Using resorbable barriers to make root recession coverage predictable

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 Gingival recession is defined as the location or displacement of the marginal gingiva apical to the cementoenamel junction (CEJ). Recession is the exposure of root surface, resulting in a tooth that appears to be of longer length.

From a patient’s perspective, recession means an unesthetic appearance and is associated with aging. The gingiva consists of free and attached gingival tissue, as seen macroscopically.

The free marginal gingiva, located coronal to the attached gingiva (AG), surrounds the tooth and is not attached to the tooth surface. The keratinised portion of gingival tissue (KG) that is dense, stippled and firmly bound to the underlying periodontium, tooth and bone.

In ideal health, the most coronal portion of the AG is located at the CEJ, where the most apical portion is adjacent to the muco-gingival junction (MGJ). The MGJ represents the junction between the AG (keratinised) and alveolar mucosa (non-keratinised).

Reasons for recession

There are numerous etiological factors that may result in recession. Generally, the etiology can be categorised as either mechanical or as a function of periodontal disease progression. Recession usually occurs due to tooth malposition1, alveolar bone recession2, high muscle attachments and frenal pull3, and iatrogenic factors related to restorative and periodontal treatment procedures.4

The detrimental effects of recession include compromised esthetics, an increase in root sensitivity to temperature and tactile stimuli, and an increase in root caries susceptibility due to cementum exposure. Thus, the main therapeutic goal of recession elimination is gingival root coverage in order to fulfill esthetic demands and prevent root sensitivity.

Miller classifies recession defects into four categories:

Class I: marginal tissue recession does not extend to the MGJ

Class II: marginal tissue recession extends to the MGJ, with no loss of interdental bone

Class III: marginal tissue recession extends to or beyond the MGJ, loss of interdental bone is apical to the CEJ but coronal to the apical extent of the marginal tissue recession

Class IV: marginal tissue recession extends beyond the MGJ; interdental bone extends apical to the marginal tissue recession.

A possible treatment modality for recession includes restorative/mechanical coverage, such as cervical composite restorations. This kind of treatment may effectively manage root sensitivity and root caries. However, such treatment entails a long-term compromise from an esthetic perspective. Composite restorations stain over time, and any marginal leakage may lead to secondary caries, recurrence of sensitivity and/or local inflammatory changes.

Additionally, colour matching can be difficult and such restorations may involve the undesirable removal of vital tooth structure in order to create adequate retention form. Thus, clinicians must determine whether the restorative benefits outweigh the esthetic shortcomings and whether it is possible to employ a treatment modality with few, if any, functional and esthetic disadvantages.

Muco-gingival surgery

Another treatment modality for recession is muco-gingival surgery. Muco-gingival surgery refers to periodontal surgical procedures designed to correct defects in the morphology, position and/or amount and type of gingiva surrounding the teeth.

In the early development of muco-gingival surgery, clinicians believed that there was a specific minimum apical-coronal dimension of AG that was necessary to maintain periodontal health.

However, subsequent clinical13-14 and experimental studies15-16 have demonstrated that there is no minimum numerical value necessary.

However, for esthetics, a uniform colour and value of AG is desirable among adjacent teeth. Some of the earliest techniques for correcting recession involved extension of the vestibule. The subsequent healing usually resulted in an increase of AG. However, within six months, as much as a 50% per cent relapse...
of the soft tissue position was reported. Thus, these techniques did not adequately address recession.

In order to improve esthetics and increase KG for root coverage procedures, current periodontal surgery largely involves the use of gingival grafts. There are a multitude of surgical techniques, which can be distinguished based on the relationship between the donor and recipient sites.

Gingival graft procedures involve either (a) pedicle soft-tissue grafts, which maintain the pedicle blood supply or (b) free autogenous soft tissue grafts. Techniques involving the latter type require the clinician to prepare two surgical sites: one to harvest the tissue and another one to prepare the recipient site. In this case, the autogenous soft tissue graft has a separate blood supply to the recipient site. Combinations of (a) and (b) have also been reported.

**Soft-tissue grafts**

The pedicle soft-tissue graft was first described by Grupe and Warren in 1956. This involved raising a full thickness flap and laterally positioning and suturing donor tissue into place from an adjacent area while maintaining a pedicle blood supply. This technique and others that followed were designed to increase the zone of KG.

Atkins described a one-stage procedure in 1968. Its purpose was to increase the zone of KG without concentrating on coverage of a recessed root. In the 1980s, a two-stage modification was suggested for an increase in root coverage, which proved to be more successful with increased predictability. This involves first placing the free gingival graft or the free connective tissue graft apical to the area of recession and using the coronally repositioned technique after healing.

**Autogenous grafts**

Free autogenous grafts are predominantly harvested from the palate. Recently, materials other than gingival grafts have been explored. Using a guided tissue regeneration (GTR) technique, an acellular dermal matrix has been reported to yield favorable outcomes in root coverage. This material may provide the patient with a less invasive alternative than a palatal donor site in order to achieve root coverage.

Procedures combining both free grafts and pedicle techniques have also been detailed. For instance, when a connective tissue graft is employed, the graft is placed sub-epitheliually with a coronal advancement of the overlying keratinised tissue. GTR techniques have also been developed more recently. In 1992, Pinto Prato et al. described a combination technique of sub-epithelial placement of a membrane with coronal advancement of the flap, such as e-PTR.

Later modifications of the technique included the double papilla flap introduced by Cohen and Ross in 1968 – the oblique rotational flap and the rotational flap. Another type of gingival movement flap was described later as the coronally repositioned flap. This technique involves mobilising a full thickness flap and repositioning the tissue to the CEJ, thereby covering the exposed recession.

The use of free gingival grafts was described in the 1960s by Sullivan and Atkins. The free autogenous graft can be made up of either pedicled or free gingival or connective tissue. Initially, the therapeutic goal was to increase the zone of KG. The clinical objective was to develop techniques involving the recessed root with a zone of attached KG.

This can be achieved in one or two stages. Initially, Sullivan and...