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Gum Regeneration with Enamel Matrix Proteins: A Novel Approach for Root Coverage- A Case Report.

Sumit Munjal¹ and Seema Munjal²

¹Department of Periodontics, IDST, Modinagar, Uttar Pradesh, India.

²Department of Prosthodontics, Bapuji Dental College & Hospital, Davangere, Karnataka, India.

ABSTRACT

Gingival recession is the exposure of the root surface due to an apical shift of the gingival margin. Clinician may correct this periodontal condition because of adverse aesthetics, tooth sensitivity, caries or cervical root abrasion. In recent years, the growing cosmetic demand for a pleasing smile has made the dental patients more conscious about the so called 'clinically long tooth.' The periodontal regeneration procedures intend to obtain a new attachment. Various techniques have been tried to address the above problem, including the root surface biomodification, flap repositioning, installation of barrier membranes & bone grafts. The choice of the technique is based on the patient's complaint and demand, as well as, the surgeon's skill. The periodontal plastic surgery has benefitted a lot today from the advent of new materials and combination of above procedures. This article describes the treatment of gingival recession using enamel matrix proteins with a one year follow-up.

Key words: Gingival recession, Periodontal regeneration, Enamel matrix proteins

**Corresponding author*

INTRODUCTION

The oral diseases, in their various forms, have afflicted humans since the dawn of history. Although dental plaque is the main culprit, the understanding of the etio-pathogenesis of periodontitis or the inflammation of supportive tissues of teeth needs to be updated with the increased scientific data available today. Gingival recession, one of the mucogingival problems is the exposure of root surface due to an apical shift of the gingival margin. The patient nowadays, consults the periodontist or general dentist for an aesthetic concern, more than the associated problems like tooth sensitivity or cervical root caries and abrasion. Mucogingival therapy is a general term used to describe non-surgical and surgical treatment for correction of bony and soft tissue defects. Miller proposed the term Periodontal plastic surgery [1] for the surgical procedures performed to prevent or correct anatomic, developmental, traumatic or disease induced defects of the gingival, alveolar mucosa or bone. New attachment with periodontal regeneration is the ideal outcome of an attempt for root coverage. The evidence of reconstruction of marginal periodontium can be obtained by clinical, radiographic, surgical reentry or histologic evaluation. Over the years, numerous surgical techniques have been considered to correct labial gingival recession defects [2] and the review of literature is discussed below in this regard.

Evolution of Root Coverage Therapy

The use of laterally positioned flap was introduced in 1956 [3] and the operation involved the reflection of a mucoperiosteal flap in a donor area adjacent to the defect and the subsequent lateral displacement of this flap to cover the exposed root. However, the same was advocated for only the areas with localized gingival recession. Other modifications of the procedure include the double papilla flap [4], the coronally positioned flap [5], the rotation flap by Patur [6], the semilunar coronally repositioned flap [7] and transpositional flap [8]. The destructed alveolar bone is restored by the osteoinductive or osteoconductive bone graft and soft tissue by free gingival grafts. The classic studies [9] by Nyman, Lindhe, Karring and Gotlow, which suggested a method for prevention of epithelial migration was based on an assumption that only the periodontal ligament cells have the potential for regeneration of attachment apparatus of tooth. The principle called Guided tissue regeneration, involved the placement of a physical barrier to ensure that previous diseased root surface becomes repopulated with progenitor cells from periodontal ligament. The biomaterials documented so far include polytetrafluoroethylene, bovine or porcine collagen, cargile membrane derived from caecum of an ox, polylactic acid, polyglactin 910, synthetic skin and fish collagen. It was stated as early as 1977 by Garrett [10] that removal of bacterial deposits, calculus and endotoxins in the root cementum is essential for forming a new connective tissue attachment. The biological basis of root surface biomodification is that the exposure of collagen fibers of the dentin matrix facilitates the adhesion of blood clot and thus fibroblast migration to the root surface. Various substances proposed for this purpose are citric acid [11], fibronectin, tetracycline and Ethylenediaminetetraacetic acid (EDTA). It was found that the cells of the Hertwigs epithelial root sheath deposit enamel proteins on the root surface during the developmental stages and that such proteins, if applied on the modified root surface are initiating factors for cementum formation. The purpose of this case report was to evaluate the commercially available Emdogain™ product derived from developing porcine teeth for a root coverage procedure, which is approved by

the U.S Food and Drug Administration. Most of the proteins in the mixture is amelogenin, with the rest primarily proline-rich non- amelogenins, tuftelin, tuft protein, serum proteins, ameloblastin, and amelin. [12]

CASE REPORT

A 32 years male patient reported to the dental private practice set up with the chief complaint of bleeding and receding gum in the upper front tooth region. It was realized that the main concern was the appearance of long upper left canine tooth. A medical and dental history revealed that the vigorous and improper toothbrushing may have been the cause. It was observed that residual deposits were present along the gum margins generally, although he underwent a routine oral scaling therapy two months back. The recent blood investigations were assessed to be all normal. A careful visual inspection of the involved site was done and the recession length, as well as width was measured using a periodontal probe (Figures 1,2 &3). All the cosmetic gum surgical options were discussed in detail including their limitations and risks involved. Following an informed written consent from the patient, a thorough oral prophylaxis was done with a rubber cup and polishing paste to ensure a bacterial plaque-free root surface. The correct brushing technique was demonstrated and a soft toothbrush was recommended. The oral hygiene status was satisfactory when he was recalled after three days. After proper patient preparation 2% lignocaine HCL with 1: 80,000 adrenaline was locally administered at the surgical site. The recipient site was prepared by first eliminating the sulcular epithelium by an internal bevel incisions using a no.15 BardParker blade and handle.(Figure 4)The flap was elevated, granulation tissue removed and the visible root surface was planed with mechanical instrumentation, followed by the normal saline irrigation .(Figure 5)The surface was then demineralized with 24% EDTA (pH of 6.7) for 15 seconds which assured the removal of smear layer and the adherence of Emdogain in the form of a viscous gel.(Figure 6)The wound was closed with coronal prepositioning using 4-0 non-resorbable vicryl sling sutures. (Figure 7)A perfect abutment of the flaps is necessary. The operated site was covered with a periodontal pack serving as an oral bandage to ensure a contamination –free area.(Figure 8)The patient was recalled for suture removal after one week and on the same appointment hygiene instructions were reinforced. Thereafter, he was recalled for follow-up after one year from the surgical date to assess the gingival status which was found to be satisfactory. (Figure 9)

DISCUSSION

There is an ample evidence of the combined use of mechanical & chemical root modification for an enamel matrix protein application[13] followed by a coronally repositioned flap for reconstruction. The goal of a periodontal surgery is to establish and maintain the dentition and the supporting structures in health, comfort and function with optimal aesthetics throughout the lifetime of the patient. With the growing demand for a perfect smile, the gum margin should be carefully assessed and the most predictable technique be chosen for correction of the soft tissue defect. Since, Miller introduced the periodontal plastic surgery term, various techniques and materials have been tested for

predictability. The mechanical and chemical conditioning of the root surface is a prerequisite for a new attachment or restoring the lost periodontal attachment.



Figure 1: Pre-operative view of gingival recession on canine.



Figure 2: Measurement of length of recession



Figure 3: Measurement of width of recession.



Figure 4: Reverse bevel incisions placed on the gingiva.



Figure 5: Flap elevated and root planning done on the exposed site.



Figure 6: Root surface demineralized with EDTA and Emdogain™ gel delivered



Figure 7: Wound closure ensured with sling sutures.



Figure 8: Periodontal dressing on the surgery



Figure 9: One year post-operative follow up of treated canine.

CONCLUSION

Predictable root coverage(100%) was achieved in this one year follow up study.The Emdogain™ from the developing porcine teeth is a promising biomaterial in dentistry. However, the precision and skill of the clinician is a pivotal contributing factor. Further case series and longitudinal data with large sample sizes are needed in this regard.

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