

Simple & Predictable Socket Preservation Techniques All Dentists Can Implement Regardless of Extraction or Grafting Experience



by Timothy Kosinski, DDS, MAGD
Affiliate Adjunct Clinical Professor, University of Detroit Mercy School of Dentistry

Whether you are grafting or not already in your practice, this article will demonstrate a simple socket preservation technique all dentists can easily implement as a service offering following an atraumatic extraction. This provides a great service to your patients and allows for your graft procedures to be more profitable – as well as predictable. Regardless of your extraction and grafting experience, by utilizing the techniques outlined through this clinical case, I am confident that all dentists can achieve atraumatic extractions followed by simple socket preservation with predictable results.

“Simple” socket grafting following an atraumatic extraction has become an integral part of general dental treatment and should be offered to our patients to prevent bone resorption. Following extraction of a non restorable tooth, the remaining socket heals from the apex toward the crest. When nothing is placed into the socket at the time of the extraction, the soft tissue infiltration at the crest often results in facial and crestal bone loss. This will often impede ideal dental implant placement in the future or will require more invasive grafting procedures in the future which is a secondary surgery for the patient that could have been prevented. Maxillary posterior tooth roots hold up the sinus floor like a tent pole holding up a circus tent. When the tent poles are removed, the tent will collapse. The same occurs in the maxillary sinus area. When roots are removed the sinus may collapse unless maintained with grafting materials.

Therefore, socket grafting of extraction sites should become a routine procedure for the dentist - even if you just start with and offer the simple socket preservation techniques outlined in this article. Of course, I recommend having the appropriate grafting training to enable more advanced grafting in the case of larger defects, including membrane placement, etc., but this technique is absolutely within the reach of all dentists regardless of grafting knowledge or experience. So why do all dentists not offer grafting? Well, there are a number of reasons including not having the proper grafting training or the belief that their patients would not be willing to pay for such service based on financial constraints and lack of insurance coverage for such procedures. The financial constraints can absolutely exist, but if you could offer a simple service for a fair price that was easily to do and the benefits were explained

properly to the patient by you, most patients will accept this treatment following and atraumatic extraction.

In order for the socket preservation technique outlined in this article to be utilized effectively the dentist must perform an atraumatic extraction. What does this mean? An ideal tooth extraction can be defined as the painless removal of the whole tooth, or root, with minimal trauma to the investing tissues, so that the wound heals without compromise and no post operative prosthetic problems are created. In the world of dental implants, this more or less means preserving the bone. In my hands, I find the Golden Dental Physics Forceps (Golden Dental Solutions, Roseville, MI) instruments provide me with the best solution for achieving atraumatic extractions on a predictable basis which will be further explained through the clinical case. However, the focus of this article is on the simple socket preservation procedure following the extraction.

When talking about grafting, one of the main issues that compromises the use of socket grafting techniques is the fact that epithelium invagination of the grafted site is more pronounced than bone integration. The graft material needs to be protected from the epithelial growth. This is typically accomplished by the use of a long lasting resorbable or non-resorbable membranes. It is imperative to know the products used and the resorption rates, as they differ. Resorbable membranes are placed over the socket site when closure of the facial and palatal tissue is 2mm or less - you achieve primary closure. It is important that the membrane extend at least 2mm onto facial and palatal bone, to prevent premature exposure or loss of the membrane. It will take a good 4-6 months for the grafted site to be replaced effectively by the patient's own bone. When a membrane is lost prematurely, the prognosis becomes compromised. The grafted site may heal, but the prognosis becomes compromised. Non resorbable membranes are used when primary closure beyond 2mm is not achieved. This is often the case in larger tooth extraction sites. Because it is imperative that attached gingiva be maintained onto the facial aspect of implants, one does not want to pull mucosal tissue from the vestibule over the crest of a socket to provide primary closure. The non resorbable membrane is eventually removed in 4-6 weeks, and osteoid material, the precursor to bone, will be created under the membrane. Again, it is critical that the membrane extend a minimum of 2mm onto facial and palatal bone to eliminate expulsion.

These procedures may be challenging for some practitioners without the proper training, and therefore many dentists do not provide grafting procedures at all for various reasons including the inability to effectively place a membrane.

There are many products on the market and it can be confusing as to what to use and when. The technique that will be shown in this clinical case, does not require the use of a membrane. The product is simply placed into the atraumatic extraction site and it will predictably grow bone in my experience - including bone adequate for implant placement. It is important to note that the extraction site must have its walls intact and not have a defect. This technique should not be utilized when you are missing one or more walls in my opinion. It is a very simple product to work with and provides great benefit for the patient.

Here a simple and cost effective graft procedure is demonstrated following an atraumatic extraction. The maxillary right bicuspid tooth had a significant vertical fracture (Fig 1) and the tooth was symptomatic to the patient. An endodontic consult revealed that that tooth was non restorable and the treatment plan was to extract the tooth.

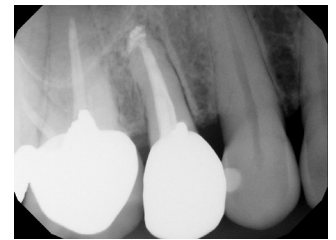


Figure 1: Pre operative digital radiograph of non restorable, vertically fractured maxillary right second bicuspid tooth

The first step is to perform an atraumatic extraction. As mentioned above, atraumatic means less damage to the bone surrounding the root, less pressure on the root of the tooth allowing removal of even fractured or damaged roots. It also means that there is less negative experience to the patient as they do not feel the forces and trauma of conventional techniques. Finally, being able to remove even the most difficult teeth with no hand, forearm, bicep or shoulder strength is a positive experience for the dentist. The use of the Physics Forceps (Golden Dental Solutions) is an ideal method in my hands to prevent fracture of teeth and fracture of the facial plate of bone that can often be experienced during conventional extractions using conventional luxators or forceps.

The Physics Forceps provide me a technique to minimize the fracture of roots and maintain the facial plate of bone, all of which are important to the proper healing of extraction sites. The forceps are a modified first class lever consisting of two components. Tension is applied with the beak, or flattened end of the instrument onto the palatal aspect of the tooth. The second part of the instrument, referred to as the bumper, is placed onto the facial aspect of the tooth as high up the vestibule as possible. The bumper simply acts as a fulcum and the working end of the instrument is the beak which engages the root of the tooth 1-3mm subgingival. The handles are held firmly,



Figure 2: The crowned tooth would be extracted and the site prepared for future dental implant placement. Crowns are often not an issue with the Physics Forceps as the beak is engaged on solid tooth structure, versus engaging the crown. On a lower molar that I determined should be sectioned, I would use the WAMkey crown remover (Golden Dental Solutions) to remove the crown and section the roots.



Figure 3: The Vibraject Injection Comfort Solutions (Golden Dental Solutions) vibrating attachment to a conventional syringe made the anesthesia relatively pain free.

but never squeezed. They allow for tension to be created onto the palatal aspect of the root, creating a physiologic release of enzyme which breaks down the periodontal membrane. Once the PDL is destroyed, the tooth is simply elevated up and out of the socket. The instrument is not intended to deliver the tooth from the socket, rather a tooth delivery instrument is used to remove the tooth from the socket site, leaving a socket with all four walls perfectly in tact. (Figures 2-10).

The atraumatic extraction techniques demonstrated provide a defect with the facial, palatal, mesial and distal walls intact. This creates a site that can be explained to the patient as a cereal bowl or ice cream cone that can be easily and efficiently filled with grafting materials. Once the tooth is removed, it is imperative to remove any remaining granulation tissue from the socket using a sharp curette.

Once the root is removed, the type of grafting material should be chosen. Autogenous graft is bone material from the patient from the symphysis or retromolar pad area. This involves another surgical site. Other materials are allograft (bone from the same species- human), or resorbable alloplastic materials (like OsteoGen®, a bioactive Calcium Phosphate based material similar to biologic apatite) which have both proven to be predictable. Xenografts are made from another species, such as cow bone. A membrane is needed when using these products.

This clinical report demonstrates the simple technique, when all walls are intact, using a product called OsteoGen® Plugs (Impladent Ltd, Jamaica, NY) (Fig 11-14) These provide one step grafting solutions for simple socket preservation without the need for a membrane. The OsteoGen® Plug is a combination of OsteoGen® bone graft with purified bovine Achilles tendon collagen. The collagen contains the graft material, making it easy and efficient to deliver to the extraction site, eliminating the need for a membrane as the particulates cannot wash out after placement. The mineral and collagen composition of the product mimics the inorganic and organic components of physiologic bone.

OsteoGen® is a highly crystalline osteoconductive bioactive resorbable calcium apatite bone graft that is physicochemically similar to human bone. It is a non-ceramic bone graft material used to predictably maintain ridge height in preparation for future implant placement. The bioactive and resorbable crystal clusters control migration of connective tissue and form a strong bond with newly growing bone. Its hydrophilic 3D matrix leads to immediate absorption of blood flow, which is important for the initiation of bone formation, early angiogenesis and bone bridging even across large defects¹⁻³ and its clinical use has been studied extensively for over 30 years.⁴⁻⁶

The OsteoGen® material is a low density bone graft and thus will be radiolucent on the day of placement. As the crystals are resorbed physiologically by osteoclasts and new bone is laid down by osteoblasts, the site will become more radiopaque.



Figures 4 & 5: The maxillary right Physics Forcep (Golden Dental Solution) is used to atraumatically remove the tooth from the socket. Physics forceps come in a series of 4 instruments, a maxillary right, maxillary anterior, maxillary left and a universal mandibular forcep. The beak is placed onto the palatal root structure 1-3mm subgingival and the bumper is placed into the vestibule.

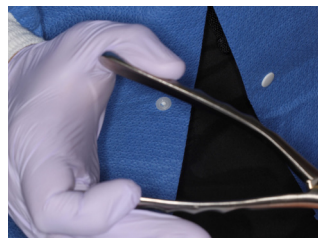


Figure 6: There is no squeezing of the instrument, rather rotational forces placed by the beak of the instrument on the palatal root surface creates an enzymatic action breaking down the periodontal ligament and releasing the tooth from the socket. The instrument acts as a lever.



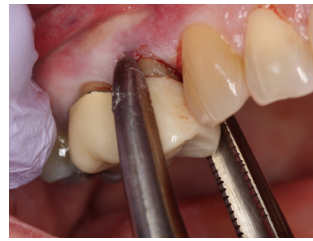
Figure 7: As the PDL is broken down the tooth is elevated up and out of the socket about 3mm.

The collagen portion promotes keratinized soft tissue coverage while the graft forms new bone. The OsteoGen® Plug is not just a regular collagen plug. It is a combination of bovine Achilles tendon collagen matrix and bioactive resorbable calcium apatite crystal clusters. It is important to understand the difference between the materials available as they are not the same. Placing a collagen based clotting material, such as a 100% collagen plug (without any graft material), is not considered simple socket grafting and will do little to maintain bone contours in the edentulous space.

Proper diagnosis for future treatment in this case requires atraumatic extraction of the non restorable tooth, cleaning out the infected site and grafting with a predictable material which will promote bone replacement. Following proper integration a dental implant can be predictably placed and the patient restored to a full dentition. (Figs 15-27 on page 50) Although there are many options for simple socket grafting today, one must consider techniques that are both predictable, simple, and cost effective for you and the patient. OsteoGen® plugs are a great option for the general dentist's consideration.

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Dr. Timothy Kosinski is an Affiliated Adjunct Clinical Professor at the University of Detroit Mercy School of Dentistry. He is a Past-President of the Michigan Academy of General Dentistry. Dr. Kosinski received his DDS from the University of Detroit Mercy Dental School and his Mastership in Biochemistry from Wayne State University School of Medicine. He is a Diplomat of the American Board of Oral Implantology/Implant Dentistry, the International Congress of Oral Implantologists and the American Society of Osseointegration. He is a Fellow of the American Academy of Implant Dentistry and received his Mastership in the Academy of General Dentistry. Dr. Kosinski has received many honors including Fellowship in the American and International Colleges of Dentists and the Academy of Dentistry International. He is a member of OKU and the Pierre Fauchard Academy. Dr. Kosinski was the University of Detroit Mercy School of Dentistry Alumni Association's "Alumnus of the Year," and in 2009 and 2014 received the Academy of General Dentistry's "Lifelong Learning and Service Recognition." Dr. Kosinski can be reached at 248 646-8651, drkosin@aol.com or www.smilecreator.net.



Figures 8 & 9: A tooth delivery instrument is used to easily remove the tooth from the socket. The vertical fracture is clearly noted and the bone is preserved.



Figure 10: The socket site is aggressively curetted, removing any granulation tissue resulting from the fracture.



Figure 11: An OsteoGen Plug (Golden Dental Solutions) is cut in half, approximating the contour of the socket site. The product is available in a large and a slim size.



Figure 12: The plug is lightly condensed into the socket site.

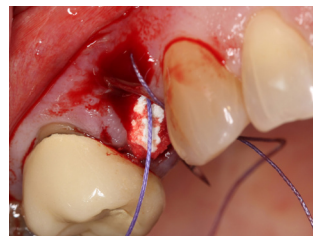
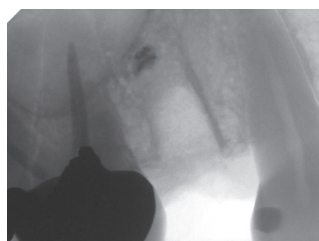
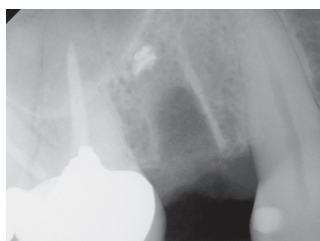


Figure 13: Vilet resorbable sutures (Implant Direct) sutures the site and keeps the plug in place



Figure 14: Suturing is completed. Note that no membrane is necessary with this OsteoGen Plug.



Figures 15 & 16: Immediate post operative radiographs illustrate that the material is initially radiolucent. The reverse contract view illustrates the material passively in place.



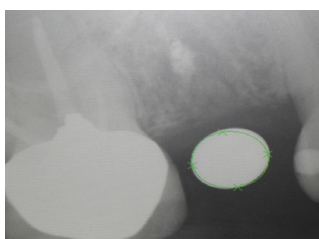
Figure 17: Two week post operative view of tissue healing and osteoid formation at the crest of the surgical site. The site will be allowed to integrate for approximately 4 months prior to my dental implant surgical placement.



Figure 18: After approximately 3 months of integration, the grafted material objectively appears more opaque indicating integration of bone.



Figure 19: The healed ridge is primed for a predictable dental implant placement.



Figures 20 & 21: To determine the amount of vertical bone available, a 5mm ball bearing is placed into the edentulous space held with orthodontic wax. This known diameter ball bearing is measured using the Dexis system. This allows for an accurate measurement of the vertical bone available from crest to what appears to be the floor of the sinus.

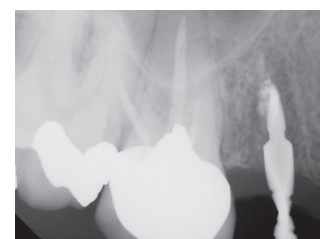
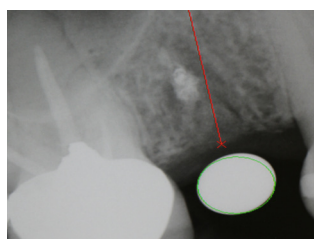


Figure 22: A 2mm pilot drill from the Hahn dental implant system (Glidewell) penetrates into the bone site approximately 6mm. This allows for proper angulation prior to creating the final osteotomy.

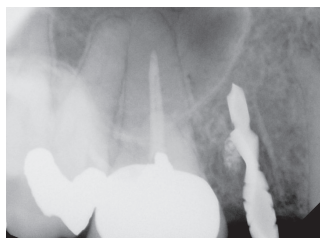


Figure 23: The pilot drill is brought to the proper depth, which here is 13mm



Figure 24: A 4.3mm diameter tapered bur makes the final osteotomy.



Figure 25: The Hahn implant is threaded in to position and torqued here to 40Ncm, establishing excellent initial stability.



Figure 26: A 3mm tall healing abutment is torqued to 20Ncm allowing the tissue to heal around this abutment, eliminating the need for future uncovering of the implant following four months of integration

==== 25 years ====

"I think that you guys are doing a wonderful job with 'The Profitable Dentist.' I look forward to all the issues and enjoy reading them. I especially love reading the 'Give'em hell' type articles! You should both be congratulated for the work you are doing!"

Dr. William G. Dickerson, DDS
Author, Lecturer & Cosmetic Dentistry Expert

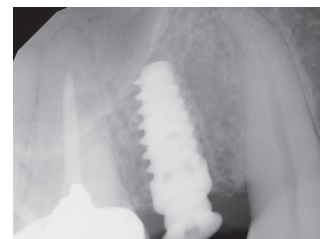


Figure 27: The post operative radiograph indicates nice position of the implant.