The Use of Platelet Rich Plasma and Acellular Protein Matrix in the Treatment of Male and Female Pattern Hair Loss: Two Case Reports

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Abstract
Hair thinning and loss is a problem for both men and women worldwide. Many patients find that the current options available for treatment are insufficient or too invasive. A novel combination of autologous platelet rich plasma and extracellular matrix derived from porcine urinary bladders has been proposed as a therapeutic option. Two patients who received scalp injections of this combination are presented. Both patients experienced increased hair growth and density. These results warrant further investigation into platelet rich plasma plus acellular matrix as treatment option for hair loss.

INTRODUCTION
The quest for an effective baldness treatment has been with humankind since the beginning of recorded history. One of the oldest medical texts ever found, the Ebers Papyrus, contains the first known “prescription” for treating baldness. The ancient Egyptians used a mixture of animal fats taken orally after recitation of a prayer to the sun god. Hippocrates, the famous Greek father of modern medicine, observed that the eunuchs did not suffer from hair loss and presumed castration would be an effective (though socially unacceptable) surgical treatment for baldness [1]. Since ancient times innumerable cures have been proposed; all inevitably failed. In modern times, follicular unit grafting and oral or topical medications such as finasteride and minoxidil are the best we can offer. More often than not, these treatments are more appropriate for males: oral finasteride is FDA approved for use in men only, and women, due to their propensity for generalized thinning, may not have robust donor areas for surgical procedures. Even in men, our current armamentarium of treatments doesn’t always yield satisfactory results.

Recently there has been an explosion of interest and information on the use of autologous platelet concentrates for dental, orthopedic, neurologic and aesthetic purposes. Platelet rich plasma has been found to speed wound healing and decrease rates of infection in both acute and chronic cutaneous wounds [2]. Some hair transplant surgeons advocate “dipping” or storing the follicles in activated PRP prior to implantation as a way of enhancing graft survival and growth. This was first described by Uebel et al in 2006 [3]. This idea led to the practice of injecting PRP directly to the scalp, with or without follicular transplants. Physicians from Italy, the US and India have reported success with this technique, though protocols varied between the groups [4-6].

In addition to PRP, some surgeons employ a product called Matristem, an acellular bio matrix, as a healing and remodeling agent in wound repairs. Matristem has been researched extensively and found to be safe and efficacious in a number of wound and surgical applications. It derived from porcine urinary bladder and has been shown to promote healing, tissue repair and site-specific accelerated tissue regeneration [7]. The product, Matristem, is a restorable, acellular material derived from lamina propria of the urinary bladder after a process of decellularization, lyophilization, disinfection and terminal sterilization [8]. It contains a bimodal surface; one surface is an intact basement membrane conductive to epithelial and endothelial cell attachment, proliferation and differentiation. The opposite surface is suited for wound bed integration and host connective tissue, while supporting neovascularization [8]. It essentially promotes the formation of site specific tissue [9], decreasing scar tissue and resulting in a more functional repair. During hair transplant procedures it is helpful to apply Matristem to the donor strip on the occipital scalp before closure with...
sutures. Not only does the wound heal more promptly, the bio matrix is thought to activate follicular progenitor cells, allowing some re-growth of hair in scar area. It also appears to recruit and signal local and circulating stem cells to initiate and promote folliculogenesis on the basement membrane scaffolding. This makes it an ideal healing agent for donor strip surgical sites but also an intriguing addition to PRP scalp injections.

The novel concept of combining PRP with Matristem for hair loss treatment is a new, yet untested idea. In fact, literature review reveals scant to no reports on this particular procedure. Dr. Gary Hitzig, a hair transplant surgeon, is acknowledged as one of the first physicians to combine PRP with the Matristem to treat alopecia non-surgically. He reported his findings during the second International conference on Cosmetology and Trichology in Nov 2013 [10]. This paper presents two patients with hair loss, one male and one female, and their response to treatment with PRP and Matristem injections.

**CASE PRESENTATIONS**

Patient 1 is a 49 year old Caucasian female with thinning hair. She will not go out in public without a wig let she uses to disguise the worst areas of hair loss. She has seen several physicians and had multiple work ups, including thyroid tests, iron levels, vitamin D levels, allergy panels, hormone levels, scalp biopsy, etc. Despite low testosterone levels, she was diagnosed with androgenic alopecia and treated with 200mg spironolactone for several years. She tried finasteride and minoxidil but felt she had minimal to no improvement. She was frustrated because "no matter what I do, I keep losing hair".

On exam, the patient had no scalp irritation, flaking or erythema. She had obvious thinning with scalp clearly visible and a widened part. The hair shafts were thin and follicles were miniaturized with an early Ludwig pattern of hair loss.

The patient agreed to therapeutic trial of PRP plus Matristem injections. She had a total of six treatments over an eight-month period. At each visit, 60mls of venous blood was drawn and combined with 8mls of citrate dextrose per protocol of the Magellan Platelet Separation System (Arteriocyte, Hopkinton, MA). 6mls of PRP obtained from the sample was then combined with 30mg of Maristem powder for the first three treatments. Based on additional research the Matristem dose was then increased to 100mg for the final three treatments.

A scalp ring block was performed for anesthesia and microneedling was performed on the areas of scalp to be treated. The PRP Matristem combination was injected to the scalp with a 25 g needle at 2 to 3 cm intervals. Finally, platelet poor plasma from the initial blood draw was applied topically. She was instructed to wash her hair the next morning. Afterward the patient reported minor scalp edema and swelling for 2 to 3 days. After the fifth treatment she noticed occipital lymph node edema and tenderness for 5 to 7 days.

After the first three treatments the patient noted that she seemed to be shedding less, and the hairs that did shed seemed “more robust”. After the fifth and sixth treatment she noticed less scalp show and thicker hair shafts. The patient wants to continue treatment (Figure 1).

Patient 2 is a 29 year old Caucasian male with Hamilton type 3 hair regressions who agreed to a trial of PRP and Matristem. He had three treatments at the time of the after photo.

Topical scalp anesthesia was applied one hour prior to treatment. Again, 60mls of venous blood was drawn and spun per protocol to 6mls of PRP. Nitrous Oxide was administered as an additional anxiolytic and anesthetic and micro needling was performed. 30mg of Matristem was combined with the PRP and injected into the scalp. Platelet poor plasma was then applied topically. Treatments were performed monthly. The patient reported some scalp soreness after the procedures for a few days but experienced no other issues or side effects.

By the second treatment, the patient noticed “sprouts” of hair in areas that were previously hair free. After the third treatment, he reported increased volume and density of hair. He is happy with the results (Figure 2).

**DISCUSSION**

As long as humans have had hair they have been plagued by baldness. Hair loss is usually thought of as a male issue but it is surprisingly common in women, affecting more than 30 million in the U.S., according to the American Academy of Dermatology [11]. Women tend to experience thinning with increasing prominence of the scalp visible through the hair. For women, who often rely on their hair as a definitive aspect of their femininity, this can be both distressing and depressing. Hair loss is more socially acceptable for males, but both sexes seek treatment and express unhappiness when hair loss becomes evident. Many of
the current treatments, such as follicular transplants, can be very effective but are too invasive for some patients. Other less invasive treatments may not be efficacious. Patients with hair loss are eager for treatment options that truly work, do not require long-term oral medication and do not require surgical intervention.

Activated PRP has been shown to increase the proliferation of dermal papilla cells, and up regulate fibroblast growth factors such as FGF-7 and beta-catenin, which are potent stimuli for hair growth [12].

Martistem, an acellular porcine matrix, is commonly used to hasten wound healing. It facilitates a constructive remodeling process in the body that reduces scarring and facilitates the restoration of normal site-appropriate tissue [13]. Anecdotal reports describe the synergistic effect of the two products injected directly to the scalp to stimulate hair growth. Published reports or studies, however, are lacking.

This case report describes both a male and female patient who benefitted from PRP plus Maristem injections for hair loss. To our knowledge, no other published reports on PRP and Maristem combination therapy exist. It demonstrates the possibility of another viable treatment option for those with hair thinning and loss. Whether these results will withstand the scrutiny of placebo controlled double blind studies have yet to be seen. Many questions remain regarding optimal Matristem dosages and PRP concentrations as well as the optimal dosage schedule. It is unknown how long the results will last, whether regular maintenance treatments are needed, and if there are any unforeseen risks associated with treatment. Further study will help clarify this treatment’s potential for consistent results and delineate ideal treatment parameters.

REFERENCES


