

Case report

TREATMENT OF GINGIVAL RECESSION WITH TUNNEL TECHNIQUE: A 13-YEAR FOLLOW-UP CASE REPORT

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ABSTRACT

The periodontium is a complex structure that plays a crucial role in oral health. It has been studied extensively, and its understanding is essential for preventing and treating periodontal diseases. Periodontal disease is a pervasive inflammatory disorder that negatively impacts the supporting structures of the dentition, culminating in progressive attachment loss and alveolar bone resorption. A prevalent clinical manifestation of periodontal disease is gingival recession. Various factors, including chronic inflammatory periodontal disease, occlusal trauma, aggressive tooth brushing, and periodontal treatment, can cause it. Multiple gingival recessions can be treated through various surgical techniques. The choice of surgical technique to adopt depends on the anatomical characteristics, the surgical objectives, the predictability data of root coverage present in the literature, and finally, the aesthetic requests of the patient. The tunnel technique (TUN) is used when there is not enough apical keratinized tissue to cover the root, and at the same time, there are well-represented papillae that allow tunneling. TUN is a minimally invasive method that doesn't require vertical releasing incisions and preserves the interdental papillae. A connective graft collected from the palate is inserted in a tunnel of the papilla to cover the roots of the teeth. The following work presents a case report. Furthermore, literature is discussed.

KEYWORDS: *gingival recession, coronally advanced flap, tunnel technique, connective tissue graft*

INTRODUCTION

Gingival recession is characterized by the downward movement of the gingival line beyond the cement-enamel junction, leading to the root surface being exposed to the oral environment (1, 2). This condition can be triggered by chronic inflammatory periodontal disease, occlusal trauma, chronic trauma, particularly aggressive tooth brushing, and periodontal treatment. Factors such as tooth anatomy and position, reduced alveolar bone crest thickness, bone dehiscence, soft tissue thickness, frenulum traction, or orthodontic treatment can contribute to its development (3-6).

Recently, Cairo et al. proposed a new classification based on the interproximal clinical attachment loss: while Recession Type 1 (class RT1) includes gingival recession with no loss of interproximal attachment, Recession Type 2 (class RT2) is associated with interproximal attachment loss less than or equal to the buccal bone site and Recession Type 3 (class RT3) shows higher interproximal attachment loss than the buccal site (4).

Two surgical techniques are commonly used to achieve complete root coverage: the coronal advanced flap and the tunnel technique (7, 8). The coronally advanced flap is a conventional surgical method to achieve total root coverage for single, multiple, continuous, or neighboring gingival recessions (6). This procedure makes two oblique cuts that start from the distal and medial aspects of the affected teeth and extend toward the alveolar mucosa. A partial thickness flap

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dissection is performed from the oblique interdental incisions. The periosteum is incised to eliminate muscle tension in the apical portion of the flap. The mobilized flap should be able to reach the enamel-cement junction passively. The sutures are positioned to fit the flap advanced coronally precisely.

However, an alternative treatment for gingival recessions is the latest tunnel technique, a minimally invasive method that doesn't require any vertical releasing incisions and preserves the interdental papillae (8, 9). This technique performs partial lateral incisions in the mucosa surrounding adjacent teeth affected by periodontal recession. Papillae are not thoroughly dissected, so a connective graft collected from the palate can be inserted in a papilla tunnel to cover the teeth' roots in the vestibular site. The graft is secured with two interrupted sutures. Suspensory sutures are recommended to advance the mucosal flap in the coronal direction over the exposed portions of the connective tissue graft. Soft pressure is applied to the graft for a few minutes to improve the graft's adaptation to the root surface (9). The following work presents a case report using the tunnel technique. Then, the literature is discussed.

CASE REPORT

A 17-year-old patient came to our clinic in January 2010 for an orthodontic evaluation. She had a gingival thin phenotype that did not present any periodontal disease. A gingival recession was noted at elements 2.3 and 2.4, with sensitivity to thermal variations (Fig. 1).



Fig. 1. *Initial intraoral photos.*

The patient reported aesthetic discomfort; she would like to cover these recessions. Before surgery, complete oral hygiene and a radiological examination were performed (Fig. 2).



Fig. 2. *Radiological examination (dental panoramic tomograph).*

The integrity of the interproximal periodontal support is fundamental in obtaining complete root coverage. This specific case of the patient's recession was classified as Miller class I. Therefore, this case's potential for root coverage was 100% complete. Before proceeding with the surgery, the thickness of the palatal fibro-mucosa was evaluated to quantify the amount of graft that would be collected (Fig. 3).



Fig. 3. *Measurement of the thickness of the palatal fibro-mucosa using an anesthesia needle and an endodontic stop.*

A 0.8-1.0 mm graft was needed to cover recessions on natural elements. Local anesthesia with adrenaline was performed at the palatal and vestibular levels. Tetracycline was used to condition the root surface. This agent eliminates the dentinal mud that accumulates inside the dentinal tubules after root planning. The elimination of dentinal mud allows the exposure of the collagen fibrils within the dentinal tubules, which can thus interact with the fibrin network of the clot that forms between the root and soft tissues. Consequently, the adhesion of the clot to the root surface was accomplished (Fig. 4).



Fig. 4. *Tetracycline eliminates dentinal mud on the root surface of elements 2.3 and 2.4.*

At this point, the graft was taken from the palate with the following technique (Fig 5):

- a linear incision of half thickness was done parallel to the molar and premolar teeth;
- a second incision was parallel to the first line (0.5 -1.0 mm);
- the graft was free with two vertical incisions and one horizontal apical.

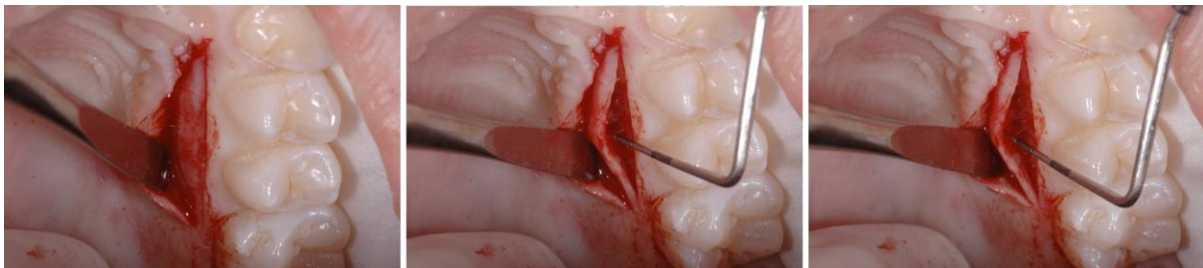


Fig. 5. *Technique used to collect connective tissue.*

The receiving bed was prepared at the vestibular level of teeth with gingival recession, and a tunnel technique was performed. The tunnel technique involves splitting the papilla between 2.3 and 2.4 without detaching it. Then, an incision was done distally to 2.4 and mesially to 2.3, and then the incision was performed apically on the two teeth, 2.3 and 2.4. This way, a receiving envelope was created without the papilla being detached. A periodontal probe was used to check that there was no adhesion inside the receiving bed. In such a way, the graft lodged passively. Subsequently, the graft was positioned and secured with a suture point. After a week, the sutures were removed (Fig. 6, 7).



Fig. 6. *Intraoperative photos.*



Fig. 7. *Healing one week after the surgery.*

The patient was discharged and subjected to therapy with a chlorhexidine-based mouthwash and a painkiller (as needed). A control was performed after a month (Fig. 8).



Fig. 8. *The first picture shows the initial stage, and the second picture shows the clinical status one month after the surgery.*

A 13-year follow-up shows the effectiveness of the tunnel technique (Fig. 9).



Fig. 9. *Intraoral photo taken 13 years later.*

DISCUSSION

The tunnel technique consists of creating a supra-periosteal “envelope” or “pouch” “envelope” at the gingival margins, allowing flap elevation and insertion of a connective tissue graft. In this procedure, minor side cuts are made in the mucosa around neighboring teeth suffering from a periodontal recession. Extreme caution must be exercised to not split the interdental papilla, allowing for a connective tissue graft harvested from the palate to be placed in a papillary tunnel. The graft is anchored with interrupted sutures. Suspensory sutures should be employed to shift the mucosal flap coronally over the exposed sections of the connective tissue graft. Light, digital pressure is exerted on the graft for a short duration to enhance the graft’s adaptation to the root surface and to maximize the graft surface in contact with the root (9).

For each case, several factors should be considered when selecting the surgical technique to achieve root coverage, for example, the arch form of the soft tissue, the position of the tooth, the depth and width of the recession, the thickness and quality of the apical and lateral tissue to the recession, aesthetic needs and compliance of the patient. From an aesthetic point of view, the coverage of the exposed root surface with soft tissues must be in harmony with the adjacent tissues. Therefore, a pedunculated graft is preferable because the gingiva color is a better match (9).

The coronally advanced flap technique consists of an intrasulcular incision made at the buccal aspect of the treated tooth and extended 3 mm horizontally in the mesial and distal interdental gingiva. Two oblique, divergent releasing incisions followed, extending beyond the mucogingival junction. A trapezoidal partial-thickness flap is then raised beyond the mucogingival junction to allow a passive coronal displacement of the flap, completely covering the cement-enamel junction. A sling suture stabilizes the flap in a coronal position, and interrupted sutures are placed on the releasing incisions (10).

The tunnel technique is specifically designed to address multiple and extensive gingival recessions typically found in jaw areas where achieving root coverage is challenging. Moreover, it aids in maintaining sufficient and steady blood flow to ensure optimal graft adaptation in the recipient area (11).

Both root coverage methods can use various graft types. The connective tissue graft is the most commonly used and is considered the gold standard for enhancing keratinized soft tissue gums. However, its main drawback is the need for a donor site, which may lead to postoperative complications (12).

In addition, many authors in the scientific community, such as Cairo et al. (13), Pini-Prato et al. (14), and Zucchelli et al. (15), confirm that the addition of connective tissue graft enhanced the clinical outcomes of the coronally advanced flap in terms of complete root coverage, providing a better long-term clinical outcome compared to coronally advanced flap alone.

The literature is not unanimous in comparing the coronally advanced flap and tunnel techniques. In fact, Toledano-Osorio et al. (16) state that the coronally advanced flap is more effective than the tunnel technique in terms of root coverage percentage; on the contrary, Mayta-Tovalino et al. (17) argue that the tunnel technique had similar primary and secondary outcomes compared to the coronally advanced flap.

Cairo et al. (18) confirm that both the tunnel technique and coronally advanced flap procedure with connective tissue graft showed the highest overall aesthetic performance for root coverage. However, graft integration might impair soft tissue color and appearance. Also, Gobbato et al. (19) demonstrated that both treatments with a subepithelial connective tissue graft had similar clinical efficacy regarding root coverage. In conclusion, our report shows that the tunnel technique has a long-term outcome in selected cases.

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