

## The Pouch and Tunnel Technique for the Management of Adjacent Gingival Recession Defects: Surgical Correction and One-Year Follow-Up

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### Abstract

**Aim:** The aim of this report is to present a minimally invasive periodontal plastic surgical method for the treatment of gingival augmentation coronal to area of recession on the facial aspect of the mandibular central incisors.

**Background:** Gingival recession is a relatively common condition patients may discuss with their general dental practitioner. Several improvements in the available corrective surgical techniques have evolved, especially in flap design of periodontal cosmetic surgeries, which can produce a favorable final treatment outcome.

**Case Description:** A 21-year-old male patient diagnosed with Miller class II marginal tissue recession on the facial surface of the mandibular right and left central incisors was treated with a subepithelial connective tissue autograft underneath a supraperiosteal pouch and tunnel recipient site for multiple areas of gingival recession. This flap design allowed intimate contact of donor tissue to the recipient site. One-year follow-up examination of the surgical site revealed excellent and stable root surface coverage.

**Summary:** The use of a technique that involves preservation of papilla height and ensures maximum blood supply to the graft helps to attain excellent esthetic and functional long-term results.

**Clinical Significance:** Given the increasing patient concerns about dental esthetics, the surgical treatment modality presented can



be beneficial in efforts to meet the esthetic and functional demands of patients, thereby contributing positively to treatment acceptance and the overall outcome.

**Keywords:** Gingival recession, pouch and tunnel technique, multiple gingival recession

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## Introduction

In a contemporary dental practice, clinicians are faced not only with the challenge of addressing the biological and functional problems of the oral cavity, but also providing therapies that result in acceptable esthetics. Gingival recession is a relatively common condition that patients may discuss with their general dental practitioner. Although different techniques have been tried in the past with varying degrees of success, predictable and complete root coverage still remains an elusive goal. Therefore, this case report presents a case treated using a cosmetic periodontal surgical technique involving the pouch and tunnel technique with a subepithelial connective tissue graft for a patient with facial gingival recession on the mandibular central incisors.

## Background

Periodontal defects that transcend the mucogingival junction have been of concern to both patients and clinicians. Gingival recession is defined as the displacement of the gingival margin apical to the cemento-enamel junction (CEJ).<sup>1</sup>

The prevalence of gingival recession varies from 3 percent to 100 percent depending on the population and method of analysis. The prevalence of recession appears to be lower in young individuals, where the incidence was found to increase over time.<sup>2</sup>

When gingival recession occurs, it is most often associated with periodontal diseases or related to mechanical factors such as an incorrect toothbrushing technique. Other causes of gingival recession may include self-inflicted injuries<sup>3</sup> and anatomical, physiological, or pathological factors.<sup>4</sup> The condition also may be a consequence of local inflammatory and immune responses due to periodontitis.<sup>5</sup> In fact, periodontal inflammation can lead to connective tissue breakdown and apical epithelial proliferation resulting in recession.

In children and young adults, gingival recession appears to be associated with gingivitis, while in older adults, it is accompanied by periodontal disease.<sup>6</sup> Once that recession occurs, patients often are unable to adequately control dental plaque in those areas of localized gingival recession with their usual oral hygiene regimen.<sup>7</sup>

A host of other predisposing factors have been linked to gingival recession, including tooth malposition and root prominence, aberrant frenulum attachment, orthodontic tooth movement, underlying alveolar dehiscence, gingival phenotype,<sup>8</sup> iatrogenic restorative dentistry, and iatrogenic periodontal treatment such as surgical recession.<sup>9</sup>

Recession of the gingival tissue typically is characterized by the loss of periodontal connective tissue fibers along with tooth cementum and alveolar bone, resulting in root hypersensitivity, a poor esthetic appearance, and the potential for increased cervical root caries.<sup>10</sup>

## Surgical Correction of Gingival Recession

A wide variety of periodontal plastic surgical procedures, defined as those procedures performed to correct or eliminate anatomic, developmental, or traumatic deformities of the gingiva or alveolar mucosa<sup>11</sup> have been used to treat gingival recession. In fact, a number of root coverage techniques have been discussed in the dental literature and can be broadly divided into several general categories: pedicle soft tissue grafts, soft tissue autografts, combination procedures<sup>12</sup> with or without adjunctive regenerative<sup>13</sup> and root bio-modification procedures using citric acid, tetracycline, or EDTA.<sup>14</sup> The advantage of pedicle grafts over free, soft-tissue grafts is the retention of flap vascularity. Pedicle flaps can be performed by either a partial-thickness, full-thickness, or a combination dissection. Partial or split-thickness flaps, with periosteal and connective tissue retention, have been shown to result in less resorption of underlying alveolar bone.<sup>15</sup>

In periodontics the subepithelial connective tissue graft technique<sup>16</sup> is considered the gold standard for treating gingival recession.<sup>17</sup> Connective tissue grafts offered several advantages over free gingival graft, probably the most important of which is fewer complications in the donor area. Because the success of this technique is thought to rely on coverage of graft by overlying tissue, several technical variants have been proposed to cover the graft. Raetzke<sup>18</sup> described the technique for treatment of single, deep, wide gingival recession defects in which the base of the connective tissue graft was placed within an envelope prepared by an undermining partial-thickness incision from the soft tissue

margin. For the treatment of multiple adjacent recessions, Allen<sup>19</sup> reported a method wherein a supraperiosteal, multi-envelope recipient bed was prepared to receive the subepithelial connective tissue graft. The Allen technique reportedly helps to minimize incisions and reflection of flaps and to provide abundant blood supply to the donor tissue.<sup>19</sup>

## Case Description

A 21-year-old male patient reported to the outpatient division of the Department of Periodontics complaining of increased sensitivity to food materials in the lower anterior region of his mouth for the past three to four months.

Upon clinical examination, inflammation involving the marginal and interdental papilla of the mandibular right and left central incisors was identified along with Miller class I gingival recession<sup>20</sup> on the same teeth (Figure 1). The patient's oral hygiene technique was reviewed, and he reported reduced efficiency in cleansing the mandibular anterior region.

Preliminary treatment consisted of professional plaque control through scaling and root planning followed by instructions to the patient in the proper brushing technique for an appropriate home care maintenance program. The patient was recalled after four weeks and reexamination of the oral cavity showed resolution of inflammation in the mandibular anterior region, which could be attributed to the efficient plaque control



**Figure 1.** Preoperative photograph showing the Miller's class I recession defect.

protocols now used by the patient. Although the inflammation had resolved, the patient's chief complaint of gingival recession persisted. In fact, the gingival marginal tissue level continued to remain below the cementoenamel junction, exposing the roots of the mandibular right and left central incisors. The gingival recession was approximately 2.0 mm on the mandibular right central incisor as measured by a manual periodontal probe.

Thus a periodontal plastic surgical procedure was planned to treat the adjacent gingival recession defects using the pouch and tunnel method after obtaining a signed informed consent form from the patient.

## Surgical Procedure

The surgery was initiated after administration of a local anesthetic agent (Xicaine®, ICPA, Mumbai, India) and performed under aseptic conditions throughout the procedure. The surgery itself involved harvesting a connective tissue graft from the left side of the patient's palate and introducing it into the multiple envelope recipient bed (tunnel) using the technique previously described.<sup>21</sup>

## Preparation of the Recipient Bed

Initially a pouch was created on the buccal aspect of the two mandibular central incisor teeth with gingival recession (Figure 2). A sulcular partial thickness incision was made through each recession area, undermining the tissue beyond the mucogingival junction, so that there would be sufficient relaxation of this flap to allow easy placement of the connective tissue graft beneath



**Figure 2.** A pouch incision was made on the buccal aspect of the two mandibular central incisors, and the tissue was undermined to create space for the connective tissue graft material.

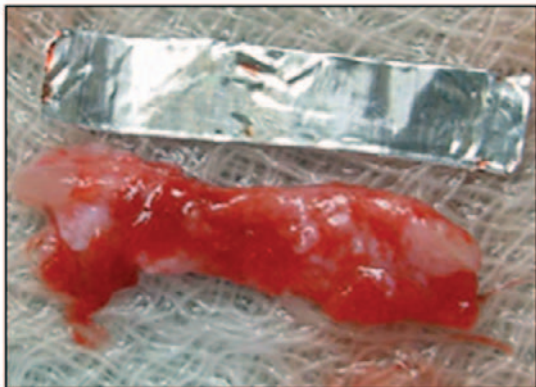


it. Each papilla adjacent to the recession was undermined gently without detaching it completely to create a tunnel.

A releasing vertical incision extending beyond the mucogingival line was made at the distal corner of the base of the papilla between the mandibular left central and lateral incisors.

### Preparation of the Donor Site

A second step was needed to procure a connective tissue graft of palatal mucosa long enough to span the entire recipient area. A tin foil template of the graft's dimensions was made and transferred to the donor site (the mesial aspect of the maxillary left first premolar to the distal aspect of the first molar). The connective tissue graft was then harvested by the "trap door" approach<sup>22</sup> (Figure 3), and the palatal donor site was sutured using a 4-0 nonresorbable, silk suture.



**Figure 3.** A surgical template made from tin foil was used to guide the harvesting of the palatal donor tissue.



**Figure 4.** Four interrupted sutures were placed to secure the graft.

### Graft Placement

The harvested connective tissue graft was positioned in the prepared pouch by sliding it through the vertical incision area and securing it to the adjacent interdental papillae using 4-0 absorbable suture (Vicryl, Ethicon, Johnson and Johnson, USA) and the mattress technique. The vertical incisions were closed with interrupted sutures (Figure 4).

The patient was discharged after placement of a periodontal dressing (PerioCare, Pulpdent Corporation, Watertown, MA, USA) (Figure 5). Before his release he was advised to refrain from mechanical cleansing of the surgical site, which could disturb initial healing, and instructed to rinse with 0.2% chlorhexidene gluconate solution (Hexidine, ICPA Health Care Products Ltd., Mumbai, India) twice daily for one minute. An analgesic was prescribed for the relief from any postsurgical pain.

### Postoperative Care

Healing was uneventful when the patient was recalled eight days after the surgery to have the sutures removed. At this same appointment the periodontal dressing was removed, revealing that the surgical site showed adequate healing, and the patient did not report any postoperative discomfort. Consequently, the patient was then instructed to resume mechanical cleaning (toothbrushing) using light pressure when two weeks had elapsed from the date of surgery.

### One-Year Recall Appointment

At the end of one year following the surgery, progressive adaptation of the graft to the surrounding tissues was noted, and the patient was pleased with



**Figure 5.** A periodontal surgical dressing was placed over the entire surgical site to protect the connective tissue graft.



**Figure 6.** Postoperative appearance one year after the surgery. Note the restoration of normal gingival architecture on the facial aspect of the mandibular central incisors.

the excellent esthetic outcome and the functional results. Root coverage was complete and the patient continued to exhibit good oral hygiene (Figure 6).

## Discussion

Most research evaluating the relevance of attached gingiva in the maintenance of gingival health have demonstrated that periodontal health can be achieved with proper oral hygiene practices in areas where minimal or no attached gingiva exist. However, clinicians often are faced with the need to correct recession defects because of adverse esthetics, root sensitivity, prevention of further recession, and management of abrasion grooves to address both functional and biologic needs.

Different cosmetic surgical techniques for the coverage of exposed root surfaces caused by gingival recession have been developed and improved. Underlying gingival connective tissue has been shown to be a viable source of cells for repopulating the epithelium. Connective tissue grafts have the advantages of improved color blending, reduced morbidity in donor site, and increased clinical success.

In the current reported procedure of subepithelial connective tissue grafting combined with a tunnel technique, incisions did not involve the papilla adjacent to the recession defects. The advantages of this technique are those demonstrated by connective tissue grafts and also those offered by

the envelope technique such as intimate contact of donor tissue to the donor site.<sup>23</sup> Additionally, preparation of the pouches beneath papillary tunnels allows for intimate contact of donor tissue to the recipient site.

After one year of treatment, the color matching was very homogenous and no surgical incisions or suture marks were visible. Using a similar technique, Santarelli et al.<sup>21</sup> reported complete root coverage with no bleeding on probing, with gingival margins reaching the cemento-enamel junction of both the teeth involved.

The success of root coverage, in terms of the quality of initial healing and the amount of coverage of denuded roots, seems to relate to the transplanted graft type and the procedure used at the recipient site. This new modification of periodontal plastic surgical technique involving a single-stage pouch and tunnel technique resulted in less trauma during the recipient site preparation, leading to increased blood supply from lateral and papillary areas. Technical difficulties associated with the technique included establishing the same plane of dissection under a large pedicle flap and avoiding severance of the papilla base at the same time.

## Summary

The single-stage pouch and tunnel surgical technique of periodontal plastic surgery is more predictable and demonstrated enhanced graft healing, satisfactory esthetic, and good functional results for multiple, adjacent areas of facial gingival recession. However, additional studies are necessary to understand the healing of the transplanted tissue using the method described in this report.

## Clinical Significance

Given the widespread incidence of marginal tissue recession and associated esthetic concern of patients, the single-stage pouch and tunnel surgical technique may be beneficial in meeting the esthetic and functional demands of patients and also contribute to increased treatment acceptance and overall patient satisfaction.

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