



Periodontal Plastic Surgery of Multiple Recession Defect Sites Using “Novel Non Cross Linked Porcine Dermal Matrix” - By Coronal Advancement- A Case Report.

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KEYWORDS

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ABSTRACT:

Background:

Palatal tissue grafts are contemplated to be the benchmarks. However, it is associated with many complications like need for the donor-site surgical procedure, technical difficulty and bleeding from the palate along with anatomical limitations, to overcome these, this article reports the coverage of multiple recession defects using “Non Cross Linked Porcine Native Dermal Matrix” (Collprotect® membrane).

Methods:

A 35year old patient named Mr. Narendra reported to the out patient Department of Periodontology, Government Dental College, Raipur, Chhattisgarh, with multiple recessions on the left maxillary quadrant. The recession sites were treated with porcine dermal matrix (Collprotect® membrane) by coronally advanced flap technique.

Results:

The surgery was well tolerated by the patient. At the final follow up, (after 1 year from baseline), a significant gain in attachment levels with complete root coverage was achieved. The membrane showed positive results and healed without any complications, providing excellent colour matching.



Thus, the patient was highly satisfied.

Conclusion:

This porcine dermal matrix (Collprotect® membrane), provided good compatibility and healed by minimal morbidity. It is highly advantageous to those patients who are contraindicated for harvesting connective tissue grafts from the palate like narrow palate and cleft patients.

Key points:

What are the determining elements in the therapy of receded gums?

- Selection of cases without interproximal attachment loss.
- Use of micro surgical instruments and sutures, with proper suturing protocol to minimize dead space and enhance revascularization.

Limitations of success in these cases?

- The cost of the membrane.
 - It's availability in India.
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Introduction:

According to the Glossary of Periodontal Terms (2001), *gingival recessions are defined as "location of marginal periodontal tissues apical to the cemento-enamel junction"*.¹ The primary reasons for the formation of marginal tissue recessions are known to be the erosion of the buccal bony plate, a delicate periodontal phenotype, any discrepancy in the locus of teeth and associated unknown and innate causes. The plausible effects of traumatogenic occlusion are highly being debated. Receded gums are commonly associated with dentine hypersensitivity, which can pose a cosmetic problem for the patient.² Additionally, decay apical to the cemento-enamel junction are frequently observed. Root coverage techniques improve appearance, reduce root sensitivity and facilitate plaque control.

Laterally relocated flaps, epithelialized grafts³, coronally advanced flaps are one of several root covering techniques that have been utilised to address localised gingival recessions.⁴ Epithelialized soft tissue grafts and palatal grafts are some of the good options.⁵ Collagen guides and grafts, mostly of cow and pig sources of types I and III⁶ are in high demand. The capacity of collagen to improve primogenitor cell attachment, thus promoting chemotaxis, maintaining cellular equilibrium and ability to undergo biological deterioration combined with its ease of handling along with minimal immunogenic response-renders it an optimal matter for barricade membrane fabrication. Collagen is destroyed by a family of endopeptidases, which include collagenases, gelatinases and many others.⁷

The most commonly employed membranes in clinical routine are collagens, primarily collagen types I and III produced from bovine and porcine origin.⁸ Collagen is a perfect material for barrier preparation because of its low immunogenicity, ease of manipulation and capacity to support progenitor cell adhesion, chemotaxis, homeostasis and physiological breakdown. There are matrix metalloproteinases that break down collagen. MMPs are released to the injured area by neutrophils, monocytes and fibroblasts during wound healing, which helps in the collagen membrane degradation. Collagen's haemostatic property, enables early wound stabilization and is one of its benefits over alternative materials. Fibroblasts are drawn because of the chemoattractant property of collagen and nutrients can be transferred because of its semi-permeability.⁹

It gives the impression that collagen types, especially I and III obtained from pig sources get incorporated and adapted into the implanted site and produce favourable results, even for augmentation therapies in the absence of any macrophage aggregation and giant cell formation.¹⁰

To assess that, a new novel porcine dermal matrix was used to repair the receded gums, in this case.

Materials and Methods:

In this case report, (Collprotect® membrane), which is a matrix derived from porcine dermis was used. It is produced from pig skin in an authenticated and verified procedure. Thus, finally the product fabricated is acellular without any foreign agents,



while the original architecture is conserved. Adipose tissue content is also eliminated. The tissue is subjected to various reagents as well. Subsequent to freeze drying, the final product undergoes sterilization through gamma irradiation. A standardized technique that complies with ISO 13485 is applied to the entire manufacturing process and independent organizations and authorities conduct routine monitoring. The thickness of this homogeneous membrane is approximately 0.4 mm. It's inherent holes and strong collagen structure effectively stops cells from migrating into the receded area while also promoting the rapid development of blood vessels. This membrane also exhibits a quit uniform network.^{11,12}

Clinical presentation:

This clinical case was planned according to the CARE guidelines. In 2024, a 35 year old patient named Mr. Narendra reported to the outpatient Department of Periodontology, with multiple recessions on the left maxillary quadrant.(Fig 1) The recession sites were treated with porcine dermal matrix by coronally advanced flap technique. The patient also gave the history of aggressive tooth brushing. There were absence of any non carious lesions. History and clinical examination of the patient revealed that he neither had habits nor any signs and symptoms of periodontal disease. He was much worried about sensitivity of the teeth to hot and cold foods. Upon diagnosis, it was confirmed that that there was no soft and hard tissue loss at the interdental zones. The treatment frame included scaling, surgery along with proper oral care. The patient was made aware of the procedures to be done. The surgery was done only after the patient signed the informed consent.

Fig 1: Preoperative view -Recession Depth



Surgical procedure:

Patient was prepared for the surgery following proper aseptic techniques. Local anaesthesia was given and

meticulous planing of the surface apical to the CEJ was done. The exposed surface was chemically modified with 24% EDTA. Afterwards, using a #15C carbon steel blade, one intracrevicular slit, followed by two slits almost parallel to the tooth surface was given, extending from both the surfaces of the papilla. Two oblique releasing slits were given from the coronal aspect to the apical aspect of tooth, extending 4 mm beyond the mucogingival junction.(Fig 2) A split thickness flap along the mesial and distal aspects of the recession, followed by which a full-thickness flap was elevated apical to the recession site and partial thickness flaps were elevated beyond the mucogingival junction.Finally, a geometric configuration in the shape of a trapezoid was obtained.(Fig 3) The outermost layer of the bone was relieved at the base of the flap and it was approximated towards the coronal aspect of the concerned teeth.

De-epithelization of the concerned papillae was carried out to ensure proper regeneration of tissues. The guide was measured according to the exposed defect size and sutured with interrupted sutures (5-0 vicryl).(Fig 4) Followed by which the flap was pulled towards the coronal aspect and approximated with sling sutures (3-0 silk). Then vertical releasing incisions were also closed with interrupted sutures.(Fig 5)



Fig 2: Incisions



Fig 3: After flap reflection



Fig 4: Membrane adaptation and suturing for stabilization



Fig 5: Final suturing

Post operative Instructions:

The patient was clearly told not to brush his teeth on the operated region for 7 days and rinse his mouth with 10 ml of 2% betadine solution twice daily. Antibiotics (Amoxiclav 625 mg b.i.d for 7 days were given) and pain killers (Ibuprofen 400 mg b.i.d. for 3 days) were prescribed. After 2 weeks patient was asked to brush his teeth with soft tooth brush, with gentle strokes. Final follow up was done after 1 year.

Clinical Outcomes:

After 15 days, patient was called for follow up and the patient did not complain of any complications. The recession sites showed root coverage esthetic score of 10 with 100% results.(Fig 6) and (Fig 7).



Fig 6: Post operative view-Recession Width



Fig 7: Post operative view-Recession Depth

Discussion:

In this current case report, a porcine dermis-derived matrix, Collprotect® (BioOss, Germany), was utilized to treat gingival recessions without interproximal attachment loss. Pig dermis shows homology to man's dermis in structural organization, hair corpuscle density, thickness, amount of melanin in skin and adipose tissue composition, making it a suitable substitute for regenerative procedures. It is an indigenous collagen guide made of pig skin. It plays a vital role in various procedures related to the oral cavity. The collagen fibres exhibit parallelism with a thickness of about 0.4 mm. Healing capacity of tissues were also found to be better.^{11,12}

The hair corpuscles present in the pig's skin corresponds to tiny holes.(Fig 8) These become visible following hair removal. It has a viscous collagen architecture. There are also presence of apertures/openings spread across the membrane. These are 3- dimensional and inturn promote angiogenesis.^{11,12}

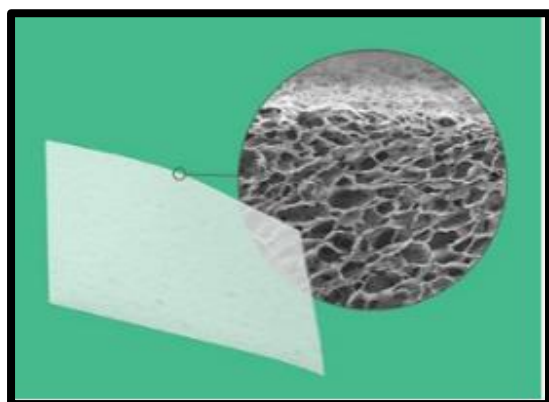


Fig 8: Tiny holes on the surface of membrane

Porcine skin and human dermis almost mimic each other in terms of architecture, physiological pigmentation, tissue thickness, amount of hair corpuscles and the makeup of adipose tissue and collagen. The strong homology with human skin ensures excellent biocompatibility and it gets well integrated into the recipient site. Moreover, pig skin exhibits densely packed, parallel-aligned collagen threads, making it an ideal one for the fabrication of dental barrier guides and grafts.

It also has a uniform structure. (Fig 9) The membrane harnesses collagen's intrinsic haemostatic properties to expedite early wound healing. Furthermore, its highly structured three-dimensional architecture, characterized by uniformly distributed open pores, fosters accelerated blood vessel infiltration and seamless tissue integration.^{11,12}

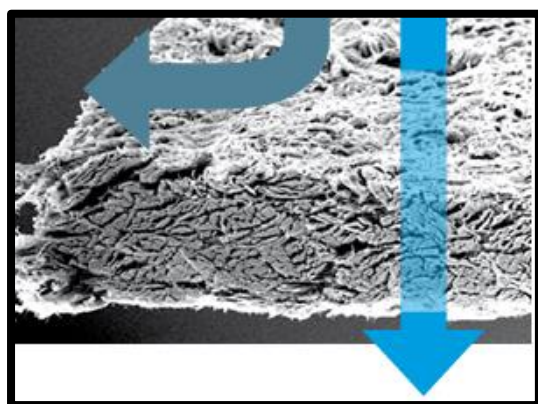


Fig 9: Homogenous structure of membrane

It is available in an indigenous form without any reagents added. Treating it with chemicals destroys the tissue;

however, it may also adversely impact tissue acceptance, adaptation, orientation and angiogenesis of collagen guides. Hence, the non-cross linking structure of this membrane offers good benefits. Periodontal root coverage procedures are technique sensitive and outcomes are influenced by the operator's clinical experience and skills. These esthetic surgeries are so intricate and requires precise handling by the surgeon. Success rates also depend upon the number, sites of GRs involved and patients oral hygiene maintenance postoperatively. Treatment of multiple recession defects is more challenging and revascularization is a determining factor in post operative healing (Cairo, 2017).¹³

In cases involving multiple recessions, the limited availability of donor tissue restricts the treatable area, necessitating multiple surgical interventions. This increases both the physiological burden and psychological stress of the patient. The primary disadvantages of this technique include donor site bleeding, postoperative pain and reduced sensitivity in the palatal region.¹⁴ The anatomy of the hard palate also poses a challenge in harvesting grafts. It is also associated with postoperative complications such as excessive tissue thickening. Due to these issues, numerous guides and membranes have been developed in recent years, which have known to show promising results.¹⁵

The coronally advanced flap (CAF), whether performed independently or combined with various palatal grafts and guides is a highly pursued technique in the treatment of receded gums involving single or multiple teeth.¹⁶ Extensive research underscores the efficacy of CAF alone in managing localized facial gingival recessions, consistently reporting substantial recession reduction and a high success rate in achieving complete root coverage.¹⁷

With recent advancements in the emerging dental field, receding gums have become significant cosmetic concerns for critical patients. Additionally, these conditions are often accompanied by decay apical to CEJ, dentinal intolerance to hot and cold food and persistent swelling of gums, all of which warrant periodontal plastic surgery. Given that this is primarily an elective procedure, treatment strategies must aim for complete root coverage without leaving even a



millimeter exposed. Achieving an ideal outcome also requires a seamless blend of tissue color and texture.

Biological matrices were developed to address the primary drawbacks of connective tissue grafts. However, in terms of success rates, long-term stability and aesthetic outcomes, each matrix inevitably undergoes direct comparison with the gold standard—Palatal grafts.

While palatal grafts are considered to be the benchmark, still keeping in mind the various limitations, guides like (Collprotect® membrane) are a good to go option.

Conclusion:

These findings illustrate the effectiveness of this novel non-cross linked porcine dermal matrix,

(Collprotect® membrane) even for multiple recession sites in a single stage surgery. This dermal matrix serves as a biocompatible guide, seamlessly integrating with the recipient's connective tissue. This integration promotes increased gingival healing, potentially improving patient comfort and optimizing aesthetic outcomes, especially for soft tissue regeneration. Furthermore, this approach enables the therapy of receded gums of many teeth in a single-stage procedure.

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