Revista de Ciencias Médicas de Pinar del Río

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2025; 29(S1): e7013

CASE PRESENTATION

Multidisciplinary approach to guided tissue regeneration: report of a clinical case

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Received: December 23, 2025
Accepted: December 28, 2025
Published: December 31, 2025

Citar como: Villacis-Tapia AF, Parra-Cabay KS, Logroño-Chávez VS, Albán-Pazmiño GC. Enfoque multidisciplinario en la regeneración tisular guiada: informe de un caso clínico. Rev Ciencias Médicas [Internet]. 2025 [citado: fecha de acceso]; 29(S1): e7013. Disponible en: http://revcmpinar.sld.cu/index.php/publicaciones/article/view/7013

ABSTRACT

Introduction: bone and gingival loss represents a significant clinical challenge in dentistry due to its functional, esthetic, and periodontal implications, particularly in young patients undergoing orthodontic treatment.
Objective: to present the clinical outcomes of a multidisciplinary approach using guided tissue regeneration for the treatment of bone and gingival defects.
Case presentation: this report describes the case of a 22-year-old female patient who exhibited significant resorption of keratinized gingiva and the vestibular alveolar bone plate in the anteroinferior region, with marked root exposure. Following clinical and radiographic evaluation, a guided tissue regeneration procedure using a multidisciplinary approach was indicated. The surgical intervention included harvesting a palatal connective tissue graft and placing a xenogeneic particulate bone graft, followed by flap repositioning and suturing. The procedure was carried out under strict biosecurity measures and postoperative control. During the immediate follow-up, the patient showed adequate healing, minimal postsurgical symptoms, and stability of the treated tissues. The achieved regeneration restored the periodontal conditions necessary for the continuation of orthodontic treatment, improving oral function and esthetics.
Conclusions: guided tissue regeneration, when applied through a multidisciplinary approach, constitutes an effective therapeutic alternative for the recovery of lost periodontal tissues. Proper planning and execution promote satisfactory clinical outcomes, contributing to periodontal stability and improved patient quality of life.

Keywords: Periodontal Diseases; Alveolar Bone Loss; Gingival Recession; Guided Tissue Regeneration, Periodontal.

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INTRODUCTION

Guided tissue regeneration (GTR) is a dental procedure used to stimulate the regeneration of dental and periodontal tissues. It involves the use of membranes or barriers to direct the growth of new tissue. Causal factors include tissue loss due to periodontal disease, trauma, excessive occlusal forces, or dental surgery.[1]

Bone and gingival loss is a clinical challenge that has generated significant interest and concern in dentistry. It is particularly relevant in patients who have undergone orthodontic treatment, where excessive forces may contribute to tissue breakdown. Understanding and addressing the associated risks is essential for preserving oral health and patient quality of life, especially given the periodontal complications that may necessitate additional interventions—such as gingival grafts or bone regeneration procedures.[2]

Alveolar bone is essential for dental support, ensuring proper tooth positioning and occlusal stability by maintaining equilibrium between dental arches and preventing temporomandibular joint disorders. Bone loss—defined as the resorption of the bone surrounding and supporting teeth—can lead to dental instability, sensitivity, increased caries risk, and functional and aesthetic problems. In such cases, regenerative procedures are often required to restore lost tissue.[3]

A palatal connective tissue graft is a surgical technique in which a portion of connective tissue is harvested and transplanted to another site. This procedure aims to improve soft tissue health—particularly in cases of gingival recession or keratinized tissue loss—by covering exposed roots and promoting new gingival regeneration. Over time, the grafted tissue integrates and closely resembles native gingiva.[4]

To minimize bone resorption, several grafting options are available: autografts (bone harvested from the patient's own mouth), allografts (human donor bone), xenografts (bovine or porcine bone, treated and purified to prevent immune reactions), and alloplastic grafts (synthetic materials such as hydroxyapatite or tricalcium phosphate). Any of these may be used to halt vertical and horizontal bone loss and maximize new bone formation.[2] Given this context, the present study was conducted with the objective of presenting the clinical outcomes of a multidisciplinary approach using guided tissue regeneration for the treatment of osseous and gingival defects.

CLINICAL CASE REPORT

A 21-year-old female patient with no relevant medical history presented with significant keratinized gingival recession and vestibular alveolar bone loss in the mandibular anterior region, resulting in marked root exposure. She reported dental sensitivity and aesthetic concerns due to gingival retraction and root prominence. Clinical examination revealed loss of bony and gingival support, reduced keratinized tissue volume, and risk of progressive resorption without intervention. Given the compromise to periodontal stability and anterior aesthetics, a regenerative surgical approach was planned to restore hard and soft tissue integrity and optimize both function and appearance.

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Materials and Instruments

Full biosafety measures were employed (gown, cap, sterile gloves, mask, shoe covers), along with topical povidone-iodine, sterile gauze, and antiseptic mouth rinse. Instruments included a carpule, syringe, short needles, intraoral mirrors, surgical suction cannula, #3 scalpel handle with #15 blade, periosteal elevator, anatomical forceps, periodontal probe, absorbable sutures (Vicryl 5/0), and non-absorbable sutures (Nylon 4/0). Eight cartridges of lidocaine with epinephrine (1:100,000) were administered, along with regenerative materials: particulate xenogenic bone graft and palatal connective tissue graft.

Surgical Technique

The surgical site was prepared by determining the incision line for recipient bed exposure. The connective tissue graft and bone graft were then placed and compacted, followed by suturing. Extraoral disinfection of the perioral area was performed using povidone-iodine–soaked gauze held with a hemostat and applied with unidirectional strokes. Intraorally, an antiseptic mouth rinse (0,12 % chlorhexidine, Encident) was used for 30–60 seconds.

Local anesthesia was administered via infiltration in the vestibular and lingual regions of the anterior teeth, considering the extent and duration of the surgical procedure. Approximately one anesthetic cartridge was used per treated tooth to ensure adequate intraoperative pain control (Fig. 1).

Fig. 1 Anesthetic technique employed.

During the diéresis phase, a trapezoidal Newman-type incision was made, combined with divergent relaxing incisions executed in a scalloped pattern along the entire gingival margin of the anterior teeth (Fig. 2). The two linear relaxing incisions extended to the vestibular depth to ensure adequate flap mobility, precise surgical adaptation, and optimal vascularization—facilitating surgical access and regenerative success.

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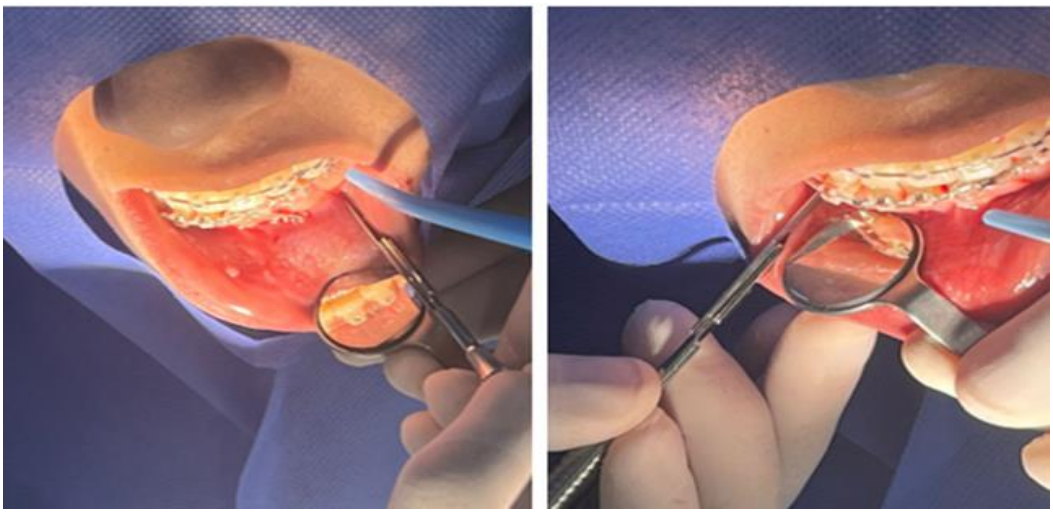

Fig. 2 Development of trapezoidal Newman-type incision.

The flap was carefully elevated using a periosteal elevator, ensuring controlled detachment across the required area while avoiding tears or soft tissue trauma (Fig. 3). This maneuver provided clear visualization of the surgical field and optimal access to the intervention site, enabling safe and effective handling of anatomical structures.

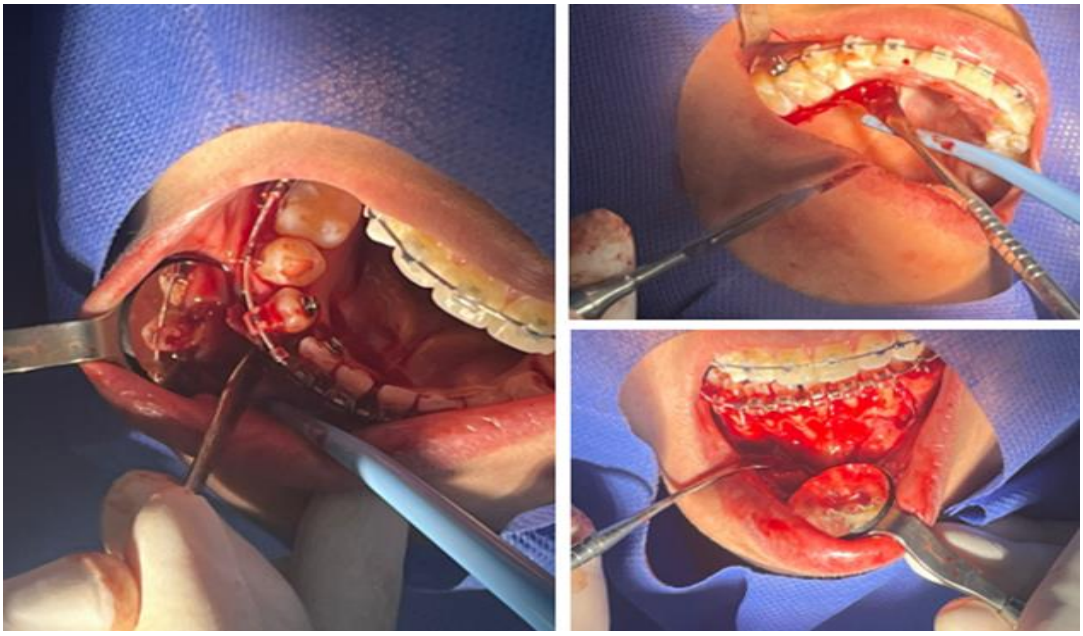

Fig. 3 Flap elevation.

Connective tissue harvesting began with a controlled incision in the palatal mucosa to expose the underlying tissue (Fig. 4). The required portion of connective tissue was then carefully harvested with atraumatic manipulation to preserve graft integrity and promote donor site healing.

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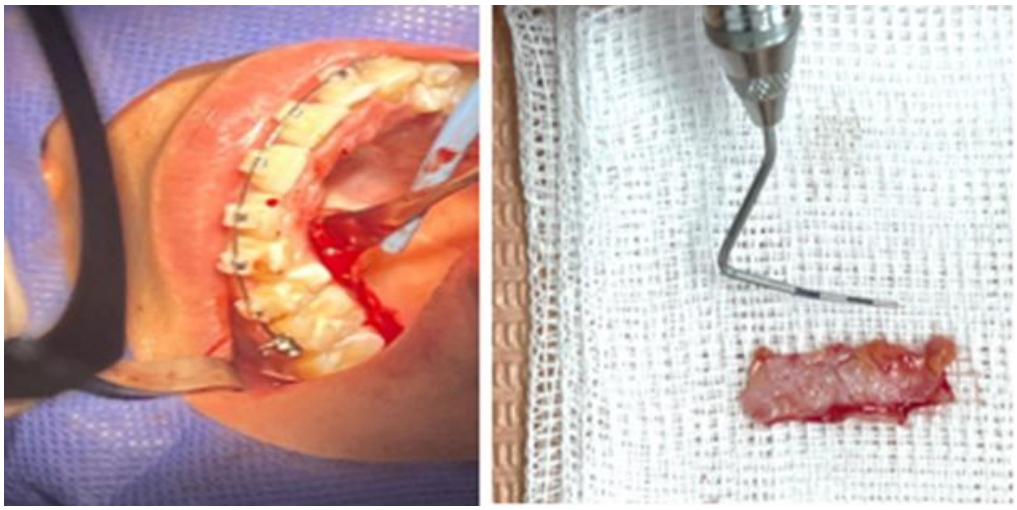

Fig. 4 Harvesting of connective tissue graft.

The donor site was immediately closed following graft harvest by suturing the palatal surgical site to promote proper healing, minimize bleeding, and reduce postoperative complications. The harvested connective tissue was then adapted and positioned at the recipient site requiring regeneration, secured with sutures to ensure stabilization, tissue integration, and optimal regenerative outcomes (Fig. 5).

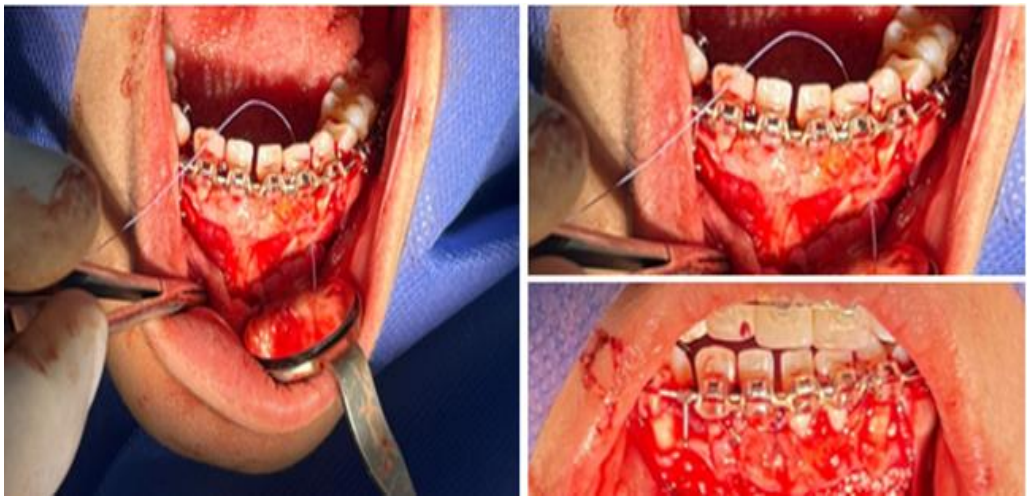

Fig. 5 Placement and suturing of the graft.

The bone graft was placed using particulate bovine-derived xenogenic material, carefully distributed into the defect site to regenerate alveolar bone. The material was evenly spread to favor osteoconduction and support the regenerative process. Finally, the incision was closed by repositioning the soft tissues to their original anatomical position (Fig. 6), with precise coaptation of surgical margins using sutures to protect the graft, promote healing, and optimize clinical results.

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Fig. 6 Final surgical closure with sutures after bone graft placement.

Postoperative care included recommendations to promote healing and prevent complications: absolute rest for the first 48 hours, avoidance of sun and heat exposure for 24 hours, and refraining from touching the surgical site with hands or tongue. Physical exertion was restricted for eight days, and straw use was prohibited to prevent surgical site disruption.

Dietary instructions emphasized avoiding irritating or hard-to-digest foods—such as pork, peanuts, dairy, saturated fats, chili peppers, hot or hard foods—and instead recommended a soft diet and adequate hydration. Additional measures included cold compress application to reduce swelling, use of an ultra-soft toothbrush, and an alcohol-free, high-substantivity mouth rinse. Pharmacological management included dexamethasone administered before and after surgery, along with antibiotic therapy (amoxicillin-sulbactam and azithromycin) as prescribed.

DISCUSSION

Tissue regeneration in dentistry is of great importance, as it enables the restoration of damaged or lost dental structures—in this case, periodontal tissues. Over time, regenerative techniques and materials have significantly improved patient quality of life and treatment longevity. Among these methods, fundamental variations exist that must be understood, as they may relate directly to the clinical scenario presented.[5]

In this patient's case, periodontal tissue regeneration was determined to be the ideal treatment, as it is the standard approach for managing loss of periodontal support structures—a common condition in dentistry that can lead to gingival and alveolar bone loss around teeth.[6]

This therapeutic process involves reconstructing lost structures through surgical techniques such as soft and hard tissue grafting and the use of biocompatible materials to stimulate bone and connective tissue regeneration.[7]

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Over the years, various techniques have been developed to promote bone regeneration. Bone grafting surgery—used to reconstruct lost alveolar bone—employs grafts of different origins. The choice depends on factors such as the amount of bone loss, defect location, and patient health status. Additionally, bone regeneration materials—including synthetic biomaterials, ceramics, and membranes—are used to stimulate new bone formation and protect the surgical site. Some even release growth factors that enhance tissue regeneration.[8]

Periodontal tissue regeneration is a constantly evolving field aimed at improving outcomes in multidisciplinary cases involving periodontal surgery. It helps correct osseous defects, regenerate lost periodontal tissue, optimize masticatory function, enhance facial aesthetics, and restore gingival harmony and volume.[9]

According to Abou Neel et al.,[1] among various strategies, guided tissue regeneration is one of the most promising techniques for preparing and regenerating tissues. In this clinical case, a multidisciplinary approach successfully restored both bone and gingival structures, contributing to periodontal health, halting disease progression, and reducing tooth loss risk. An invasive technique was chosen due to the extensive bone and soft tissue loss in the affected area. Although final results require time to manifest, the patient could already observe visible improvement post-surgery.

The patient's response to guided tissue regeneration was satisfactory, with minimal postoperative symptoms, increased confidence, and improved functional comfort. Due to the surgical success, she will soon resume orthodontic treatment under close monitoring, maintenance, and a tailored care plan to achieve optimal outcomes.

CONCLUSIONS

In this case, excessive orthodontic forces caused resorption of osseous and gingival tissues, resulting in loss of keratinized gingiva and vestibular alveolar bone plate, with marked root exposure. Following initial clinical assessment, a surgical guided tissue regeneration approach was selected after evaluating defect extent to determine the appropriate size of the palatal connective tissue graft and quantity of particulate bone graft required. During the postoperative period, the patient may experience greater discomfort at the donor site until adequate healing occurs, while discomfort related to the bone graft is typically mild and manageable with analgesics. A multidisciplinary approach proved essential in this case, optimizing tissue regeneration, enhancing clinical outcomes, and contributing to the patient's oral health and quality of life.

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