Using Elemental Oral Surgical Granulate as a Novel Socket Barrier Concept

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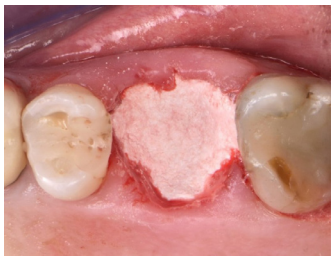
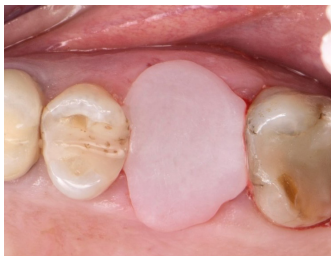
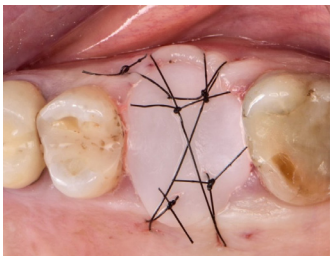
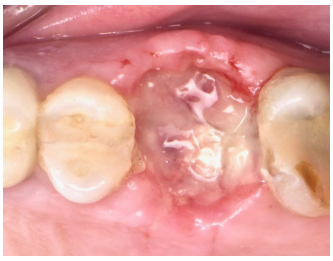





Tooth extraction is one of the most widely performed procedures in dentistry and oral surgery. Numerous experimental and clinical studies have demonstrated that removing a root from the surrounding hard and soft tissues results in significant dimensional changes of the alveolar ridge.

To prevent the atrophy of the alveolar ridge after tooth extraction, the alveolar ridge preservation technique (ARP) has been proposed and utilized by clinicians for over 20 years as a well-documented and evidence-based effective method in the short term and the long term.

Multiple studies have shown less ridge resorption occurring when APR methods were used versus the placement of no biomaterial in fresh extraction sockets. Different grafting materials (autogenous, allogenic, synthetics, xenografts) or biological preparations (PRF, PRP, PRGF) are being used to fill the extraction sockets, and many different surgical protocols are being followed to achieve this. However, it must be noted that still, there is no consensus regarding which materials or surgical protocols are the best for ARP, and it is crucial that each filling material and surgical protocol have different advantages and disadvantages.

Conventional techniques for ARP may involve primary closure. A buccal full-thickness flap has to be surgically prepared, raised and advanced to cover and protect the grafted extraction socket. Primary closure is thus associated with several critical disadvantages like prolonged surgical time and increased morbidity. Most importantly, raising and advancing a flap to cover the extraction socket results in the disturbance of the vestibule buccally and the loss of the buccal keratinized soft tissues, leading to the development of short and long-term aesthetic and functional complications in the area, compromising the results. As a consequence, additional surgical interventions might be required to manage these complications.

To overcome the above critical problems, clinicians prefer to avoid primary closure. Studies have shown that APR can be performed without primary closure, and APR sites can show successful secondary intention healing without the need for raising and advancing a full-thickness flap.

The essential benefits of not obtaining primary closure are a stable mucogingival junction and increased zone of keratinized gingiva, compared with cases where primary closure is obtained for site preservation. In such clinical scenarios of open healing APR, the grafted socket can be left exposed in the oral environment or protected using a barrier that will protect and contain the graft, thus reducing the risk of part or the whole amount of the material being washed out. This is especially critical in molar sites where the larger size of the socket requires a much longer time for soft tissue healing and complete coverage of the graft, compared to smaller anterior extraction sites.

Current techniques for open healing APR involve the use of resorbable collagen membranes (single-layer or double-layer), non-resorbable PTFE membranes and titanium foils.
However, these barriers need to be trimmed and shaped precisely with surgical scissors, their use requires the reflection of a small flap or the surgical preparation of pouches in the surrounding soft tissues to insert and stabilise the barrier *in situ*, it adds on the complexity of the procedure and finally, it significantly increases the required clinical time and cost of treatment.

Elemental as an alternative barrier for Open Healing Alveolar Ridge Preservation

Pilot multi-center clinical investigations have demonstrated the effectiveness of using a barrier, prepared chair-side and made out of Elemental Oral Surgical Granulate as a socket barrier, instead of convention barrier techniques, to cover the grafted extraction sockets.

The key benefits of using the Elemental Oral Surgical Granulate are:

1. A socket barrier composed of Elemental polymer does not serve only as a passive barrier, but also acts as an active agent that topically promotes the healing of and controls the bacteria. The novel formula of the Elemental granulate uses the trace element of zinc to improve the neovascularization and reepithelialization of the site, while having critical antibacterial properties reduces the risk of post-operative infection.

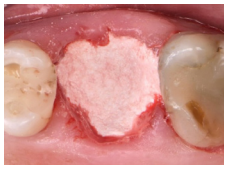
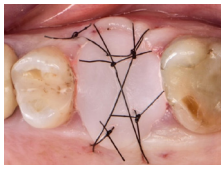
2. Exceptional unique mechanical properties allowing for easy handling, fast chair-side preparation and easy application, *in situ* hardening, excellent sealing of the grafted site, stability, and no discomfort for the patient.

3. Time-saving: the dental assistant can prepare the polymer in just a couple of minutes, and then the clinician can mold and apply it over the surgical site in a few seconds. If suturing is needed, it is effortless to apply sutures through the material and secure it to the surrounding soft tissues.

No need for time consuming trimming and contouring of the material, as with collagen or titanium barriers.
No need to create soft tissue pouches to insert and stabilize the Elemental barrier – gentle tactile compression over the soft tissue contour of the socket is enough to shape the material to its final form and position.

4. Safety. The Elemental synthetic polymer is free of any risk of transmitting infections or diseases, which might be an issue when utilizing collagen membranes of animal origin.

5. Cost-effective. Less expensive compared to traditional socket barriers.

Case report

Female patient, 76-year-old, non-contributory medical history. The patient presented with a non-restorable, fractured upper left first molar. A Periapical x-ray revealed localized bone pathology **(Fig. 1).**

Under local anesthesia the tooth was extracted in a flapless manner, and the fresh extraction socket was grafted using a synthetic silicate-substituted beta-TCP paste (Powerbone Dental Putty) **(Fig. 2).**

The Elemental polymer barrier was prepared chair-side by heating the granules in hot sterile saline, thus turning them in a soft moldable dressing. Subsequently, this polymer dressing was placed over the grafted extraction site, and by applying gentle tactile pressure, it formed a barrier over the grafted socket, covering completely the underlying graft, and extending approximately three millimeters over the surrounding soft tissues. In a few seconds, the polymer dressing had hardened *in situ* and a small number of sutures (SKD monofilament 5-0) were placed to stabilize it further **(Fig. 3).**

Eight days post-op, the Elemental polymer barrier was removed, revealing excellent healing of the area, with no signs of infection, tissue collapse or loss of the graft. The grafted socket was already covered completely by newly-formed uninflamed connective tissue, which proliferated rapidly over the protected bone substitute **(Fig. 4).**

Conclusion

In conclusion, the Elemental polymer barrier allowed for improved, successful and uncomplicated open healing ARP, at least during the critical first stages of healing. The results of the presented case show that the use of this novel product fulfils all essential clinical requirements for successful and predictable ARP, following easily applicable, time- and cost-effective procedures that can be applied in everyday practice.

Fig. 1

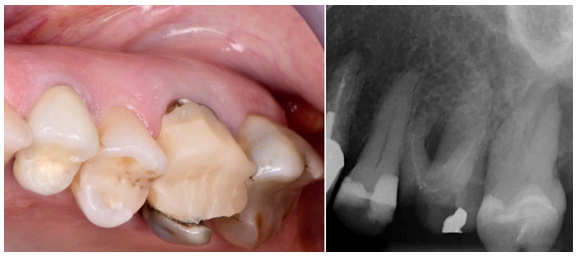


Fig. 2

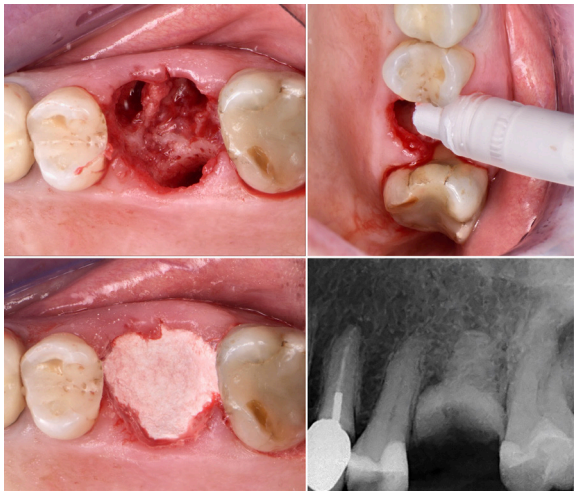


Fig. 3

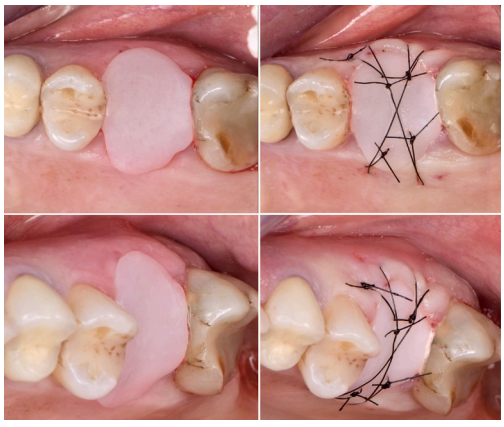
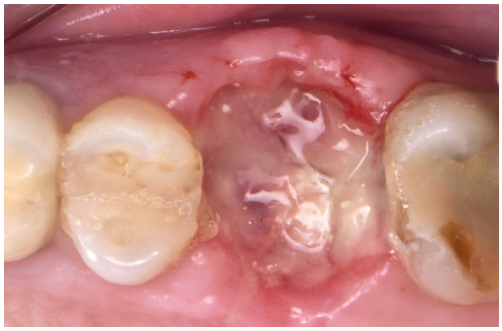


Fig. 4



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About the author

Dr Minas Leventis holds a PhD (2010) and an MSc (2004) in Oral Surgery from the Dental School of University of Athens, Greece. In 2008 he also attended a post-graduate program in Periodontics and Implantology at the University of Heidelberg, Germany.
Dr Leventis is lecturing throughout the world on a variety of scientific topics in Oral Surgery. He is the author of numerous scientific articles published in international peer-reviewed PubMed-indexed journals like Journal of Cranio-Maxillofacial Surgery, TripleO, Implant Dentistry, Clinical Oral Investigations and Compendium.

From 2002 to 2014 he was a Clinical Fellow at the University Department of Oral and Maxillofacial Surgery, Children's Hospital of Athens "P. & A. Kyriakou", Greece. Dr Leventis is currently on the Faculty of the Dental School, University of Athens as a Visiting Clinical Instructor and Researcher, where he teaches under and post-graduate students Exodontia, Oral Surgery, Bone Grafting and Implantology, while undertaking extensive experimental research.

Based in central London his private work and clinical research are focused on Oral Surgery, Tissue Engineering and Implant Dentistry. He is a member of many prestigious International and British scientific societies, in 2012 he earned the Diplomate status of the International Congress of Oral Implantologists (ICOI), he is a member of Leading Implant Centers and a founding member of ICOI-Hellas (Greece).