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An Introduction to Surgical Correction of Gingival Recessions

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INTRODUCTION

The relation between the gingival contour, the clinical crown of the dental elements and the lips during the smile is directly related to the aesthetics in dentistry. It is not the symmetry that guarantees the beauty of the smile, but the proportion and the harmonious balance between these structures [1]. The concept of red aesthetics arises due to the preferential attraction of the eyes to warm colors, especially red.

Gingival recession effectively treats a marginal tissue recession (MTR), since gingiva (protection periodontium) and periodontal insertion tissues are compromised apically to the cementoenamel junction [2,3]. According to the classification of current periodontal clinical diagnosis, cases of loss of clinical insertion and MTR related to bone dehiscence not caused by periodontitis should be diagnosed as **"**Congenital or Acquired Conditions and Deformities**"** [4].

The biological distances between the gingival sulcus epithelium, the junctional epithelium and the conjunctival insertion in the gingival sulcus are related to the apical migration of the gingival margin in cases of local bone dehiscence, since they are considered a biological constant [5-7], especially those that make up the biological space (junctional epithelium and conjunctive insertion). The mean distance between the gingival margin and the bone crest is approximately 2.04 mm to 3.0 mm [8]. Marginal tissue recession has a multifactorial etiology induced by bacterial plaques as in cases of periodontal or non-plaque-induced disease, such as traumatic brushing, dental malposition, traction of the gingival margin by braces and bridles, limitation of the amount of keratinized gingiva, iatrogenic factors, occlusal trauma, parafunctional habits, orthodontic movement and morphological characteristics (bone dehiscence) [9].

Aging results in an increase in the number of periodontal sites with RTM by the accumulation of causal factors throughout life and, therefore, an increased risk of its occurrence [10]. The cases of RTM in children should be proserved because of the growth of the alveolar process and the changes in the dental positions expected during growth [11-14].

The gingival biotype is directly related to the risk for RTM, as well as to the predictability of mucogingival surgeries of root coverage. Most cases (60% of the teeth) of insufficiently inserted gingival area present areas of RTM, which suggests the importance of keratinized tissue for maintaining health and periodontal stability [15]. Thin vestibular bone walls, characterized by being predominantly cortical, also presents a high risk of RTM [16]. The association of thin, low keratinized tissue with a narrow vestibular bone sheet may result in increased susceptibility to local tissue inflammation and consequent RTM [17,18].

Periodontal tissues can be described clinically according to the classification proposed by [19] in: periodontium type I, periodontium type II, periodontium type III and periodontium type IV. In periodontium type I the keratinized tissue range is ideal (3 to 5 mm) and the buccal-lingual thickness of the alveolar process is also normal, observed in approximately 40% of the patients. The reduction of only

the keratinized tissue ranges (up to 2 mm), observed in approximately 10% of patients, and characterizes a periodontium type II. An ideal gingival tissue associated with a fine alveolar process characterizes a periodontium type III, present in approximately 20% of patients. The Maynard and Wilson [19] periodontium type IV is the most susceptible to mucogingival problems, characterized by a low keratinized gingival tissue and a thin alveolar process,

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present in approximately 30% of the patients. Among the periodontal clinical parameters adopted by the American Academy of Periodontology - AAP (2000), the clinical attachment level and the probing depth allow to estimate the loss of clinical insertion and distancing of the gingival margin to the cementoenamel junction, as well as the radicular covering and the insertion gain achieved after root recoating surgery.

In a thin-thickness gingival tissue, the inflammatory process resulting from the accumulation of plaque on the dental crown may infiltrate the connective tissue 1 to 2 mm in the apical direction and cause alveolar bone resorption [20]. Some authors such as Sullivan and Atkins [21], Benqué [22] and Miller [23] proposed different descriptive classifications of MTR, used by clinical professionals and researchers, orient the classification of MTR in relation to their width and depth, such as: shallow and narrow, shallow and broad, deep and narrow and deep and shallow. This methodology is important because the periodontal ligament nourishes up to 1.5 mm from each side of the root and, therefore, large defects may present less predictability due to the limitation of nutrition and viability of indicated grafts for root coverage. Benqué [22] describe the MTRs as "U", "V" or "I". In general, V-shaped MTRs are related to cases of occlusal trauma, whereas I-shaped defects are more present in buccal teeth in the dental arch.

Miller's [23] classification is the most used not only for describing the cases of MTR, but mainly for attributing to the MTR type a greater or less predictability of success in root coverage surgeries. In classes I and II of Miller the gingival margin is below or at the mucogingival line, respectively. In both cases the interproximal bone crest and the interdental papillae are preserved and the expectation of 100% root coverage occurs. In Miller's III and IV classes, a maximum coverage of 70% and 50% of MTR, respectively, is expected, taking as reference the height of the remaining interproximal tissue (bone crest and papilla). In the first, what differentiates it from Miller class I is the existence of interproximal tissue loss and/or rotational tooth. In class IV the interproximal tissue loss is severe and the gingival margin is located beyond the mucogingival line.

The MTR occurs mainly on the buccal surfaces of the teeth, due to constant trauma during toothbrushing and, in the interproximal areas due to inadequate oral hygiene [24].

The mucogingival surgeries are indicated in cases of progressive MTR, cases of indication of intrasulcular restorations in a thin periodontium, shallow vestibule associated with the use of removable dental prostheses, presence of frenum with high insertion near the gingival margin, planning of orthodontic movements of risk for MTR and limited oral hygiene associated with local pain. The mucogingival surgeries should precede orthodontic treatment by promoting greater stability of the gingival contour during tooth movement [25,26].

The main damages to the patient with MTR are loss of periodontal support, root exposure accompanied by esthetic compromise and presence of dentin hypersensitivity, increased risk of cervical and radicular caries, and possibility of root wear by dental brushing, difficulty in hygiene and discomfort. The treatment of MTR may be conservative by means of desensitizers and laser-therapy in cases of dentin hypersensitivity not accompanied by other indications or, surgically [27,28].

Marginal tissue recession cases accompanied by loss of dental substance (trauma, caries or abfraction) can be restored prior to root coverage procedures. Among the restorative materials of choice for this purpose are the composite resin and resin-modified glass ionomer [29]. These restorations optimize the final aesthetic and morphophysiological results of root coverage and contribute to the reduction of dentin hypersensitivity.

Among the main techniques of mucogingival surgery for root coverage is: free gingival graft [30], rotational flaps [31] laterally positioned flap [32], a "tunnel" technique [33], a double pedicle flap [34,35] a semilunar flap [36-38], technique of Raetzke [9], among others; the different flaps may or may not be associated with the subepithelial graft with connective tissue [39]. The gold standard for root coverage surgeries is to associate with the planned flap the accomplishment of an autogenous connective tissue graft, in the receptor area [40]. The literature also suggests partial-thickness flaps, called split flaps, as the most suitable technique for this purpose [41,42].

The connective tissue removed from the palate (donor area) and grafted in an area of MTR (receptor area) modulates the local epithelium and results in a gain of keratinization, similar to the characteristics of the palate [43,44]. Despite the biological properties and the advantages of using the autogenous connective tissue graft to gain gingival tissue thickness in areas of MTR, collection is not always possible or indicated. Patients with a shallow depth palate (up to 7 mm), with anatomical variations of the greater palatine artery or with little tissue thickness present risks and limitations for the removal of connective tissue from this region.In order to optimize the periodontal insertion gain after root surface conditioning and the local cell stimulus with inducing biomaterials, it is possible to replace the connective tissue of the palate in patients with limitations in the donor area by biocompatible and efficient biomaterials for the thickness gain of the palate. Gingival tissue and consequent stability of this tissue. Some companies of biotechnology and tissue bioengineering have developed products that lend themselves to surgeries of gingival thickness gain and keratinized tissue gain satisfactorily: AlloDerm™ (BioHorizons®, Birmingham, England) and

Mucograft® (GeistlichPharma Brazil, São Paulo, Brazil). The main advantages of the use of grafting biomaterials are related to the lower morbidity, the significant reduction of the surgical time, the need for a second surgical access (donor area) and the possibility of approaching a large area in a single surgical time [45-47].

Exposed root surfaces affected by periodontitis have reabsorption gaps and presence of bacterial microorganisms and endotoxins that compromise cell adhesion and fibroblasts functions [48-50]. The indulgence layer formed during mechanical instrumentation of the root surface acts as a physical barrier to reinsertion and conjunctive neo insertion [51-53]. The scaling and root planing can be performed manually (curettes and limes), by ultrasound or multilayer burs [54-58].

Different bio modifying solutions of the root surface have been used, especially EDTA at 24% (Prefgel®, Straumann®, Headquarter - Basel, Switzerland) citric acid pH 1.0 and tetracycline HCL 50 mg/mL. These products allow the removal of smear layer, decontamination, demineralization with exposure of collagen fibers, fibroblast adhesion, conjunctive reinsertion and cementogenesis [59]. Emdogain® (Straumann®, Headquarter - Basel, Switzerland), a product composed of enamel matrix proteins acquired from animal models (pig), induces the formation of tissues that make up the periodontium of support and has been widely studied and used for regeneration of these tissues [60,61].

The connective tissue is used in dentistry in different indications associated with teeth or implants such as gingival pigmentation treatment [62], root coverage [27], alveolar ridge volume increase (LANGER & CALAGNA, A substitution alternative for the connective tissue graft is the Mucograft® (GeistlichPharma Brazil, São Paulo, Brazil) membrane, a fully decellularized, biocompatible, and fully decellularized porcine connective tissue scaffold, an efficient conduction of angiogenic and regenerative cells such as fibroblasts [63]. This ready-to-use soft tissue graft eliminates the need to remove autogenous tissue at a second surgical approach (donor area), reduces surgical time and patient morbidity [64], as well as risk of accidents and complications [65]. The Mucograft® (GeistlichPharma Brazil, São Paulo, Brazil) membrane adheres naturally and harmoniously to the patient's own tissue, allowing optimal coverage of gingival recession [63] or regeneration of keratinized tissue [64].

Mucograft® (GeistlichPharma Brazil, São Paulo, Brazil) membrane is indicated to replace connective tissue grafts, soft tissue augmentation around teeth and implants, guided bone regeneration, alveolar ridge reconstruction, alveolar closure, to cover exposed bone tissue and for root coverage. The membrane does not cause any damage to the gingival tissues [66].

In root coverage surgeries, the final result achieved is only established after the first month of tissue repair, due to a biological event called creepingattachment. This late coronary gingival tissue migration occurs during maturation of the post-repair/healing tissue and may result in root recoil gains of 0.5 mm to 9 mm [67].

Marginal tissue recession present different etiologies and can be multifactorial, ranging from conservative procedures such as restorations and treatments for dentin hypersensitivity, to surgical interventions aimed at root coverage. The periodontal biotype should always be evaluated, as should the morphology of the gingival recession. The root coverage associated with subepithelial grafts allow greater soft tissue stability and can be achieved with autogenous connective tissue or xenogeneic biomaterials. Whenever possible, root surface conditioning, cell stimulation for tissue regeneration (neoinsertion) by biostimulators and subepithelial grafting should be performed to gain marginal gingival tissue thickness.

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