parameters that provide predictive guidelines for achieving complete root coverage. [2] The first of these emphasized the relative importance of vertical and horizontal defect dimensions as predictors of final defect coverage. Four categories were utilized: shallow narrow, shallow wide, deep narrow, and deep wide. These are still important dimensions to consider when assessing the difficulty of achieving complete root coverage. The second of these classifications focused on the importance of interproximal bone and soft tissue levels as the primary predictors when assessing the possibility of achieving complete root coverage. [2] One hundred percent root coverage was considered achievable at sites with no loss of interproximal bone or soft tissue and were designated as either Class I or II depending on the location of the soft tissue margin relative to the mucogingival junction. Partial or no root coverage was considered achievable at sites with interproximal bone or soft tissue loss or tooth malposition, depending on the severity of these factors. These defects were designated as Class III or IV. A more recent classification⁷ which does not give predictive guidelines, is unique in its thoroughness with respect to characterization of vertical and horizontal defect dimensions and may be most useful as an epidemiologic tool.

Connective Tissue Graft Techniques

The subepithelial connective tissue graft (CTG) is a highly predictable procedure that lacks the esthetic disadvantages of the thick free gingival graft. [8], [9] It was first reported in 1980 as a ridge augmentation procedure, then subsequently in 1982 as a root coverage procedure. Successful defect coverage can be achieved with less donor tissue since revascularization occurs from

both the periosteal or osseous base and the overlying flap. This dual blood supply is responsible for the increased predictability of CTG procedures. The overlying flap ensures an excellent color match when the graft is completely covered; however, mucosal tissue will not necessarily take on a keratinized appearance. When the graft is partially exposed, the color of the exposed tissue will not necessarily match the flap, but the exposed tissue does become keratinized, thereby increasing the zone of keratinized tissue. The harvesting techniques for connective tissue produce less postoperative morbidity than for thick free gingival grafts. Many iterations of this technique have appeared in the literature, each subtly different, all with a dual blood supply and each with its own advantages for the varied clinical presentations of recession defects. [8], [9] The subepithelial connective tissue graft technique involves a split thickness flap technique and utilizes vertical incisions while preserving facial tissue and papillae. Donor connective tissue is immobilized with sutures and then the flap is sutured to cover as much of the graft as possible. The pouch procedure is similar but does not include vertical incisions. Some marginal tissue is excised during the split thickness pouch preparation. The connective tissue graft is then placed into the pouch and a surgical adhesive is recommended instead of sutures. The subpedicle and double pedicle techniques take subpapilla tissue and move it to the mid-facial area so that the CTG has at least one blood supply over the avascular root surface. Other distinct connective tissue graft techniques include the supraperiosteal envelope or "tunnel," and a coronally positioned envelope. Aside from these distinct procedures, there are hybrid methods that combine elements of different techniques described above. A unique modification of the tunnel technique involves freeing adjacent subpapilla tissue and laterally positioning it to provide increased graft coverage and blood supply. [10] This tissue can also be coronally positioned to provide the same blood supply advantage and to facilitate placing a graft at multiple sites. Keeping some papillae intact serves to prevent flap retraction that can lead to incomplete root coverage. While a large, thick graft was required to obtain root coverage with a free gingival graft, it has recently been demonstrated that smaller, thinner connective tissue grafts work as well as

larger, thicker grafts when the graft is completely covered by a coronally positioned flap. [6] This concept merits further study to confirm the finding and to compare the long-term stability of thick versus thin connective tissue grafts. Studies show mean defect coverage ranging from 57% to 98% with a mean for all studies of 84%. [3] Final root exposure ranged from 0.1 to 1.7 mm, with a mean of 0.6 mm relative to a mean initial recession of 3.7 mm. Outlier values to some extent distort the mean final root exposure and 44 of 54 studies evaluated had mean values less than 1 mm. Predictability data indicated that 90% or greater defect coverage was achieved 68% of the time. Connective tissue graft procedures have clearly been established as a highly effective means of covering recession defects.

Factors Affecting Predictability

For years an adequate width of keratinized tissue was considered necessary to prevent recession. In general, this concept was not supported by the literature if the patients had good oral hygiene and were on recall. Similarly, some consider an adequate width of keratinized tissue necessary to achieve complete recession defect coverage. Others have been able to achieve defect coverage irrespective of the width of keratinized tissue. Recent data indicate that soft tissue thickness ≥ 0.8 mm is needed for complete coverage with a coronally positioned flap, while tissue < 0.8 mm in thickness more often results in incomplete coverage. [11] Another study that used thickness as a criteria for site selection reported that sites treated with GTR are more likely to get complete coverage when thick tissue is present. A recent study indicates that increasing tissue thickness results in complete root coverage irrespective of width of keratinized tissue or any other site characteristics, including recession depth. Additional research is needed to determine if tissue thickness is the predominant factor affecting the predictability of root coverage. Adequate vascular supply is essential to achieve complete root coverage. This may be obtained from the bone, periosteum, and periodontal ligament underlying the graft and from flap tissue overlying the graft. The thick free gingival graft has primarily a single blood supply from underlying bone, periosteum, and periodontal ligament, while most connective tissue

procedures also derive blood supply from overlying flap tissue. Dual blood supply is desirable and undoubtedly contributes to the increased predictability of root coverage by subepithelial graft techniques when compared to the thick free gingival graft technique. Flap retraction will decrease the predictability of subepithelial graft or coronally positioned flap techniques. It has been clearly shown that the increased flap tension decreases the predictability of complete root coverage. It is essential that flaps are designed to be tension free so that retraction during healing will not compromise the result. Suturing techniques that will prevent or minimize flap retraction are also necessary. Another technique to prevent flap retraction is to use a tunnel type procedure that keeps the papilla intact. The choice of surgical procedure can compromise the predictability of complete root coverage.

Histologic Evaluations of Attachment

There are histologic evaluations of the attachment obtained connective tissue graft show long junctional epithelium, some show connective tissue attachment, while others show small amounts of regeneration. One report indicates that the bulk of the attachment is composed of connective tissue adhesion. [12] The type of attachment, therefore, may not have a significant impact on the clinical result, particularly since longer term studies of 3 years or more show that the result is stable over time for connective tissue, free gingival graft, coronally positioned flap, and non-resorbable membrane techniques.

Conclusion

Recent reviews that have been systematic, evidence based, or meta-analysis have demonstrated that connective tissue grafting is an effective means of root coverage. The importance of reporting individual patient data was emphasized in a recent meta-analysis to allow reviewers to better assess the factors affecting predictability. Dual blood supply is responsible for the increased predictability of CTG procedures and the overlying flap ensures an excellent color match.

Summary

Root coverage is a successful and predictable procedure in periodontics, employing a variety of techniques. This

is an area of rapid change and new techniques are constantly being reported. Connective tissue graft procedures are the most extensively documented. Newer techniques allow root coverage without use of palatal donor tissue. This facilitates treating a larger number of sites in one surgical appointment.

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