# Papilla Preservation Technique with Enamel Matrix Derivative (EMD) in the Treatment of Periodontitis – a Case Report

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This case report demonstrates minimal invasive regenerative therapy using enamel matrix derivative in a patient with chronic periodontitis. The microsurgical approach using a modified and simplified papilla preservation technique in an intraalveolar 2-wall bony defect was effective in the regeneration of periodontal soft and hard tissues. The minimal-invasive technique enabled primary wound healing with minimal recession and considerable attachment gain after 6 months.

Key words: chronic periodontitis, regenerative therapy, Emdogain Gel‰, infrabony defects, minimum invasive surgery, modified papilla preservation flap, simplified papilla preservation flap, early healing index (EHI), primary healing

Local periodontal therapy primarily consists of supra- and subgingival debridement, and instruction and motivation for the improvement of oral hygiene. Effective regular mechanical plaque control has been proven to be one of the most important measures to avoid and control recurrence of infection (Axelsson and Lindhe, 1978; Axelsson and Lindhe, 1981a; Axelsson and Lindhe, 1981b). In addition residual pockets may be eliminated or reduced by different surgical procedures (Becker et al, 2001).

In addition to physical barriers enamel matrix derivative (Emdogain Gel, Straumann, Switzerland) has been proven to regenerate lost periodontal structures (Esposito et al, 2003; Heden et al, 1999; Heden, 2000; Pontoriero et al, 1999; Sculean et al, 1999).

The amount of regenerated tissue may vary according to a number of different local and systemic factors, and among those the surgical procedure and the type of flap management are of crucial importance (Kornman and Robertson, 2000). Also the type of defect and the topography of the intrabony lesion influence the treatment outcome. Cortellini et al (2001) and Cortellini and Tonetti (2001) as well as Wachtel et al (2003) described some technical aspects which may help to improve the amount of regenerated tissue. Primary flap closure in the interdental area in combination with a meticulous surgical technique with minimal mechanical forces may improve treatment outcome. According to Cortellini et al (2001) cross mattress sutures or offset sutures in the interdental area help to reduce mechanical stress on the sutures for the closure of the defect and may facilitate microsurgical flap closure (Cortellini and Tonetti, 2001).

The present case shows regenerative therapy using porcine enamel matrix derivative in combination with microsurgery for periodontal regeneration in a lower incisor.

## CASE REPORT

A 56-year-old woman was referred to the department by her dentist because of bleeding gums, which she had observed for 1 year. The patient's medical history showed that she had undergone surgery and chemotherapy for breast cancer some

Fig. 1 Presurgical situation at the time of re-evaluation after debridement and oral hygiene instructions.

Fig. 2 Residual probing depth before surgery.

Fig. 3 Buccal flap after incision.

Fig. 4 Elevation and preparation of a modified papilla preservation flap. Note simplified papilla preservation flap between 32 and 33.

5 years previously. Her general health status was normal on her first visit. In her clinical records she reported that she used a tooth brush and dental floss on a daily base.

The woman's dental status revealed that teeth 18–15, 24–28, 35–38, 42 45 and 48 were missing. At the first periodontal examination 7 teeth showed elevated probing depths with pocketing at several sites, which bled upon probing. All recordings were performed by the same dentist and recorded at 6 sites / tooth using a PCPUNC 15-probe (HuFriedy, Heidelberg, Germany).

Based on the clinical and radiographic data chronic periodontitis was diagnosed. Subsequent therapy consisted of supra- and subgingival debridement and the patient was instructed and motivated in order to perfect oral hygiene. A modified plaque index and a simplified papillary bleeding index were recorded and controlled (Saxer and Mühlemann, 1975; Silness and Löe, 1964). At re-evaluation 6 months after subgingival debridement a residual pocket at the lateral lower incisor (32) was present which still bled upon probing. Intraoral radiograph revealed an infrabony pocket (Figs. 1, 2, 14a). The patient was informed about regenerative therapy with EMD and gave her written informed consent.

Before surgery local anesthesia was applied by submucuos infiltration with Ultracaine DS forte (Aventis, Frankfurt, Germany). A modified papillary preservation flap was elevated between 31 / 32 and 31 / 41 whereas a simplified papilla preservation technique was applied between 32 and 33. A split flap was subsequently prepared

Fig. 5 2-wall (lingual and mesial) bone defect after removal of granulation tissue.

Fig. 6 Conditioning of the root surface with EDTA-gel (Prefgel‰) for 2 min.

Fig. 7a Instillation of Emdogain-gel‰ into the bone defect. Note the root surface is free of blood and residual deposits.

Fig. 7b Overfill of the defect.

on the buccal side (Figs. 3, 4) and opened. Granulation tissue was removed and it became obvious that the defect was a 2-wall infrabony pocket (Fig. 5). In order to remove the superficial smear layer and also to decalcify the dentine surface EDTA gel (Prefgel®, Straumann, Switzerland) was applied for 2 min. after meticulous planing of the root and removal of all calcified deposits under 4.5 magnification (Fig. 6). This was washed out using sterile physiological NaCl-solution. The wound was kept free of any blood and immediately afterwards it was filled with EMD, which also covered the exposed root surface (Figs. 7a, b). The flap was closed to guarantee enough bleeding into the wound in order to buffer the low pH of the gel to a physiological level (Fig. 8). Excess gel was then removed and the flap adapted by an internal cross mattress suture (Figs. 9, 10) (Gore CV-5 Nobel Biocare, Köln, Germany). Final closure was achieved by local sutures using 6-0 atraumatic Prolene" (Ethicon, Norderstedt, Germany) suturing material (Fig. 11).

The patient was instructed not to brush in the area of surgery for 5 weeks. In order to control plaque deposits she was asked to disinfect the wound for the first 3 days by using 3% hydrogen peroxide twice daily and afterwards to use 0.12% chlorhexidine (Paroex, Butler, Kriftel, Germany) (Fig. 12).

Healing was uneventful; the stitches were removed 1 week after surgery, and the early healing index (EHI) was assessed according to Wachtel et al (2003). Professional tooth cleaning was performed and repeated 2, 4 and 6 weeks after surgery.

Fig. 8 Adaptation of the flaps and bleeding to buffer the acid pH of the gel.

Fig. 9 Cross mattress suture to adapt the flaps.

Fig. 10 Stabilizing effect of cross mattress suture.

Fig. 11 Final situation after complete closure with microsutures (6-0).

EHI of 1 was determined at all 3 interdental areas involved. At a subsequent recall visit six months after surgery all clinical parameters were recorded again and another intraoral radiograph was also taken to control the success of treatment (Fig. 13). It was obvious that a considerable probable attachment gain was achieved together with healing of the intrabony pocket (Fig. 14, Table 1).

## DISCUSSION

It has been demonstrated in several in vitro studies that enamel matrix derivatives are able to stimulate cell proliferation and support wound healing (Berry et al, 2003; Hakki et al, 2001). Apart from cell proliferation and colonization of the cleaned root surface, which is a prerequisite for new attachment formation, the protection of the blood clot may also be of importance for the success of local treatment (Polson and Proye, 1983). Flap management and closure using specific suturing techniques, thereby allowing primary healing (per primam intentionem), is crucial and influences the outcome of regenerative therapy (Cortellini et al, 1995; Cortellini et al, 1996; Cortellini et al, 1999; Cortellini and Tonetti, 2000; Cortellini and Tonetti, 2001; Wachtel et al, 2003).

This requires the patient to maintain continuous and perfect interdental oral hygiene which has to be instructed, reinforced and supervised otherwise the gingival inflammation renders the tissue quality unacceptable for this type of surgery.

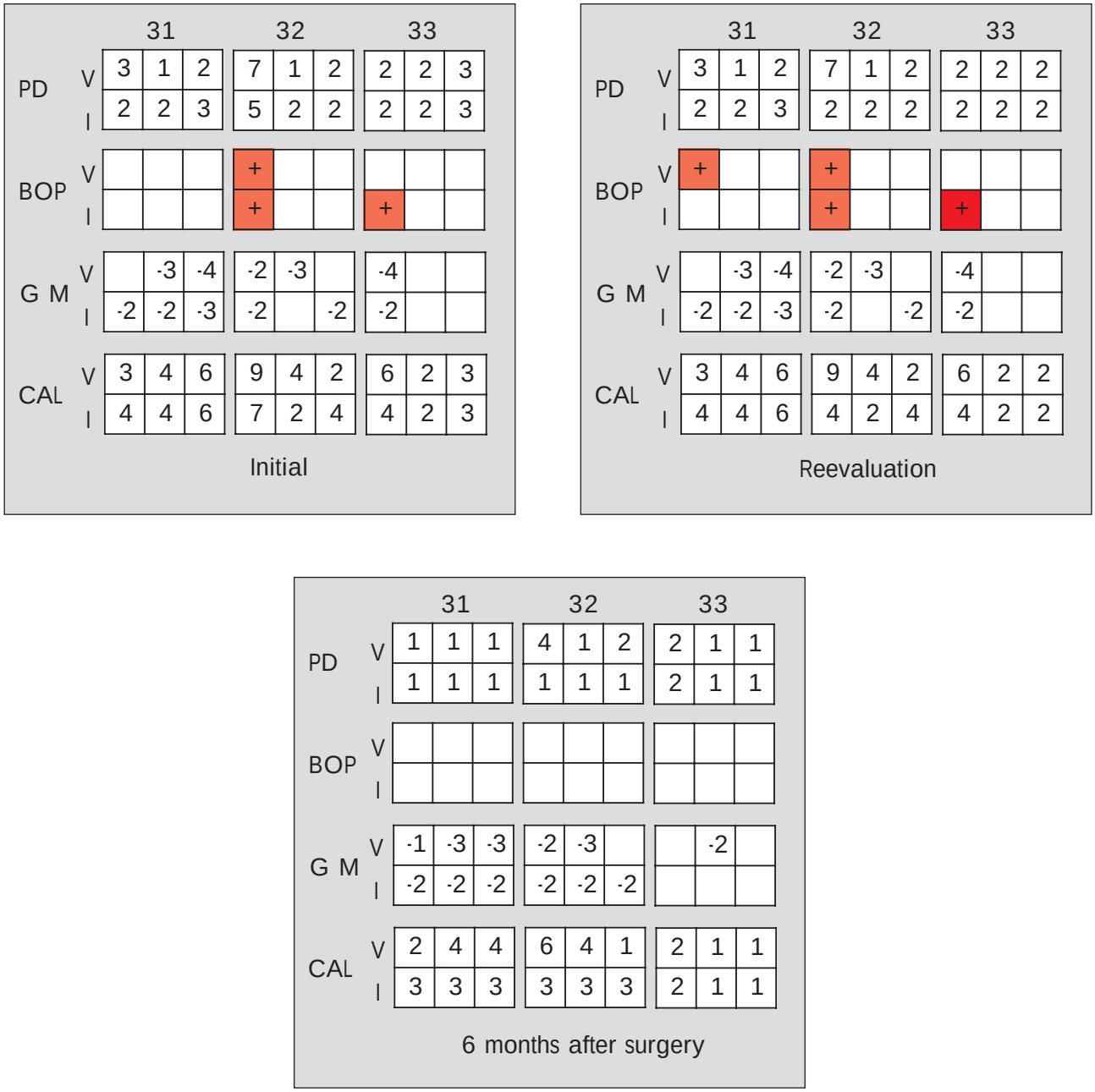
The modified papilla preservation technique, in combination with the two-level suturing technique demonstrated in this case, not only allows a com-

Fig. 12 One week after surgery with some deposits on the root surfaces (without mechanical local oral hygiene), but primary healing (EHI 1).

Figs. 13a, b Clinical situation 6 months after surgery. Note that compared with Fig. 1 no further recession developed at 32 mesial.

Figs. 14a, b Intraoral radiographs before and 6 months after surgery. Osseous regeneration of the local defect is clearly visible in Fig. 14b

Table 1 Probing depths (PD), bleeding upon probing (BOP), gingival margin (GM) and clinical attachment level (CAL) before, during, and 6 months after local treatment. Tooth numbers 31, 32, 33 (FDI)




plete closure of the tissue in the interdental area, but also greatly reduces mechanical stress on the final micro-sutures and thus also may improve microcirculation in the flap, which is crucial for uneventful healing. The effect on regeneration is reflected in the gain of probing attachment, but also in the bone repair (Fig. 14, Table 1). As demonstrated in randomized controlled clinical trials (RCTs) enamel matrix derivatives are able to promote periodontal regeneration and attachment gain (Tonetti et al, 2002). This is supported by the results in the present case.

Local topography of the defect and the geometry of the interdental space make it much more difficult to achieve complete and primary closure of defects in the posterior maxillary region, and this remains a burning problem for future clinical research.

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