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Periodontal Regeneration using an Enamel Matrix Derivative (Emdogain™) as Mono- or Combine Therapy - A Surgical Approach

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Abstract: ***The main goals of contemporary periodontal therapy include not only the arrest of periodontal disease progression, but also the regeneration of structures lost to disease where this is appropriate approach. The surgical procedures aimed the more predictable regeneration of periodontal tissues and functional attachment close to their original level. The continuous improvements in surgical techniques and knowledge of healing processes leading to advance technology and predictability of the regenerative procedures. The aim of this paper is to present two clinical cases of periodontal regeneration with enamel matrix derivative (Emdogain™Straumann, Switzerland) as a mono-therapy and Emdogain™ in combination withbone grafting material.***

Keywords: attachment, enamel matrix derivative, Emdogain™, periodontal regeneration, surgical approach

1. Introduction

The conventional surgical approaches such as open-flap debridement offer unfortunately only limited regenerative potential. Various new materials such as bone grafts, barrier membranes, and enamel matric derivative - biologic modifiers, currently used for the regeneration of periodontal, bone and furcation defects [4,9].An alternative clinical approach to obtain regeneration of periodontium is to mimic the events that take place during the development of the teeth [5,8].There are scientifique evidences that the root sheath cells secrete enamel matrix proteins during root formation, and that these proteins are involved in the formation of acellular cementum during root development [8,10,14]. Because of this enamel matrix derivative (Emdogain ™) is used for periodontal regeneration. These proteins probably induce the formation of acellular extrinsic fiber cementum [2,3,7].

The continuous improvement in surgical techniques, knowledge of healing and regenerative processes leading to advance technology and predictability of the result of regenerative procedures.

2. Two Case Reports

The first patient, a 41-year-old female, was referred to our practice by her general dentists, due to demonstrated clinical evidence of attachment loss with increased probing depth around mandibular first molar (#46).Vertical lesions have a much higher risk of continued attachment loss and regenerative procedures should be considered immediately after their diagnosis. The periapical radiograph presents a defect on the distal aspect of the tooth which corresponding with a clinical situation - probing at more than 10mm (Fig.1A). The Electro pulp test (EPT) was positive - 12µA, so the right decision is to preserve the vitality of the tooth. The planned surgical procedure includes the mono-therapy with Emdogain™ to promote the regeneration of the tissues in the periodontium. As a first step of a surgical procedure it was done a sulcular incision for conservation of as much tissue as possible. After the incision it was seen the well-contained bone defect which confirming planning surgical protocol according to " clinical decision tree" [6] (Fig.1B). We use a high speed finishing bur to facilitate easier and more complete root preparation. The use of a 24% EDTA solution (Straumann® PrefGel®) was necessary to prepared root surface for two minutes and completes this process. The Emdogain ™ was applied according to manufacturer's (Fig.1C). In post-operative period we measure the vitality of the tooth and the EPTwas 15µA at the end of the first month, and 12µ A at the end of the third month. The control radiographs on the third month, one and two years after the surgical procedure show the new bone formation around distal root and in interradicular zone (Fig.1D-F). We assess the regeneration also with probing (< 2mm), the first was 8 weeks post-operative.

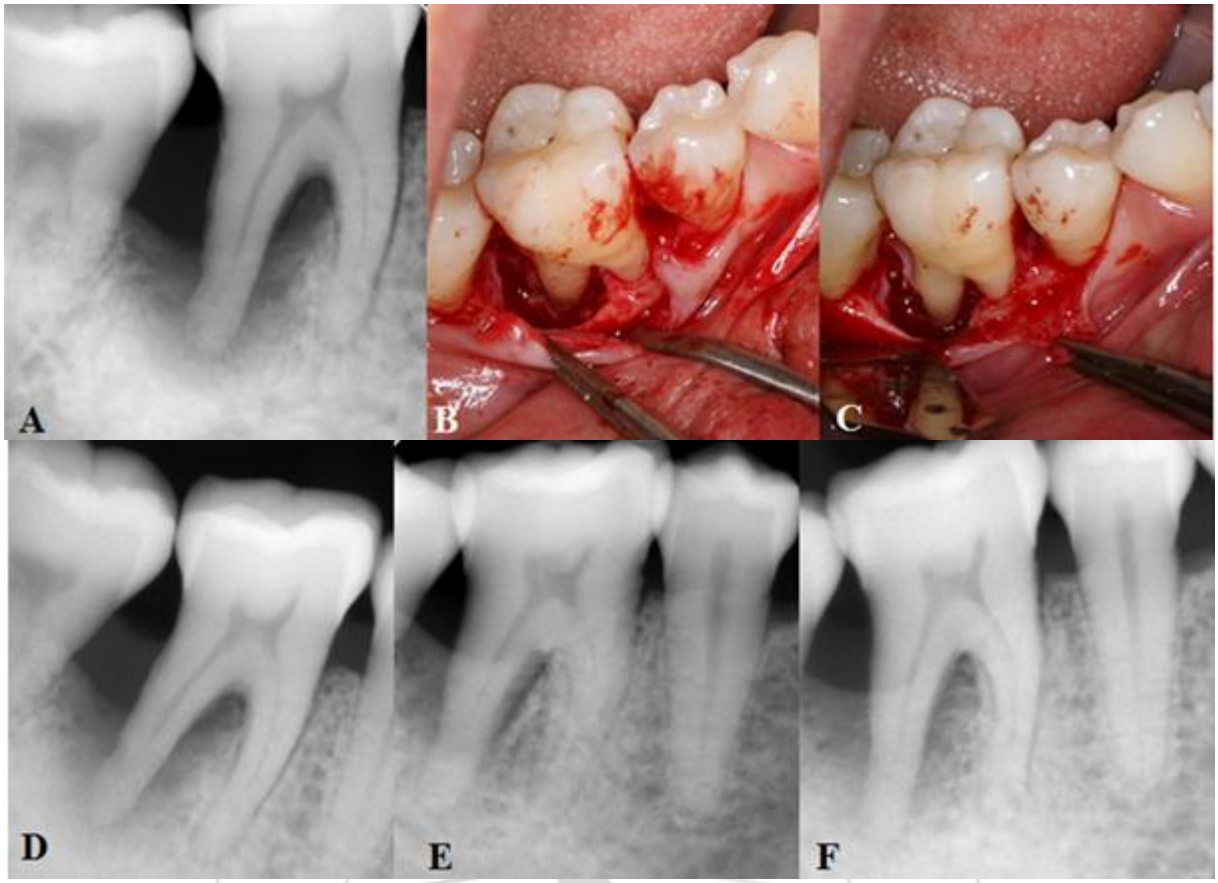

Figure 1: A/The pre-operative radiograph present an intrabony defect on tooth #46; **B**/After the sulcular incision it was seen a deep well-contained bone defect;**C**/ The application of Emdogain ™; **D**/ Post-operative radiograph - 3 months after surgical procedure; **E**/ One year post-operative radiograph; **F**/Two-year post-operative radiograph

The second case we report, a 32-year-old female, was referred also by her general dentists, due to the high mobility of maxillary right canine (#13). The pre-operative radiograph and CBCT images confirmed the presence of a deep vertical defect on the palatal direction on tooth 13 (Fig.2A). The radiographic initial image corresponding with a clinical situation - probing at more than 10mm. The EPT was measured twice - first measurement (76µA) was in first appointment when the initial dental calculus was cleaned, the splint was positioned on palatal extracoronal for permanent stabilization, and antibiotic was prescribed for 10 days. The endodontic and surgical procedure was planned after two days (Fig.2B,C). The EPT was measured again just before the endodontic treatment - 79µA. The planned surgical procedure after the root canal treatment includes the combine therapy with Emdogain™ to promote the regeneration of the tissues in the periodontium, and bone grafting material Bone Ceramic (*Straumann*)and Jason Membrane (*Botiss*) bone regeneration. More extensive and complex defects as this frequently require the addition of a bone graft material for flap support. As a first step of a surgical procedure it was done a sulcular incision for conservation of as much tissue as possible.After the incision it was seen the deep noncontained intrabony defect which was an indication for combine therapy according to "clinical decision tree" [6]. We use a high speed finishing bur to facilitate easier and more complete root preparation. The use of a 24% EDTA solution (Straumann® PrefGel®) was necessary to prepared root surface for two minutes and completes the process. The Emdogain ™ was mixed extraoral with bone grafting material - Bone Ceramic, and the mixture was applied into the bone defect. The membrane -Jason Membrane,was used to protect the epithelial proliferation process into the grafting material. The first post-operative radiograph - 1 week after, present a satisfied positioning of the bone graft material and the follow-up periapical radiograph show also an adequate regenerative process after two years (Fig.2D).

Figure 2: A/The pre-operative radiograph present an intrabony defect on tooth #13;**B/** Control radiograph of endodontic treatment. The tooth was immobilized with an extracoronal splint; **C/** Post-operative radiograph - the position of bone graft material was satisfied; **D/** Two-year post-operative radiograph - the splint is still in place.

For both of regenerative cases, the sutures are left in place for two weeks to maximize wound stabilization. During that time there is no periodontal dressing used. The patients are instructed in the use of a chlorhexidine swab twice daily. We also prescribe an antibiotic (usually amoxicillin - *Ospamox*) for the first seven days of thepost-operative period.

3. Discussion

The main goal of the presented treatment options was not only to decrease the clinical probing depth, but also better clinical attachment, stabilizeteeth and realize a gain in bone. With these surgical procedures, like mono-therapy or combine therapy we want to realize the minimization of the vertical component of the defect as much as possible. The follow-up of these clinical cases allows us to conclude that the use ofenamel matrix derivative in intrabony defects yields satisfactory clinical and radiographic outcomes which are confirmed by other authors [1,11,12,13,15]. In addition, regenerative therapy has the unique advantage of preserving crestal bone height and soft tissue contours for improved esthetics over resective approaches as in presented clinical cases.

4. Conclusion

We have found that Emdogain™ either alone as a mono-therapy or in combination with a bone grafting material can provide safe, effective, and predictable results in treatment of intrabony defects. The decreased probing depths (1-2 mm)will allow for easier and more effective patient's care while preserving function and aesthetics.

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