

Platelet-rich plasma offers vast fat graft benefits

PRP-enrichment increases cellular survival and proliferative potential

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Dr. Alexander

Seattle - Platelet rich plasma (PRP) appears to be a useful adjunct for enhancing outcomes of autologous fat transplantation, said Robert W. Alexander, M.D., D.M.D.

Results of in vitro studies show that the incorporation of PRP during preparation of autologous fat for transplantation both increases cellular survival and proliferative potential. That finding is consistent with the clinical observation of higher retention volume in transplantations performed with PRP-enriched fat relative to conventional fat grafts. In addition, clinical experience indicates the addition of PRP is associated with other advantages, including acceleration of the healing processes, and, in large volume transfers, reduction of spherical calcifications and lipid cyst formation. This observation has been confirmed by radiographic and ultrasonic visualization, noted Dr. Alexander, a private practitioner of Cosmetic & Reconstructive Surgery and faculty member of the University of Washington in Seattle.

"Autologous fat meets many of the criteria of an ideal material for use in tissue augmentation procedures and stem cell investigations. We are actively researching a method of scientific quantification of surviving fat graft cells following transfer. In addition, current studies suggest improved cellular take rates as a result of addition of PRP, does improve the predictability fat grafting procedures. The benefits and uses of this safe and readily available tissue resource would be greatly enhanced" he said.

Dr. Alexander has been studying the effects of addition of PRP to autologous fat since the late 1990s, based on the principle that PRP, as a material rich in growth factors and cytokines, would have the potential of improved fat cell viability, as well as accelerate the wound-healing cascade.

"The platelet-derived chemical mediators found in PRP would be expected to contribute to survival and increased metabolic activity of the fat cells, while also enhancing healing and revascularization at the surgical site. Consequently, there would be an increase in transplant cell survival and lipogenesis potential, as well as reduction of liponecrosis, resulting in calcification and microcyst formation. Theoretically, if PRP reduces the time needed for the grafted cells to be accepted in its recipient site, there will be less loss of graft cells to prolonged inflammation and necrosis, and improved clinical efficacy," he said.



Patient before undergoing lip vermilion graft (left); Patient 18 months after PRP lip augmentation graft (right)

In the last few years, development of an affordable and convenient method of isolating PRP has made its uses in outpatient surgeries much more practical (Fig. 1). Dr. Alexander has been enriching all processed fat with PRP, regardless of the volume of grafts and whether the material will be used for immediate transfer, or frozen for delayed grafting. Currently, he uses "plain" PRP (not activated with the addition of calcium chloride and thrombin) isolated with technology able to spin down a useful volume of platelet concentrate from a reasonably small sample of blood. A 16- to 18- cc blood specimen yields about 3 cc of PRP, while 10 cc of PRP is obtained from 54 cc of blood.

For small volume grafts, such as those used for facial augmentation, PRP is added in approximately a 1:10 ratio to the saline rinsed fat grafts, while for procedures involving larger graft volumes, PRP is added to make up to 5 percent of the graft total volumes prior to transfer.

Discussing the clinical advantages of using PRP-enriched fat, Dr. Alexander noted that the benefit of improved retention volume and duration of results has been based on clinical observations. However, he is collaborating with Mark B. Lyles, DMD, Ph.D., to develop methodology that would allow quantitation of in vitro cellular survival.

"We have been working with various types of tags placed on the cellular membrane, but those techniques have essentially destroyed the cell's metabolic potential to create intracellular lipids. Currently, Dr. Lyles is investigating a biochemical method of analysis that shows promise for allowing us to quantify what proportion of harvested cells survive the grafting process and remain active over time in the recipient bed," Dr. Alexander said.

With the expectation of achieving a higher take rate, it is also possible to transfer fewer cells, and therefore, making over-correction less important. Subsequent to that change in technique with the added benefit of PRP-induced healing, Dr. Alexander has noted patient benefit with less initial distortion and severity of bruising and swelling.

For example, among patient undergoing autologous fat transfer for vermillion lip augmentation, swelling resolves in 24-36 hours, whereas it would take approximately three days to disappear following conventional fat transplantation.

More recently, Dr. Alexander has begun the study of using treated fat intended for use in small and large volume transfers with activated PRP gel, which is produced with the addition of calcium chloride and thrombin. The PRP gel establishes a fibrin meshwork which is observed to "concentrate" the fat graft prepared for transfer. It thereby may serve to stabilize the cellular components in the fat graft, and because of its reduced content of nonviable extracellular fluids, offer the potential for improving the precision of graft placement.

"When using condensed graft material, it is possible to implant smaller volumes with greater accuracy and the same or better clinical results," according to Dr. Alexander.

In addition to use of PRP-enriched fat, careful attention to the technical harvesting, handling, and transfer protocols are critical to achieving reproducible success with autologous fat transplantation. In that regard, Dr. Alexander suggested important elements of his techniques include careful selection of donor sites, and use of a minimal traumatic low pressure harvest and transfer. He feels that fat is best collected from primary, genetically determined problem deposit sites of individual patients, using a tumescent saline technique. Significant improvement in the latest equipment has been advanced in improved closed syringe systems (Cell Friendly, Tulip Medical), using proprietary super-polished (internal), and coated (exterior) surfaces to minimize cell trauma during harvest and transfer.

Dr. Alexander reports that he has no financial interest in any device or equipment utilized in these techniques.