



Treatment of multiple Miller class I and III gingival recessions by means of sub-epithelial connective tissue graft and tunnel technique

Tratamiento de recesiones gingivales múltiples clase I y III de Miller combinando injerto de tejido conectivo sub-epitelial con técnica en túnel

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ABSTRACT

Introduction: Gingival recession can be associated to periodontal disease or muco-gingival conditions causing hypersensitivity, root caries and esthetic problems. A combination of the tunneling technique with sub-epithelial connective tissue graft can be considered an option for multiple gingival recession treatment. **Case presentation:** A 38 year old female patient who informed of suffering hypersensitivity in upper teeth (13, 14, 22, 23, 24), exhibiting gingival recession. Periodontal evaluation revealed Miller class I and III gingival recessions in quadrants I and II. Periodontal diagnosis was healthy periodontium. In order to achieve root coverage, placement of sub-epithelial connective tissue graft with tunneling was planned. This represents a suitable procedure in cases when interdental papillae are wide, moreover, it constitutes a high predictability technique in order to achieve root coverage. In the present case, it was decided to initiate treatment on the second quadrant since it lodged sites with greater dental hypersensitivity, to be followed a month later by treatment on the first quadrant. **Conclusions:** This applied technique allowed for 100% elimination of tooth hypersensitivity, only considering a disadvantage the double surgical site of the donor site. It is important to mention that, in addition to achieving improvement in tooth hypersensitivity, esthetic appearance was improved.

Key words: Connective tissue graft, gingival recession, tunneling technique, tooth hypersensitivity.

Palabras clave: Injerto de tejido conectivo, recesión gingival, técnica en túnel, hipersensibilidad dental.

INTRODUCTION

Gingival recession is the migration of marginal gingival tissue in an apical direction with respect to the cement-enamel junction (CEJ) with root surface exposition. Tissue trauma caused by vigorous tooth brushing is considered the main factor to cause development of gingival recession, especially in young subjects.¹

Many of these conditions can be detected by the patients themselves, who frequently observe gingival recession and seek treatment of some kind. Within this context, coverage of exposed root surfaces has become an important therapeutic factor due to rising

RESUMEN

Introducción: La recesión gingival puede estar relacionada con la enfermedad periodontal o condiciones mucogingivales ocasionando hipersensibilidad, caries radicular y problemas estéticos. La combinación de la técnica en túnel y el injerto de tejido conectivo subepitelial puede considerarse una opción para el tratamiento de recesiones gingivales múltiples. **Presentación del caso:** Paciente de sexo femenino de 38 años de edad, al interrogatorio refiere tener hipersensibilidad dentaria en los dientes superiores (13, 14, 22, 23, 24) que presentan recesión gingival. A la valoración periodontal se observan recesiones gingivales clase I y III de Miller en cuadrante I y II, el diagnóstico periodontal es periodonto sano. Para realizar la cobertura radicular se planea combinar la colocación de injerto de tejido conectivo subepitelial con técnica en túnel, siendo un procedimiento adecuado cuando las papilas interdentes son amplias, además de ser una técnica de alta predictibilidad para lograr la cobertura radicular. En este caso, se decidió iniciar por el segundo cuadrante, ya que eran los sitios con mayor hipersensibilidad dentaria y un mes después realizar el tratamiento en el primer cuadrante. **Conclusiones:** La técnica que se aplicó permitió eliminar la hipersensibilidad dentaria en un 100% considerando como única desventaja el doble sitio quirúrgico del sitio donador. Es importante mencionar que además de lograr mejoría en la hipersensibilidad dentaria, se mejoraron las condiciones estéticas.

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patient demand as well as esthetic problems, tooth hypersensitivity, root caries or when adequate removal of dental plaque is hindered.²⁻⁴

Handling of gingival recessions and sequelae are based on a detailed evaluation of etiological factors and the degree of damage of adjacent tissues. Initial treatment of patients' gingival recession must target correction of etiological factors.⁵

Several surgical treatments have been reported to decrease depth of gingival recession as well as to increase clinical insertion and breadth of keratinized tissue,³ these treatments are: pedicle grafts, free gingival grafts, sub-epithelial connective tissue grafts (SCTG), «envelope» or «tunnel» technique, guided tissue regeneration using synthetic membranes and use of acellular dermal matrix.

Meta-analysis results have reported that SCTG could be considered the gold standard of gingival recession treatment procedures, nevertheless, predictability of this procedure is influenced by a great variety of factors, for example, surgical factors, teeth to be treated, flap tension, tobacco habit, type of recession, factors related to operator and patient, amount of keratinized tissue present and type of surgical procedure to be followed.

Miller's classification sustains a forecast for root coverage procedures, where full coverage (100%) can be anticipated in class I and II recessions, partial coverage (< 100%) can be expected in class III recessions, and no root coverage can be foreseen in class IV recessions.^{4,6,7}

Tunnel procedure was introduced in 1994, and is called «supra-periosteal fold». The unique characteristic of this procedure is the fact that interdental papilla is left intact and absence of vertical incisions achieves more favorable esthetic results. At a later point in time, this tunnel technique was modified in order to introduce crown position of marginal tissue, which allows for full graft coverage.²

According to protocol described by Allen, the «tunneling» technique includes preparation of a supra-periosteal mucosa flap with intra sulcus incisions. This allows for gums displacement in a cervical direction, and thus, the creation of a «pocket» or bag. After this, sub-epithelial connective tissue graft is inserted into the tunnel partially exposed during recession, to be then sutured in that position.

When compared to other techniques, the modified tunnel technique is free of horizontal or vertical incisions, it is a minimally invasive method, blood supply can be preserved to a maximum degree, and graft coverage is feasible; there is less post-operative discomfort for the patient as well as more favorable

esthetic results. For this technique a muco-periosteal dissection beyond the muco-gingival junction is required as well as in every papilla involved. Small sized instruments are to be used, especially designed to facilitate tunnel preparation, thus decreasing risks of iatrogenic perforation and surgical trauma.^{2,5,6,8}

Original suture procedure for sub-epithelial connective tissue must secure crown direction displacement, first from the graft to the receptor bed, and then displacing the flap in direction to the crown by means of a continuous suture (sling suture) in order to cover as much graft as possible.⁹

In order to consider that successful root coverage has been achieved, the new gingival margin position must be located in crown direction with respect to the cement enamel junction.^{4,10}

CLINICAL CASE PRESENTATION

A 38 year old female patient attended the periodontal clinic looking for a solution to dental hypersensitivity experienced in the upper area of her mouth. Patient interrogation revealed non-contributory pathological personal history, she was thus considered to be in good health. Periodontal probing was conducted during initial evaluation. Emitted periodontal diagnosis was healthy periodontium and Miller class I gingival recessions in teeth 13, 14, 22, and 23 and Miller class III in tooth 24. Periapical X-rays were taken in order to determine bone crest height.

Recommended treatment plan was to achieve root coverage by means of sub-epithelial connective tissue adhering to tunneling technique. Aforementioned procedures were conducted in two sessions, the first quadrant was first treated since it represented the area causing most discomfort to the patient; a month later, procedures in the second quadrant were performed.

Initial treatment

It is worth mentioning that treatment was explained in great detail to the patient, highlighting its advantages and disadvantages. Patient was requested to sign an informed consent form.

Periodontal phase 1 was conducted through modifications in oral hygiene habits; modified Stillman brushing technique was implemented as well as suitable use of dental floss. Dental prophylaxis and polishing were conducted.

Surgical procedure

Before initiating surgical procedure, the patient was requested to rinse her mouth with 0.12% chlorhexidine

gluconate during one minute; iodopovidone was used to disinfect the extra-oral region. After this, the region of teeth to be treated (13-14) was anesthetized. Supra-periosteal anesthesia technique through vestibular and palatal access was used (*Figure 1A*).

After this, partial thickness intra-sulcus incisions were performed, with a scalpel blade # 15c, creating thus a deep fold in each recession, extending the incision beyond the muco-gingival junction so as to allow flap displacement towards the crown, thus preserving interdental papillae intact.

This procedure was equally conducted in all gingival recessions to be treated so as to create a tunnel and allow easy displacement of the graft (*Figure 1B*).

A vertical incision was performed in order to conduct SCTG, using a # 15c scalpel blade at the level of the palatine side of the premolars and first right upper molar, preserving an approximately 3 mm distance from the gingival margin of these teeth. Through this incision a fold was created for graft harvesting. Once this was achieved, SCTG was preserved hydrated with saline solution while the vertical incision was sutured in the palate, to this effect, 3 simple suture stitches were applied with 5-0 polyglycolic acid, achieving thus suitable closure of donor bed.

Adipose tissue was removed from SCTG with SD 14 scissors, so as to obtain a thin, easy to manipulate graft when placed (*Figure 1C*). This graft was placed at the site with a P20 periosteal elevator, carefully passing it through the tunnel so as to preserve interdental papilla insertion intact (*Figure 1D*). In order to avoid displacement of sub-

epithelial connective tissue graft crown suspender sutures were applied to later perform flap displacement towards the crown combining simple isolated stitches with crown suspenders and X shaped stitches. To this effect 5-0 polyglycolic acid suture was used (*Figure 1E*).

Once the procedure was completed, periodontal pack (Coe-pack) was applied to both surgical sites.

Post-operatively prescribed drugs were sodium naproxen, tablets 550 mg, one tablet every 6 hours for three days, use of cold compresses on the cheeks and mouth rinse with 0.12% chlorhexidine gluconate (20 mL every 12 hours for two weeks); the patient was instructed not to touch treated sites and to avoid activities requiring intense effort.

RESULTS

Follow-up check-ups were undertaken. Seven days after procedure, periodontal surgical pack was removed and sutures were removed two weeks after procedure. The patient did not suffer any post-operative complications and exhibited healing process in concordance with evolution time.

One month after the first procedure, the second periodontal surgery was conducted for root coverage of teeth 22-24. The same protocol as in the first procedure was adhered to. Healing process was similar to that of the first surgery, lacking any complications (*Figures 2A to C*).

Clinical characteristics of the case here presented were wide papillae and sufficient amount of keratinized



Figure 1.

A) Miller class I gingival recessions. **B)** «Tunnel» creation preserving interdental papillae intact. **C)** Presentation of sub-epithelial connective tissue grafts. **D)** Sub-epithelial connective tissue grafts placement through the tunnel without altering insertion of interdental papillae. **E)** Sutures. **F)** Root coverage results in the first quadrant after two months. **G)** Full root coverage after six months (first quadrant).

tissue which allowed to achieve the tunneling technique with a sub-epithelial connective tissue graft. Likewise, the donor site provided sufficient amounts of tissue to achieve full recession coverage.

Four weeks after completing each of the procedures, the patient informed of dental hypersensitivity remission.

Two months after procedures, suitable root coverage was observed on treated teeth (*Figures 1F and 2D*).

Six months after procedure, follow-up review was conducted, satisfactory root coverage was observed in treated teeth (*Figures 1G and 2E*).

The patient was satisfied with clinical results.

DISCUSSION

Patients' demands with respect to achieving greater esthetic results have presently increased. Frequent presence of gingival recessions^{2,11} and their multi-factorial etiology determine the need to identify causing factors so as to tailor suitable treatment.²

In order to conduct root coverage procedures, sub-epithelial connective tissue graft is considered the gold standard. SCTG offer suitable results, nevertheless, they are limited by the amount of donor tissue obtained from the palate, and generate the need to create a second surgical bed to harvest them. Use of an acellular dermal matrix is an option to avoid creation of a second surgical bed, nevertheless, cost can be a drawback for this option.¹² However, some studies report «tunneling» technique with placement of acellular dermal matrix for treatment of multiple gingival recessions, results of this case series show an average defect coverage of 61% and a 0.15 mm gain in tissue thickness which were achieved one year after surgery was completed.¹³

Nevertheless, other studies have reported that SCTG with tunneling technique seem to be a suitable technique to treat Miller class II and class III gingival recessions located in the anterior mandibular region;

in these cases, average percentage of root coverage was 83.25%, with a 2.5 mm statistically significant increase of keratinized tissue.⁶

Chaparro et al, in their study, did not observe statistically significant differences between full root coverage achieved in the lower jaw when compared to the upper jaw. Nevertheless, significant difference was observed between full root coverage achieved in Miller class I recessions when compared to Class II, since, a year after surgical procedure completion, 67.9% of treated sites in the upper jaw preserved full root coverage when compared to 52.5% of gingival recessions in the lower jaw.²

Literature review provides access to multiple techniques designed for root coverage; these techniques have been modified and gave rise to other techniques. It is important to consider that in addition to technique, accurate diagnosis of the gingival recession is of the utmost importance as well as assessment of clinical characteristics of adjacent tissues and operator's skill.¹¹

Although aforementioned factors are important, it has equally been mentioned that presence of caries lesions in the roots and loss of interdental tissues negatively affect full root coverage, these aspects must be previously clinically evaluated and discussed with the patient.¹⁴

Moreover, authors such as Dani et al have reached the conclusion that success of any root coverage procedure is determined by several factors which are critical to each step of the procedure including follow-up, long-term maintenance (support periodontal therapy) and patient's compliance. SCTG and tunnel technique achieve significantly better and more predictable results thus providing great advantages.⁸

Authors such as Lops D et al have suggested use of a computerized system for image analysis, which represents a simple and reliable method to measure soft tissue modifications during a follow-up period.¹⁵

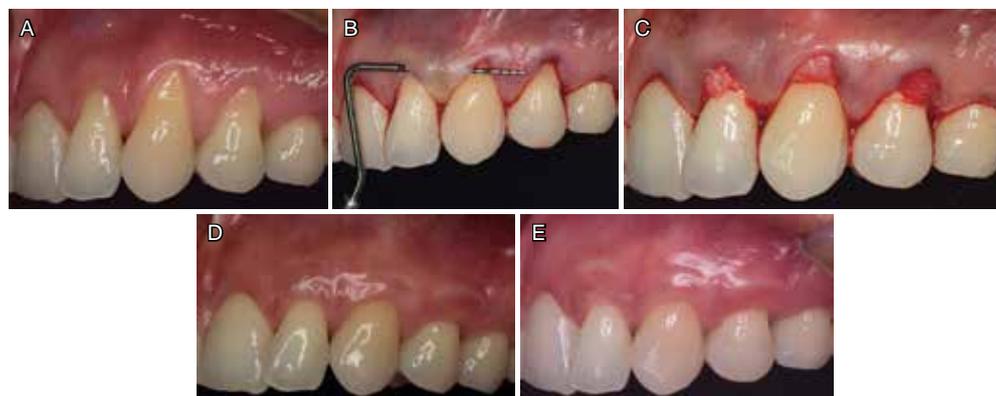


Figure 2.

A) Miller class I gingival recessions in teeth 22-24. **B)** Tunnel preparation. **C)** Sub-epithelial connective tissue grafts adaptation within the tunnel. **D)** Results of root coverage in the second quadrant after two months. **E)** Full root coverage after six months (second quadrant).

In the present study it was confirmed that combination of SCTG and tunneling technique provides excellent esthetic treatment in cases when it is assessed by patients.⁶

According to the aforementioned, we can state that this combined technique applied in the present case for multiple gingival recessions treatment achieved outstanding esthetic and functional results, which had been equally observed in other studies.

CONCLUSION

Combination of tunneling technique with sub-epithelial connective tissue graft as treatment of choice for multiple recessions can be successful if conducted after accurate diagnosis and cause identification, operator's skill will determine success of a predictable technique such as that here presented.

«Patient's informed consent was procured for publication of the present case as well as images that complement it».

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