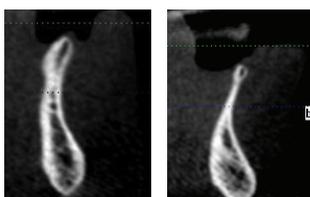


Stem cell block grafts

Dr. Paul Petrunaro delves into allogenic stem cell block grafts to facilitate reconstruction of localized/severe ridge defects and reconstruct proper alveolar contours prior to dental implant placement

One of the most challenging clinical situations to present to the implant team is advanced bone loss that leads to insufficient bone volume for proper implant placement. Rebuilding bone height and width has been a difficult technique and sensitive procedure, which usually requires the patient to undergo painful and aggressive surgeries to harvest autogenous bone from the ramus, symphysis, iliac crest, or tibia. Commonly, the site where the bone was harvested from caused more postoperative pain and sequella than the actual surgical site itself. Additionally, from the literature, a 16-20% loss in bone volume of the healed graft can be noticed at re-entry for implant placement. This can be a problem for the reconstruction of normal soft tissue architecture for implant esthetics and long-term maintenance.



Preoperative serial views



Paul Petrunaro, DDS, MS, graduated from Loyola University Dental School in 1986 and completed an independent study of Periodontics at the Welsh National Dental School in the United Kingdom. He completed a residency, specialty certificate, and Master of Science Degree in Periodontics from Northwestern University Dental School, and formerly served as the Coordinator of Implantology for the university's Graduate Department of Periodontics. Dr. Petrunaro has maintained a private practice in Periodontics and Implantology since 1988, and holds licenses in Illinois, Minnesota, and Washington. As a world-renowned and pre-eminent educator, he has presented numerous seminars and lectures worldwide on topics of advanced periodontal, prosthetic, and implant interrelationships, bone regeneration, esthetic tissue formation, transitional implants, immediate restoration of dental implants, and the use of platelet rich plasma in bone grafting. In addition, he has authored over 75 articles on these topics including cosmetic bone grafting and esthetic implant procedures in such prestigious publications as *Compendium*, *Inside Dentistry*, and the American Academy of Cosmetic Dentistry's *Journal of Cosmetic Dentistry*. Dr. Petrunaro's consultant role to several biomedical companies and laboratories has resulted in many new innovations in surgical dentistry. He is a fellow of the International and American College of Dentists and a Diplomate of the International Congress of Oral Implantologists and holds memberships in several professional associations.

The following case report presents a new technique and allogenic grafting procedure to increase both bone volume in the height and width dimensions. Dr. Petrunaro is one of the only surgeons in the country using this state-of-the-art material for the reconstruction of small to large intraoral osseous defects. A 42-year-old, non-smoking female presented for reconstruction of her lower arch with dental implants (Figures 1 and 2). The patient had a congenitally missing dentition, which contributed to large defects in her mandibular arch in the buccal-lingual dimension (Figure 3). The defects made conventional implant placement impossible without a prior bone reconstruction procedure. The patient had also obtained other opinions regarding treatment, which consisted of removal of over 20+ millimeters of bone and an All-on-4 type option, advanced bone harvesting procedures from the iliac crest region, and the option she chose in Dr. Petrunaro's practice, localized ridge augmentation using a stem-cell infused allogenic block graft procedure. This technique negates the patient undergoing a painful bone harvesting surgical procedure, and provides a bone reconstruction and remodeling process in which her own osseous structures are stimulated and reconstructed prior to implant placement.

After removal of tooth Nos. 24 and 25 (Figure 4), the large buccal-lingual defect can be seen clearly from this clinical view. Figures 5 and 6 show the undercut in the crest of the ridge from the buccal and occlusal views, respectively. This thin knife-edged ridge, and significant undercut, would make proper implant placement very difficult, if at all possible to achieve.

Coronal flattening of the crest of the ridge (Figure 7) is necessary for closure of the wound and stimulation of the marrow spaces at the crest of the ridge by removing the cortical plate. Figure 8 shows the allogenic stem cell block grafts placed at the buccal aspect of the ridge from the tooth No. 19 area to the tooth No. 27 area. Over 140,000 stem cells are at the facial aspect of the crest of the ridge to stimulate the patient's own osseous structures to help rebuild the insufficient buccal aspect.



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6

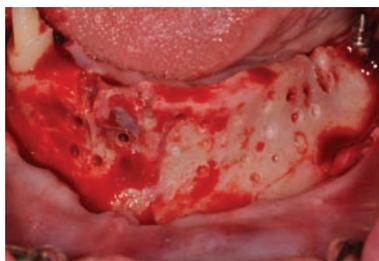


Figure 7

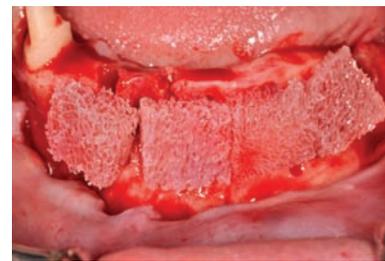


Figure 8

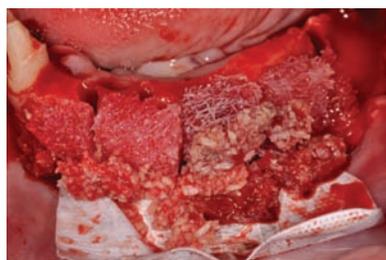


Figure 9



Figure 10



Figure 11



Figure 12



Figure 13



Figure 14

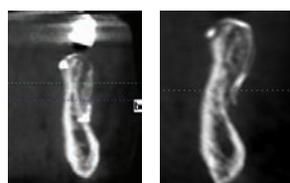


Figure 15A

Figure 15B



Figure 16



Figure 17

Additional allogenic cortical and cancellous particulate grafting is accomplished (Figure 9) prior to isolation and stabilization of the stem cell graft by a nonresorbable expanded polytetrafluoroethylene (e-PTFE) titanium-reinforced membrane (Figure 10).

This e-PTFE membrane allows for exclusion of soft tissue during the healing phase of the graft, and maintains the shape of the desired crestal bone dimension being regenerated. An additional membrane, BioXclude™ (Snoasis Medical),

comprised of amniotic tissue (Figure 11) is then placed over the e-PTFE membrane prior to wound closure (Figure 12). This amniotic membrane contains stem cells also, and aids in the rapid soft tissue healing necessary to obtain optimal wound closure, and provides a stable wound throughout the healing phase. Figure 13 demonstrates optimal closure, while Figure 14 demonstrates the immediate fixed provisional restoration supported by a provisional implant in the tooth No. 18 position. Figure 15 shows 4-month postoperative serial views. Please note the significant increase in the buccal-lingual dimension of the ridge obtained. Figure 16 shows the 4-month clinical re-entry view, and Figure 17 shows the implant placement clinical view.

The radiographic confirmation of the increase in buccal-lingual ridge dimension can be readily seen, and comparing to Figure 2, it is readily apparent. The introduction of stem cells to this allogenic material creates an ideal situation for rapid bone replacement in difficult osseous defect sites, eliminating the need for painful harvesting of bone from other parts of a patient's oral cavity or body. This is a much less invasive option for patients to consider.

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