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RIDGE PRESERVATION UTILIZING PLATELET CONCENTRATE TECHNOLOGY

The average oral and maxillofacial surgical practice is set in an office, or surgi-center. It is ideally positioned for the use of autologous platelet concentrate (APC) which has broadened the arena of reconstructive procedures. In November of 1999, the SmartPreP™ (Harvest Technologies, Corp., Plymouth, MA) APC+ technology was introduced to the profession. The SmartPreP technology allows for the harvest of approximately 50cc of intravenous blood in the immediate pre-operative or perioperative time frame. The harvested blood is processed in a completely closed system (FDA cleared) in a 12-minute time frame. That volume of blood will produce 7-10cc of APC+ and 20cc of Platelet Poor Plasma (PPP), from 50cc of blood.

Several significant advantages are present with the SmartPreP technology, which were not previously available. It can be used in an office, surgi-center or hospital setting. The volume of autologous blood required is only 50cc to produce 10cc of APC+ instead of the 400cc-500cc required by hospital based cell processing systems. An assistant in an office practice can use this system and its accompanying equipment with a minimal orientation and training session. The entire production time is only 12 minutes in addition to 3 to 5 minutes for blood draw, as compared with a minimum of 45 minutes with the cell-saver, perfusionist procedure. Unlike cell processing systems, the low blood draw volume negates the need to retransfuse the red blood cells to the patient.

Once the APC+ is produced the APC+/PPP products are placed into separate plastic sterile cups from the consumable package. The CaCl₂/Thrombin activator is held in a third plastic cup. When ready for application, the APC+ or PPP is drawn in a 10cc syringe, and CaCl₂/Thrombin activator is drawn into a 1cc syringe. The 10:1 ratio should always be maintained (e.g., 10cc APC+ to 1cc CaCl₂/Thrombin). These syringes are fixed into a dual lumen (spray or liquid) applicator tip which will furnish a single stream of platelet gel product. The handle (plunger tip) of the syringes are engaged with the connector block and the pistol grip is snapped into place on the barrel of the 10cc syringe. The substrate, either HA, demineralized, freeze-dried bone matrix (DFDBM), or PepGen P-15 (Dentsply CeraMed Dental, Lakewood, CO), is spread across the bottom of a sterile glass or plastic petri type dish. The APC+ is applied with the appropriate applicator tip to create a "pancake", which is flipped over and the procedure is performed once again to add additional body to the mix. The material can be cut into any configuration with scissors and placed at the appropriate graft and/or donor site.

The SmartPreP autologous platelet concentrate, in addition to producing a mean platelet count increase of 6 to 8 times native levels (ie.; 140,000—200,000 = 9,940,000/ml), contains an impressive array of growth factors.²⁻⁵

Case Review

The concept of ridge preservation has been discussed for many years.⁶⁻⁹ With the introduction of platelet concentrate technology it seemed an ideal addition to our reconstructive armamentarium. The patient illustrated in this presentation was a 43-year-old Caucasian female. Her medical history was essentially within normal limits and non-contributory. The maxillary and mandibular dentitions were no longer salvageable and were treatment planned for full mouth extractions (figure 1). The patient was presented with a treatment plan, which included maxillary and mandibular removable prosthetic appliances or the concept of implant connector bar overdenture prosthesis. In addition, ridge preservation, using platelet concentrate, was discussed. The patient accepted the ridge preservation concept. Under general nasotracheal anesthesia, on an ambu-



Figure 1



Figure 2 Maxillary post-extraction alveolar ridge prior to graft placement



Figure 3 Mandibular post-extraction alveolar ridge prior to graft placement



Figure 4 Platelet gel pancake with the freeze-dried bone granules as a substrate



Figure 5 Platelet gel pancake with the freeze-dried bone granules as a substrate



Figure 6 Filling of the individual sockets with the platelet concentrate pancake



Figure 7 The on-lay veneering technique to build out the buccal-labial cortical areas

latory basis, the residual dentition was surgically excised (figures 2 and 3). Pre operatively 100cc (double-draw) of intravenous blood was harvested. The APC+ concentrate was produced. The APC+ was over-sprayed combining it with freeze-dried bone granules (figures 4 and 5). The gelatinous concentrate was used to pack into each post-extraction socket, as well as on-lay veneers of the labial/buccal cortex in order to create improved ridge contour (figures 6 and 7). The PPP was over-sprayed to form a native “fibrin-glue” adhesive (figures 8 and 9) and the mucoperiosteal flaps were repositioned and sutured with 4.0 chromic interrupted sutures (figures 10 and 11). The sutured flaps were once again sprayed with the residual APC+. This concept allows for the hemostatic effects to maximize. In addition, the side benefits of reduced edema and ecchymosis, all contribute to reduced post-operative analgesic requirements, therefore, a more comfortable patient with increased quality and quantity of hard and soft tissue healing (figures 12-16).¹⁰⁻¹²



Figure 8 Platelet Poor Plasma applied over the graft complex



Figure 9 Demonstrates the veneered and filled sockets of the maxillary arch



Figure 10 Closure of the maxillary arch



Figure 11 Closure of the mandibular arch



Figure 12 Maxillary healed soft tissues at 9 days post-operatively



Figure 13 Mandibular healed soft tissues at 9 days post-operatively

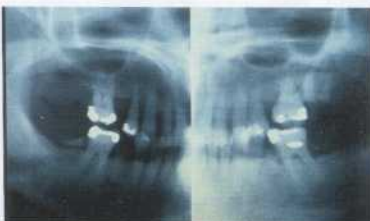


Figure 14 Pre-operative panorex



Figure 15 Immediate post-operative panorex showing defects in alveolar ridge



Figure 16 Panoramic showing complete osseous fill at four months post-op

Summary

The procedures that can be performed with autologous platelet concentrate have significantly increased the quality and quantity of the results for the outpatient population. Patient acceptance has also increased in significant numbers, as compared with harvesting aspirated hemopoietic marrow from the iliac crest and the necessity to harvest either particulate cancellous bone or cortical blocks via an open procedure. Finally, the cost-effective advantage of Harvest SmartPREP technology has enable the savings to be passed to the patient population. APC+ is used in the following procedures within the scope of my practice; implant placement, extraction-ridge preservation, sinus grafting, nerve repositioning, and treatment of the ailing, failing implant. Post-harvest donor bone with secondary osseous fill, in conjunction with bone graft augmentation, deeply impacted wisdom teeth with secondary augmentation and immediate grafts following cyst enucleation.

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