COVERAGE OF GINGIVAL RECESSION WITH HETEROLOGOUS COLLAGEN MATRIX

COBERTURA DE LA RECESIÓN GINGIVAL UTILIZANDO HETERÓGENA MATRIZ DE COLÁGENO

RECOBRIMENTO DE RECESSÃO GENGIVAL UTILIZANDO MATRIZ HETERÓGENA DE COLÁGENO

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Abstract
Objective: To describe a clinical case of root coverage based on a heterologous collagen matrix. Case report: Male, 22-year-old patient with gingival recession of elements 23 and 24. After the dimension of the defect was determined with a periodontal probe, incisions were made to prepare the receptor site. The flap was divided, and the areas of the papillae were de-epithelized, to allow the coronal flap to anchor at the cement/enamel junction. The matrix was juxtaposed and carefully adapted to the defect in the dry state, and the flap was coronally sutured over the matrix. The position of the gingival margin improved significantly, and both the height and width of the recession decreased. The thickness of the keratinized mucosa increased significantly, indicating that the change in the gingival biotype of the site ensured long-term maintenance of the outcome. Conclusion: The heterologous collagen matrix can be an effective and predictable substituent of autologous connective tissue graft. It can also cover the root of teeth with gingival recession, with favorable aesthetic outcome 4 years after.

Resumen
Objetivo: describir un caso clínico de cobertura de raíz basado en una matriz de colágeno heteróloga. Caso clínico: paciente masculino de 22 años con recesión gingival de los elementos 23 y 24. Después de determinar la dimensión del defecto con una sonda periodontal, se hicieron incisiones para preparar el sitio del receptor. El colgajo se dividió y las áreas de las papilas se desepitelizaron para permitir que el colgajo coronal se anclara en la unión cemento / esmalte. La matriz se yuxtapuso y se adaptó cuidadosamente al defecto en el estado seco, y el colgajo se suturó coronariamente sobre la matriz. La posición del margen gingival mejoró significativamente, y tanto la altura como el ancho de la recesión disminuyeron. El grosor de la mucosa queratinizada aumentó significativamente, lo que indica que el cambio en el biótipo gingival del sitio aseguró un mantenimiento a largo plazo del resultado. Conclusión: la matriz de colágeno heteróloga puede ser un sustituyente eficaz y predecible del injerto de tejido conectivo autólogo. También puede cubrir la raíz de los dientes con recesión gingival, con un resultado estético favorable 4 años después.
Palabras clave: matriz de colágeno. recubrimiento gingival. recesión gingival.

Resumo
Objetivo: Descrever um caso clínico de cobertura radicular baseado em matriz de colágeno heterólogo. Relato de caso: Paciente do sexo masculino, 22 anos de idade, com recessão gengival dos elementos 23 e 24. Após a dimensão do defeito ser determinada com sonda periodontal, incisões foram feitas para preparar o local do receptor. O retalho foi dividido, e as áreas das papilas foram desepitelizadas, para permitir a fixação do retalho coronal na junção cimento / esmalte. A matriz foi justaposta e cuidadosamente adaptada ao defeito no estado seco, e o retalho foi suturado coronariamente sobre a matriz. A posição da margem gengival melhorou significativamente, e tanto a altura como a largura da recessão diminuíram. A espessura da mucosa queratinizada aumentou significativamente, indicando que a mudança no biótipo gengival do local assegurou a manutenção a longo prazo do resultado. Conclusão: A matriz de colágeno heterólogo pode ser um substituto efetivo e previsível do enxerto de tecido conjuntivo autólogo. Também pode cobrir a
raiz dos dentes com recessão gengival, com resultado estético favorável após 4 anos.  
**Descritores:** Matriz de colágeno. Revestimento gengival. Recessão gengival.

**Introduction**

Gingival recession is defined as migration of the gingival margin in the apical direction relative to the cement-enamel junction, with consequent exposure of the root surface to the oral environment.\(^1\) The etiology of gingival recession is multifactorial and is associated with pathological, anatomical, and physiological factors.\(^2,3\) This unpleasant and anti-aesthetic effect can have multiple causes, like trauma caused by brushing, lack of inserted gingiva, gingival inflammation, local iatrogenic factors, anomalous insertion of braces and bridles, abnormal tooth position, shallow vestibule, thin bone plate, or presence of bone fenestrations and dehiscence.\(^3,4\) To avoid patient’s discomfort and to increase surgical acceptance, acellular dermal matrixes and lyophilized porcine collagen matrixes can be employed in dentistry.\(^5-7\)

Treatment of gingival recession aims not only to re-establish normal gingival position, but also to prevent the appearance of dental hypersensitivity and to improve aesthetics.\(^7-8\) Many mucogingival surgical techniques have been used to treat gingival recessions. Grafts may be used or not.\(^1,5,9\)

Recently, an alternative that dismisses the need for a palatal tissue donor site has emerged. The alternative consists in using porcine collagen membranes to increase the keratinized tissue. This strategy can be employed to cover the root, and the material is commercially available as Mucograft\textsuperscript{®}.\(^5-8,10-14\) Mucograft\textsuperscript{®} is the most recent alternative to the surgical techniques based on gingival autograft. It is based on a xenograft of porcine origin. Mucograft\textsuperscript{®} consists of a bioabsorbable pure type I or type II collagen matrix that promotes regeneration of the soft tissue and growth of keratinized tissue in clinical situations where this type of tissue is reduced or absent.\(^5,7,8,12,15\)

This study aims to report the use of Mucograft\textsuperscript{®} in the treatment of a clinical case of gingival recession and to correlate our findings with the pertinent literature.

**Case report**

Patient R. S. M., aged 22 years, male, non-smoker, in good general health conditions, with leucoderma but without medical restrictions sought dental treatment complaining of aesthetic discomfort and occasional dental hypersensitivity in teeth 23 and 24, related to gingival recession. After detailed anamnthesis, the patient was submitted to clinical and radiographic examination as well as to a photographic protocol to document the case. The gingival recessions in teeth 23 and 24 measured 3 mm; none of them stretched beyond the mucogingival line. These characteristics helped to classify the recessions as Miller Class I defect (Figure 1A-B).
Because we aimed to cover the root in the sites of gingival recession, we adopted the surgical procedure proposed by Langer and Langer. After infiltrative anesthesia of the site, three horizontal incisions were made perpendicular to the bone and parallel to the cement-enamel junction between teeth 22 and 23, and between 24 and 25 (Figure 2A). The initial incisions were complemented with divergent incisions until the end of the recession (Figure 2B).

After the incisions were delineated, the epithelium was removed with the aid of micro-scissors, which exposed the connective tissue for better adaptation of the graft. Beginning at the sulcular incision of the teeth involved in the procedure, the flap was apically divided with a scalpel blade number 15C (Swann Morton, Rio de Janeiro, RJ, Brazil) beyond the mucogingival line, which enabled mobility of the flap, displacement in the coronal region, and preservation of the interdental papillae without laceration of the tissues (Figure 2C-D).

**Figure 1:** A) Initial clinical aspect. B) Presence of 3-mm recession in teeth 23 and 24. The recession did not stretch beyond the mucogingival line and corresponded to Miller Class I defect. **Source:** Direct research.

**Figure 2:** A) Parallel lower incisions located at the height of the cement-enamel junction. B) Higher incisions diverging in the direction of the apical limit of the recession. C) Sulcular incision stretching beyond the mucogingival line. D) Aspect of the displaced flap. **Source:** Direct research.
Then, the root was scraped and planed with the aid of Gracey 7/8 curettes (Hu-Friedy, Rio de Janeiro, RJ, Brazil), which provided a root surface that was free of contaminants and was as planar as possible. An EDTA solution was applied on this same surface to remove the smear layer and to favor retention of the collagen fibers on the root surface (Figure 3A-B).

![Figure 3: A) Decontamination of the root with Gracey 7/8 curette B) Application of EDTA with gauze to remove the smear layer. Source: Direct research.](image)

After the receptor site was prepared, the heterologous collagen matrix Mucograft® (Geistlich Pharma do Brasil, São Paulo, SP, Brasil) was measured and cut into the desired size. The matrix was kept dry and without direct contact with the tissue (Figure 4A-B). The collagen matrix was delicately accommodated in the receptor site (Figure 4C) with the aid of a blunt instrument. The graft was totally covered with a flap and sutured with Poliglactin vicryl 910 thread 6.0 (Shalon Medical, Goiânia, GO, Brasil).

The graft was initially sutured with interrupted sutures along the receptor site, which was followed by stabilization of the flap coronally displaced at the height of the cement-enamel junction and horizontal incision (Figure 4D).

![Figure 4: A) Porcine collagen matrix (Mucograft® – Geistlich). B) Dimensioning the membrane without direct contact with the tissue. C) Matrix accommodated in the receptor site. D) Flap suture. Source: Direct research.](image)
Four months postoperatively, the recession had been partially covered (Figure 5A).

Comparative analysis of the images revealed significant improvement in the position of the gingival margin. The recession dimensions (width and height) decreased. The mucosa thickened significantly in the grafted site, which indicated a change in the gingival biotype of the site and ensured long-term maintenance of the outcome.

This favorable aspect—root coverage and keratinized mucosa—were maintained along the past four years as verified by recent examination of the patient (Figure 5B).

The patient signed the informed consent of the University.

**Figure 5:** A) Clinical aspect four months after surgery. B) Aspect of the region four years after surgery showing maintenance of root coverage.

**Source:** Direct research.

**Discussion**

During the first meeting with a patient, the main aim of the dentist is to identify and interpret the patient’s main complaint. Patients frequently report dissatisfaction with the aesthetics of their smile, which requires that professionals have the ability to identify the factors underlying this dissatisfaction. Misalignment of the gingival margin is normally part of this context. When biologically possible, surgical treatment is recommended to correct the defects because it is currently a safe procedure with predictable outcome.\(^{(16-18)}\)

Connective tissue graft has been used for many purposes in dentistry. It has been associated with teeth or implants, treatment of pigmentation,\(^{(19-21)}\) root coverage,\(^{(1)}\) increased ridge volume,\(^{(22)}\) and increased range of keratinized tissue, among others. The use of connective tissue graft has broad indication, and a donor site (hard palate) is required. This increases surgery time, morbidity, and risk of accidents during removal of the tissue.\(^{(13)}\) Therefore, alternatives to connective tissue grafts are important: they simplify and accelerate the surgical procedure and cause less discomfort, thereby preventing trans-operative events.\(^{(7,23)}\)

The recently developed porcine collagen membranes have the potential to increase the keratinized tissue and to regenerate the soft tissue, besides being an alternative for root coverage procedures.\(^{(5,6,8,11,14,24)}\) The porcine collagen matrix is produced from selected pigs. Collagen is naturally obtained and purified, which avoids allergic reactions. The collagen molecules are linked, to form tridimensional networks; no chemical process is required. Consequently, the porcine collagen
matrix is more stable, and its degradation along the healing process does not harm the gingival tissues because the matrix does not release any toxic substances.\(^{(5,8,12,25)}\)

The porcine collagen matrix consists of a double layer with total thickness of approximately 5 mm. One of the layers is more compact and has an occlusive effect, which allows the soft tissue to adhere onto it; this layer is also elastic, which facilitates suture of the receptor site. The other layer is thick and porous, and it should face the receptor site, to absorb blood and facilitate the clotting process, the formation of new blood vessels, and the integration with the host tissue.\(^{(5,7,12,26)}\)

New surgical procedures involving collagen matrix grafts (Mucograft\(^{®}\)) have provided excellent clinical results regarding gingival augmentation and root coverage.\(^{(5,7,8,14,25,26)}\) Additional controlled studies are necessary to evaluate the long-term stability of these materials.

**Conclusion**

The heterologous collagen matrix can be as effective and predictable as autologous connective tissue grafts and can provide adequate root coverage of teeth with gingival recession, affording favorable aesthetic outcome.

**References**


