The Role of Biologics in Regenerating Bone

The greater the volume of bone to be created, especially vertically or palatally, the more difficult it is to predictably regenerate bone.

Bone grafting material on its own, usually either allograft human bone, or xenografts such as bovine or porcine bone, can have trouble turning into a bed of bone suitable for an implant to integrate into. This is because the bone graft, especially the xenograft, is conglomeration of tiny non-vital blocks of calcium that used to be vital bone. All the cells needed to create new bone are missing. And if the graft particles are packed too tightly and not enough blood clot with living cells enter to create new bone between the calcium blocks, there is not enough living bone substrate for an implant.

In this case, techniques such as mixing shavings of living bone from an adjacent site to the graft site, or use of biologic materials such as rhBMP (recombinant human bone morphogenic protein) or Emdogain, or a combination of both are used to enhance bone healing, and with remarkable results. The rhBMP in particular is fascinating because the proteins required are in a liquid form that hydrate a sponge, and the sponge is cut up and layered in between particles of adjacent living bone shavings mixed with both autogenous and bovine graft material. This creates an excellent bed of living bone for implant placement.

Guided Bone Regeneration

We reviewed in the prior newsletter how bone is lost from around the teeth and how to regenerate bone around teeth that did not necessarily involve grafting materials such as bone, membranes, and biologic materials to enhance healing.

But there are some defects in the ridge separate from the teeth that are so large or involving a particular wall of bone that is missing, that it is imperative to use these additional materials.

Bone is produced primarily by a blood clot converting into bone. We know this from most non-complicated tooth extractions… as long as there are relatively good walls of bone remaining after tooth removal, and as long as any remaining granulation tissue is fully removed, the blood clot that fills the socket predictably turns into bone!

However, the more walls of bone that are missing due to infection, or surgical need to remove bone to gain access to remove a dilacerated root for example, the less likely the socket will completely convert to bone.

This is partly because the blot clot is compressed and minimized by the soft tissue, and because bone grows slower than the soft tissue which can invade the clot space and prevent bone formation. So membranes with titanium struts or tenting screws can be tac'd into place and used not only to exclude the soft tissue, but also create clot space.

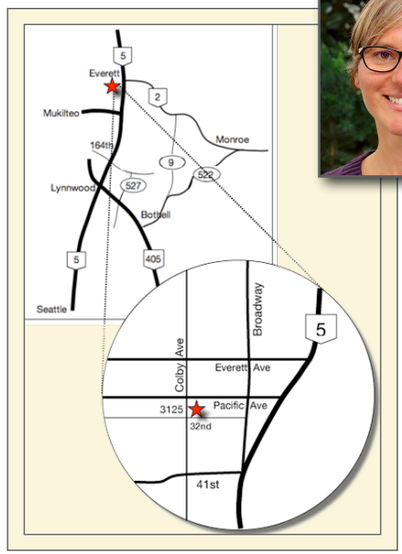
This issue of **ProbeTips** will review a few cases where bone was regenerated WITH the use of bone grafting materials and biologics with exclusion membranes and associated slow or non-resorbing materials.

Pamela A Nicoara DDS MSD PLLC

PERIODONTOLOGY IMPLANTOLOGY ORAL MEDICINE

Pamela Nicoara is a Board Certified Periodontist practicing in Everett since 2007. She is a UW Perio graduate, and a transplant from Dallas, Texas.

She is driven to achieve esthetic and predictable outcomes, particularly for anterior implant cases, and is always looking to improve processes and results. You can email her directly below with questions, comments, or suggestions for future newsletters.



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Probe Tips

A Quarterly Periodontal Newsletter

By Pamela Nicoara DDS MSD

Bone Grafting WITH bone

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Ridge Augmentation with Bone and Biologics

Case 1

The first case involves a 77 year old woman who had a long standing fixed partial denture replacing missing teeth #11 and 12 using teeth #10 and 13 as abutments. You can see radiographically the severe osseous defect at site #11 in particular.

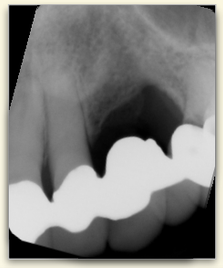
She developed caries on the premolar #13 which was non-restorable. She wanted implant replacement of her missing teeth if possible. The large defect at #11 is a very difficult defect to treat because of the vertical component of her missing bone. Her treatment was phased into several segments:

1. Section partial at distal #10 and remove #13.
2. After 6-8 weeks of soft tissue healing, rebuild the ridge with a titanium reinforced non-resorbable membrane tac'd into place, and filled with a combination of autogenous shavings mixed with allograft and xenograft, and layered with rhBMP sponges. Proper release of the soft tissue for passive closure over the non-resorbable membrane is critical for proper bone growth.
3. After 9 months of healing, removal of the non-resorbable membrane and tacs, and placement of implants at sites #11 and 13.
4. After 4 months of implant healing, uncovering and restoration of implants with a new fixed partial denture from implants #11 and 13.

You can see from the beautiful restorative work that the CEJ of the implant at #11 is now level with the CEJ of the contralateral natural tooth which would not be possible without the graft.

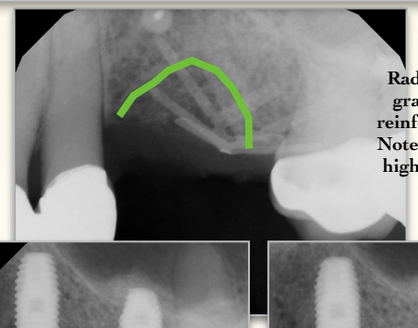
All cases are patients of Dr. Pamela Nicoara

Find more online at www.nicoaraperio.com!

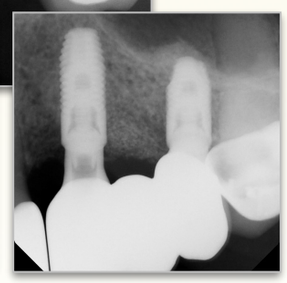


Pre-Op Radiographs

6 weeks Post Extraction #13



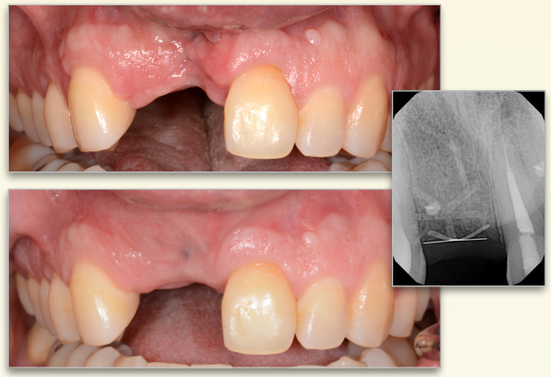
Radiograph of bone graft and titanium reinforced membrane. Note initial bone level highlighted in green.



Restored by Dr. Kelly Peterson

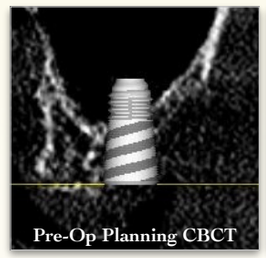
Case 2

This next case involves a 49 year old man who had experienced trauma to his anterior teeth many years ago. Implant replacement is desired over continuing to wear his flipper. Similar to Case 1, a titanium re-inforced non-resorbable membrane, and rhBMP in the bone graft mixture is used to overcome the severe facial and vertical defect. Once the bone is mature, the implant can be placed at site #8 with a cantilever pontic to replace tooth #7 since achieving a papilla between sites #7 and 8 is most predictable with a pontic site versus two implants adjacent to each other.

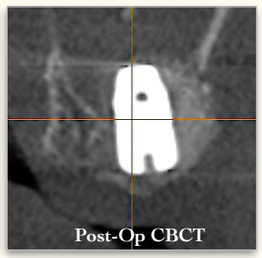


Case 3

This case was managed with Emdogain and a stiff slow resorbing membrane to achieve the desired result. In the images adjacent, the planning CBCT shows the amount of bone needed facially and in the sinus to support an implant in the proper position. The adjacent post-operative CBCT shows the significant facial bone gained.



Pre-Op Planning CBCT



Post-Op CBCT

Case 4

This final case highlights a defect from a failing implant that is so severe, that a tenting screw is utilized to help maintain the space under the titanium reinforced membrane to allow the rhBMP bone mixture to have room to mature. Note the significant vertical ridge gain in preparation for implants.

Tenting Screw