CONNECTIVE TISSUE GRAFTS: AN OVERVIEW

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ABSTRACT

Connective tissue grafts (CTGs) have been reportedly used as a barrier for protecting and stabilizing wounds at furcation sites during the healing period and to support bone regeneration for closing mandibular Class II furcation defects in humans.

Keywords: Graft, periodontal therapy, regeneration

INTRODUCTION

Various histological studies of healing onsubepithelial CTG to the root surface revealed areas of regeneration, withnew bone, cementum, and connective tissue attachment coronal to theoriginal gingival margin.Bouchard et al compared CTG as a barrier with expandedpolytetrafluoroethylene (ePTFE) membrane for closing 24 mandibularbuccal Class II furcation lesions, and reported comparable potential forboth types of graft in supporting bone regeneration in mandibular Class IIfurcation lesions. Recently, Belal et al reported the results of a study thatevaluated the response of CTG as a barrier therapy for 10 Class IImandibular furcation defects, and 2.83 mm of V-RAL gain was observed.A gain in V-RAL using CTG as a barrier (as observed in the presentstudy) also supports the favourable clinical and histologic results ofBruno and Bowers, who used CTG in their case report study. The goodresults CTG could be explained by the fact that, in addition to providing aspace for regenerating cells, CTG as a barrier may have better supportedand protected the wound of the furcation site during the healingperiod(similar to or perhaps better than GTR membranes).[1]Histologic studies on CTGs have shown that the attachment of the graft tothe root surface appears to be mediated by a combination of epithelialdown growth and connective tissue attachment with minimal sign of newcementum-like tissue formation in the apical portion of the recessionareas coronal to the base of the instrumented root surface. Coronal growthof alveolar bone has been observed to a minimum extent and does notparallel the height of newly formed cementum- like tissue.The use of CTG appears to improve the long-term stability of thecoronally advanced flap; and the use of CTG in conjunction withcoronally advanced flap, double pedicle graft, or the supraperiostealtunnel technique appear to yield higher root coverage than the use ofbioabsorbable membranes. Therefore, it can be argued that the use ofCTG should provide better and more stable long-term clinical results inthe treatment of Class II furcation defects as well.[3,4]

OTHER BIORESORBABLE MEMBRANES

Dura mater, consisting of an irregular network of collagen fibers, isobtained from cadavers, processed to eliminate antigenic and pyrogenicactivity, then lyophilized and sterilized. Use of cadaveric dura mater mayrepresent a risk of acquiring Creutzfeldt–Jakob disease (Tatakis et al.1999).Acellular dermal matrix (ADM), material obtained from human skin,has been used as a substitute for palatal connective tissue to increase thewidth of keratinized tissue around teeth or implants.[5]

One of the oldest biomaterials used for scaffolds is the fetal membrane. Inparticular, amniotic membrane (AM) has gained importance because ofits ability to reduce scarring and inflammation, enhance wound healing,and serve as a scaffold for cell proliferation and differentiation as a resultof its antimicrobial properties. AM was used as a barrier membranebetween the gingival epithelium and hard tissue to promote theperiodontal ligament cells to form progenitor cells that can regeneratenew tissues in the treatment of human periodontal grade II buccalfurcation defects (Kothiwale et al. 2009). AM was also effective inhelping cicatrization and wound healing after dental implant surgery. AMsupports the growth of epithelium thus facilitating migration andreinforcing adhesion. It decreases pain (Velez et al. 2010).

SYNTHETIC ABSORBABLE MEMBRANES

Synthetic absorbable devices for medical use are usually manufacturedfrom organic aliphatic thermoplastic polymers. The materials mostcommonly used are poly (⍰-hydroxy acids), which includes poly (lacticacid), poly (glycolic acid), and poly (glycolide-lactide), also known asPGA/PLA membrane.

The PGA/PLA membrane is composed of a synthetic copolymer ofglycolide and lactide. The polymeric components of the barrier are brokendown by hydrolysis and eliminated from the body through the Kreb's cycleas carbon dioxide and water.[2] The degradation rate is dependent on

thepH, the presence of mechanical strain, enzymes and bacteria (infection). Italso varies depending on the composition; modification of poly (L-lactide)by cross-linking or addition of D-lactide or glycolide result in materialsthat have more rapid degradation, thus diminishing the poly (L-lactide)disadvantage of slow degradation.A double-layered absorbable device (GUIDOR matrix barrier) made ofpoly (lactic acid) (containing both L-and D-lactic enantiomers) and a citricacid ester (acetyl-tributylcitrate) was the first to gain FDA approval. Theexternal layer of the barrier, designed to allow integration of the overlyinggingival flap, contains rectangular perforations. Between external andinternal layers there are internal spacers, creating a space into which tissuecan grow. The GUIDOR device has received clinical evaluation in avariety of periodontal defects.Hurzeler et al. compared the PGA/PLA placement to control defectstreated by flap debridement surgery alone in a monkey model. There was astatistically significant histologic increase in the amount of defectresolution at the test sites as compared to controls.2 Lundgren et al. alsothrough his study showed that favourable results obtained with polylacticacid membrane was credited to the special double layer design whichpromoted the integration of the barrier with the surrounding tissues.[5]

Advantages:

1. Absorbable barriers do not require additional surgery for removal,which reduces patient discomfort, chair-side time and related cost,while eliminating potential surgery-related morbidity.[103]

2. By their inherent nature, absorbable barriers offer limited control overthe length of application. This is because the disintegration processstarts upon placement in the tissues, and the ability of each individualpatient to degrade a particular biomaterial may vary significantly,particularly for materials requiring enzymatic degradation (such ascollagen).

Disadvantages:

Because of their biodegradability, absorbable devices elicit inevitableand necessary tissue reactions that may influence would healing. Ideally,these inflammatory reactions should not compromise the intendedregenerative outcome. This probably requires that such reactions be oflimited magnitude and tolerable nature and occur after the critical earlyhealing.[6]

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