

AN ORIGINAL RESEARCH ON PLACENTAL MEMBRANES AS TISSUE REGENERATING AGENTS USED FOR PERIODONTAL RECONSTRUCTION

Dentistry

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ABSTRACT

Background: Owing to its antibacterial, anti-inflammatory, and non-immunogenic qualities, placental membranes have become increasingly popular over time. They have been employed as a barrier membrane in periodontal treatments to cover recessions and cure intrabony defects. The use of placental membranes to correct intrabony defects is supported by the findings presented in this case study. The present interventional study observed that the application of placental membrane-chorion facilitates faster wound healing. It is the perfect allogenic graft material due to its non-immunogenic characteristic.

KEYWORDS

Allograft, Guided Tissue Regeneration, Intrabony defect.

INTRODUCTION

In order to promote regeneration, Melcher introduced the concept of compartmentalisation in 1976, wherein the periodontal ligament cells are allowed to repopulate over the root surface. [1] This is advantageous for regeneration because the periodontal ligament cells have the ability to differentiate into progenitors of the periodontal ligament, bone, and cementum. Since the introduction of this concept in periodontal therapy, a variety of materials have been tried as GTR membranes. Throughout the years, a variety of materials, including bone grafts, growth factors, and guided tissue regeneration (GTR) membranes, have been used to achieve the goal of restoring the lost periodontium. However, no material has been considered the gold standard for achieving complete periodontal regeneration.

Placental membranes, such as amnion and chorion, are among the novel materials that have lately been tested.[2] Because of their antibacterial, anti-inflammatory, and non-immunologic qualities, placental membranes have attracted a lot of attention in the fields of medicine and dentistry.[3] Additionally, they include different types of collagen (type I, III, IV, V, and VI) and release a variety of growth factors, including vascular endothelial growth factor (VEGF), platelet-derived growth factor (PDGF), keratinocyte growth factor (KGF), and epidermal growth factor (EGF). It was thought that these special qualities of the placental membranes of the amnion and chorion would promote wound healing and regeneration.[2]

Significant data supporting the use of placental membranes to achieve periodontal regeneration of intrabony lesions is shown in the current case study.

MATERIALS AND METHOD

A total of 20 patients with vertical defects were included in the study. One such case of a 45-year-old woman's case is detailed below. The patient came with the main complaint that she had been experiencing dull, agonising pain and tooth loosening in the bottom back area of her right tooth for the previous seven months. The patient's medical history indicated that she had diabetes and had been taking metformin for the previous four years. Based on the plaque index provided by Silness and Loe, the clinical examination indicated that the patient had a fair oral hygiene level. Additionally, the patient said that she had chewed on hard objects on the right side of her teeth. According to the FDI system, #44 was a grade II mobile with a clinical attachment level (CAL) of 10 mm and a probing pocket depth (PPD) of 8 mm. The distal part of #44 had vertical bone loss, according to the radiographic assessment (Figure 1).

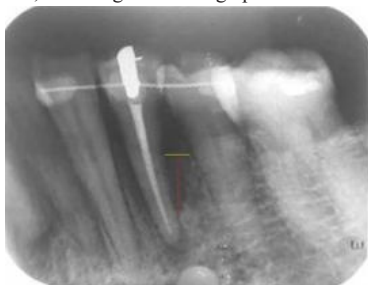


Figure 1: The Vertical Bone Deficit In Respect To #44 Is Seen On The Pre-operative Radiograph.

Trauma from occlusion (TFO) was determined to be the main cause of PPD once the occlusion was evaluated. Since the vertical defect reached the apical part of the tooth, surgical periodontal therapy was scheduled following the root canal procedure. The patient was informed about the procedure and given signed informed consent before the surgery started. William's probe was used to measure PPD at each of the tooth's six locations during the periodontal examination, extending from the gingival margin to the base of the pocket. CAL was measured from the fixed position, which is the base of the pocket to the cemento-enamel junction.

After oral prophylaxis, TFO was removed by occlusal adjustments using a high-speed airtor and finishing bur. To help with the decreased movement, the tooth was further splinted and kept in place for two months. The patient was scheduled for surgical periodontal therapy because the PPD at the two-month recall visit was 8 mm (Figure 2).



Figure 2: Pre-operative Image Showing The PPD In Relation To #44

Under local anesthesia, the surgical periodontal therapy was started. Regarding #44, a papilla preservation flap with two vertical releasing incisions was reflected. The granulation tissue was thoroughly debrided, and Gracey's area-specific curette was used to plane the root surfaces. Regarding #44, a two-walled intrabony defect was found upon flap elevation. Nanocrystalline hydroxyapatite (HA) was used to correct the defect (Figures 3). For directed tissue regeneration, the Chorion membrane was placed over the defect site after being cut to fit the defect (Figure 4). It hydrates and sticks to the surface of the tooth and bone beneath it as soon as the chorion membrane touches it. Sutures were made using 4-0 silk suture material after the flaps were re-approximated. When the sutures were removed, no healing was observed.



Figure 3: Bone Alloplast HA Placed In The Defect Region In Relation To #44



Figure 4: After Pre-suturing The Flap, The Chorion Membrane Is Positioned And Cut To Fit The Defect Location.

RESULTS

No negative side effects, including pain, allergic reactions, or the development of an abscess throughout the healing process, were reported by the patient. At three months, the patient returned for a follow-up periodontal examination. The pre-operative PPD of 8 mm was decreased to 3 mm, and the CAL was 5 mm (Figure 5). A decrease in tooth mobility was observed when the splint was removed during the 6-month surgical follow-up appointment. At six months after surgery, the radiographic examination comparing the pre-operative (Figure 1) and post-operative bone levels revealed a rise in bone level (Figure 6). Statistical analysis of all the 20 cases showed that there was significant difference in gain PPD and CAL when chorion membrane with bone graft was used. P-value was <0.05.



Figure 5: Reduction In PPD Noted During The 6 Months Follow-up Visit

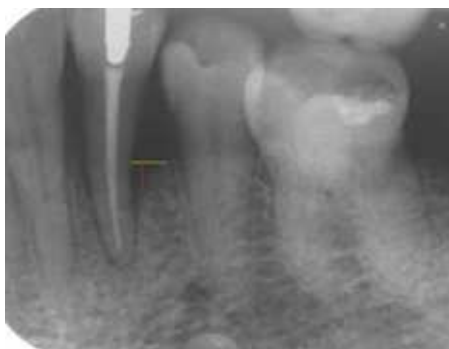


Figure 6: Gain In The Height Of Alveolar Bone Observed During The 6 Months Follow-up Visit.

DISCUSSION

Despite being allografts by nature, the placental membranes' primary benefit is that they are not immunogenic. The human placental membranes' HLA-A, HLA-B, HLA-D, and HLA-DR antigens are the cause of the lack of immunogenicity.[4] Moreover, they possess anti-inflammatory and anti-scarring qualities. In order to prevent immunological reactions and the spread of illnesses like HIV, HBV, and others, the amnion and chorion membranes utilised in the case study are freeze-dried and irradiated. Laminins and other adhesion molecules make up placental membranes. Laminin-5, which is found in placental membranes, is essential for gingival cell cellular

attachment.[5] Additionally, a number of collagens, including types I, III, IV, and V, are essential for hastening the healing process of wounds.[2]

ACM is one of the most distinctive regeneration materials of the decade since placental membranes have an inherent antimicrobial capability. Through his in vitro research, Ashraf H. shown in 2019 that ACM is just as bactericidal as positive controls treated with tetracycline.[6] In 2012, Singh VP conducted a comparison between OFD alone and nanocrystalline HA in conjunction with collagen membrane for the treatment of periodontal intrabony defects.[7] Because nanocrystalline HA offers a clinical benefit in establishing periodontal bone fill, the study promoted it. Therefore, the preferred material for regenerating intrabony flaws in the current case report was nanocrystalline HA combined with ACM.

The use of amnion-chorion membrane (ACM) for combination GTR treatment of periodontal intrabony deficiencies with at least a 12-month post-operative surveillance was reported by Holtzclaw et al. in a retrospective observational report in 2013.[8] The study's findings indicated encouraging outcomes in terms of wound healing and an improvement in clinical indicators. The author came to the conclusion that more controlled, long-term research is required to assess ACM's efficacy. The study's findings are consistent with the aforementioned research.

CONCLUSION

Rapid healing and periodontal regeneration are made possible by the use of the human placental membrane, chorion, as a GTR membrane. The membrane's enormous supply of GFs and stem cells is most likely how it achieves this better outcome.

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Conflict of Interest: Nil

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