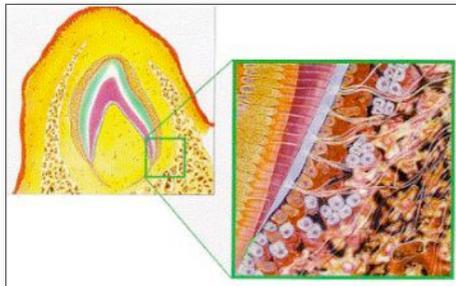


WHAT IS EMDOGAIN

Emdogain is a trademark name for Enamel Matrix Derivative (EMD). EMD is derived from the developing tooth germ of 6 month old piglets. It contains amelogenins and other enamel matrix proteins. Using these proteins is intended to aid in periodontal regeneration by mimicking the development of the cementum during tooth formation. Once cementum is formed, collagen fibers from the adjacent PDL can attach and regenerate the periodontium. EMD shows angiogenic properties and can promote fibroblast proliferation, osteoblast differentiation, and also has anti-inflammatory properties.

The vehicle solution, propylene glycol alginate, has significant effects to kill certain periodontal pathogens, namely *Porphyromonas gingivalis*. However, Emdogain itself is not considered to have anti-microbial properties.

Emdogain is generally packaged with Pref-Gel, a 24% EDTA solution, that is used to prepare the root surface for treatment with Emdogain. Root surface preparation is intended to stimulate periodontal regeneration. The literature has failed to indicate efficacy with this, or any root surface preparation solution.



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THE DESTRUCTIVE FORCE OF PERIODONTITIS

We are all aware of how destructive the effects of periodontitis can be on the supporting structures of the teeth. Bacterial infection along with the genetic susceptibility of the patient to those bacteria cause gum recession and bone loss that lead to tooth mobility and tooth loss.

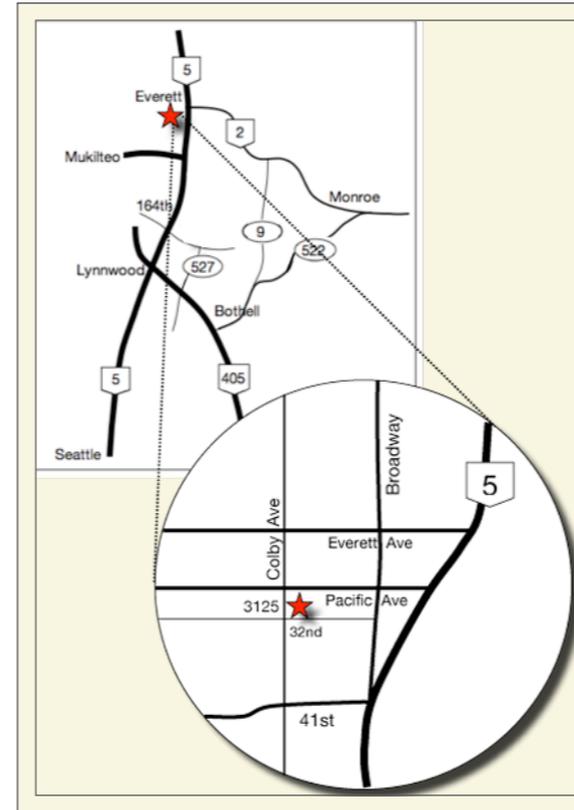
When detected early enough, simple steps such as scaling and root planing and improved home care can arrest progression of the disease. With the right healing potential and provided easy enough access to the root surface, most patients achieve re-attachment of the soft tissues to the root without the need for any further invasive care other than continued periodontal maintenance and improved oral hygiene. However, in areas where access is limited, or when the resultant osseous defects can be a nidus for future infection and further bone loss over time, then surgical intervention is warranted.

Surgery not only allows access to areas that were difficult to reach with scaling and root planing alone, but also provides an opportunity to attempt to regenerate lost bone in particular. This is not always easy. Furcations and hard to reach root surfaces around multi-rooted teeth pose a significant challenge even with surgical flap reflection. Flap debridement alone creates some regeneration of cementum, periodontal ligament, and bone at the base of a pocket, but it is usually small. Technology has attempted to provide us with materials that should improve the degree of success at regeneration. This issue of **ProbeTips** will explore one of these materials in particular: **Emdogain**.

All cases are patients of Dr. Pamela Nicoara
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PROBE TIPS

A QUARTERLY PERIODONTAL
NEWSLETTER

BY PAMELA NICOARA DDS MSD

Emdogain in the Treatment of Periodontal Defects



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Emdogain and its Effect on the Periodontium

PRINCIPLES OF PERIODONTAL REGENERATION

In order for bone to fill a defect, a blood clot must form and the epithelium must not be allowed to overtake the clot. We see this with any tooth extraction. As long as a blood clot fills the socket, bone will grow in the defect. If the blood clot is lost (dry socket), epithelium grows into the socket and bone fill is minimal. Because epithelium grows faster than bone, even with a good clot, there is usually a small saucer defect coronally where the tooth was initially extracted until surrounding bone slowly resorbs to create a rounded ridge. If bone is not given time to develop, the soft tissues will always win. This is why with flap debridement alone, only the most apical portion of the defect has an opportunity to regenerate (1-2mm). One way of protecting the defect from the soft tissue is to use a membrane. Membranes are usually made of collagen and resorb on their own, or can be made of a non-resorbable material to most certainly keep out any invading soft tissue and achieve the most bone formation. This is called guided tissue regeneration (GTR). Even with such membranes, sometimes soft tissue still invades. If the bone could regenerate faster, it can win the race against epithelium. Regeneration around a tooth is particularly difficult because the attempt is to regenerate not only bone, but also cementum and periodontal ligament. This is where products like Emdogain may provide an advantage.



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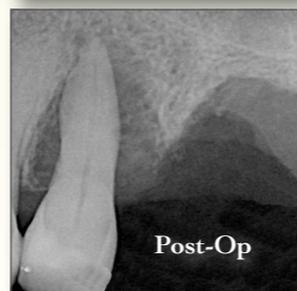
EMDOGAIN FOR PERIODONTAL REGENERATION

Emdogain can be used on its own, or in combination with various bone grafting materials and membranes. It can be used for enhancing soft tissue grafting, guided bone regeneration for an edentulous ridge, or guided tissue regeneration around a tooth.

For gingival grafting, the literature indicates that when compared to the most commonly used palatal connective tissue grafting procedures, Emdogain is equivocal.

For ridge augmentation, adding Emdogain does not significantly improve bone fill, but may reduce recession.

For GTR in the case adjacent, we consider Emdogain alone versus flap debridement, the gold standard for periodontal surgical therapy. The radiographs show calculus near the apex and bone loss so extensive, that the long term prognosis was questionable. With such a prognosis, rather than spend money on bone grafting material, Emdogain alone was used to attempt to enhance bone regeneration around the premolar. No other material was used other than Emdogain after thorough surgical flap de-



bridement. After 26 months, there has been significant bone fill, despite the need for endodontic treatment (note the apical lesion). The research shows Emdogain provides about 1mm average more bone over flap debridement.

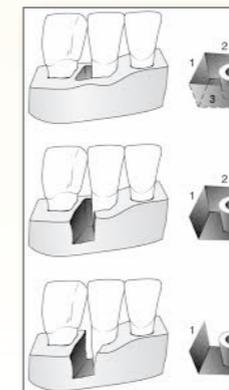
Emdogain has been found to be equivocal to GTR of vertical defects using resorbable membranes, but led to greater reduction in horizontal furcation defect depth compared to resorbable membranes. In addition, Emdogain is simpler to use and may have less complications compared to non-resorbable membranes which have considerably less bone gain over resorbable membranes if the membrane becomes exposed or infected.

IMPLICATIONS

In general, the literature indicates combination therapies including the use of Emdogain are better than single therapies, but not by much. An average advantage of 1mm when using Emdogain doesn't seem like a lot, but it's an average. There are times when quite significant improvements are made (like the case on the panel adjacent) and times when little change occurs. There are multiple factors that can affect outcomes:

- Number of tooth roots
- Furcation involvement
- Mobility of the tooth
- Amount and configuration of remaining bone (see adjacent).

Each sequential defect becomes more difficult to treat, either because of difficulty in regenerating bone vertically, or because access to root surfaces may be limited if not



Types of Bone Defects
Taken from Google Images

impossible.

In addition, other factors such as the healing potential of the patient, which is completely unknown in many cases, are strongly related to the extreme variation in outcomes. Soft tissue biotype may play a role. Was the patient compliant with post-operative instructions regarding hygiene or the use of antibiotics? Were they smoking? Were they in a period of high stress?

Finally, even the literature has its limitations. There are so many different configurations of therapy, kinds of bone graft, types of membranes, and types of antibiotics, that it is very difficult to come to a consensus on treatment outcomes.

The reality is Emdogain does not hinder outcomes in any way. In fact, it can often be very helpful. In cases where blood supply may be limited for a connective tissue grafting case or over a bone graft, if using Emdogain may be that little bit extra that keeps a flap alive to allow a 'normal' outcome instead of a dehiscence and a 'disaster', it may be worth using. For the patient in the case adjacent who had Alzheimer's and limited finances, risking flap dehiscence over a bone graft because her hygiene may be compromised allowed for a situation using Emdogain where she could keep her tooth and reduce the cost of her care as well.

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