A Novel Needleless Delivery System for Scalp Platelet-Rich Plasma: Pilot Study

The current delivery methods for scalp platelet-rich plasma (PRP) involve the use of needles to administer local anesthesia and/or PRP. Platelet-rich plasma delivered to the scalp without needles, using jet propulsion transdermal technology called JetPeel, would expand the noninvasive treatment options for patients with androgenic alopecia. We sought to prospectively evaluate the efficacy and usability of a needleless delivery mechanism for scalp PRP in patients with androgenic alopecia.

Methods

Men and women with androgenic alopecia underwent 3 sessions of needleless PRP, each 1 month apart for a total of 3 treatments. Platelet-rich plasma was collected and processed using the Emcyte 60 mL PurePRP II Kit and centrifuge. Briefly, 60 mL of venous blood were collected and underwent 2 spin cycles to first separate the red blood cells and then the platelets. The platelets were resuspended in 5 mL of plasma in preparation for delivery. Each patient received 5 mL of PRP using the needleless system.

The needleless system, manufactured by TavTech, is an Food and Drug Administration-approved technology that resurfaces the skin via a 2-phase stream that combines oxygen and any liquid into a jet that incorporates the liquids into the skin at subsonic speeds. Travelling at 600 ft/s, the jet of air exfoliates dead skin cells and can provide penetration of up to 1.4 mm, allowing for transdermal transfer. It has been used in aesthetic medicine for noninvasive skin treatments and in wound cleaning and debridement.[1]

Independent-samples *t*-tests were used to compare the photography results, calculated using a validated 15-point Jaeschke scale,[2] at the start of the study (T0) and at 6 months (T1). The lead author (G.L.) evaluated the patient in-person before and after treatments. The before and after photographs were then evaluated by G.L. and by 2 independent observers, and the Jaeschke scale was used by each observer to rate the change from before to after.

TABLE 1. Demographics and Analysis

	Frequency (*n*)	Percentage (%)	Average	Range	SD
Gender					
Female	5	36			
Male	9	64			
Age, yr			37	26–70	12
Photo scores (scale −7 to −7)			2.2	−0.7 to 5.3	1.8
Improved	12	86			
Interobserver reliability	0.85 (Kappa)				
Precondition severity					
Post photograph location					
Survey (scale 0–10)					
Comfortable during			10	10–10	0
Comfortable after			9.9	9–10	0.3
Pain during			0		
Pain after			0		
Satisfied			8.1	4–10	2.1
Recommended	13	93			

Intraclass correlation, 2-way mixed model (consistency, average measures), was used to calculate interrater reliability for all photograph raters (>0.6 = substantial

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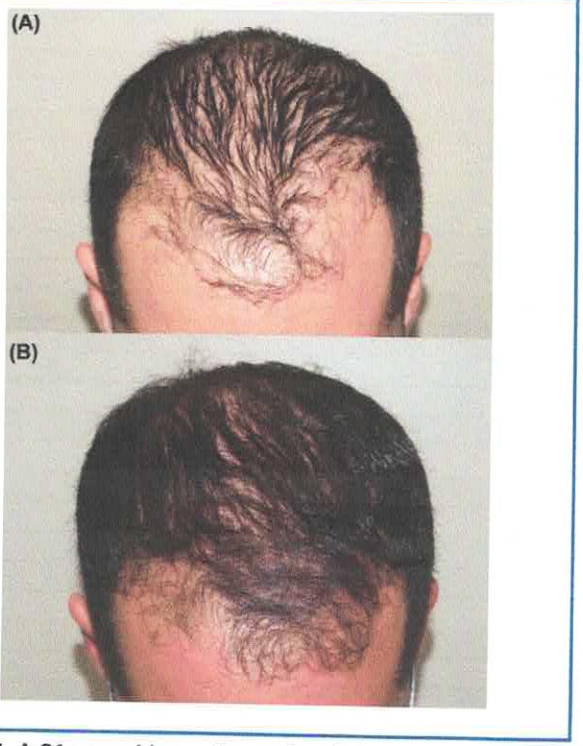

Figure 1. A 31-year-old man 6 months after 3 consecutive sessions of needleless scalp PRP. The top image (A) represents the pretreatment photographs and the bottom photograph (B) captures the final results after 6 months. Jaeschke scale average score 4.3. PRP, platelet-rich plasma.

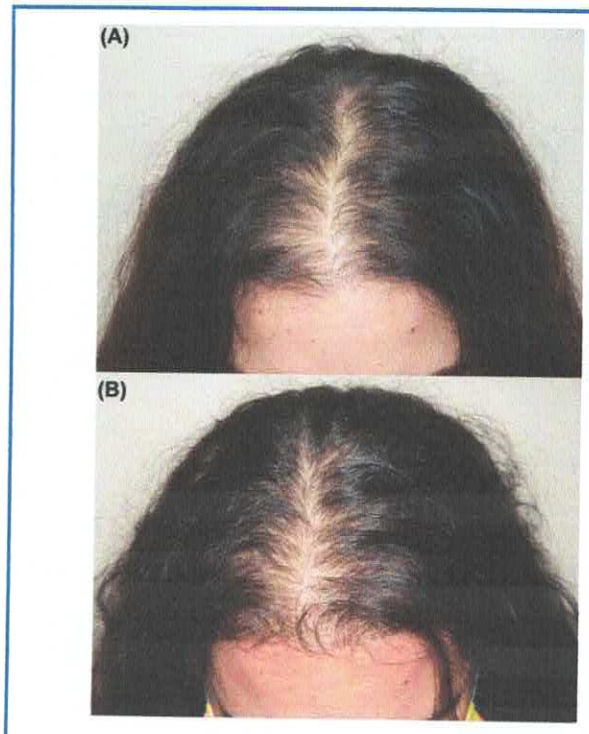

Figure 2. A 33-year-old woman 6 months after 3 consecutive sessions of needleless scalp PRP. The top image (A) represents the pretreatment photograph and the bottom photograph (B) captures the final results after 6 months. Jaeschke scale average score 3.0. PRP, platelet-rich plasma.

agreement). Statistical analysis was performed using SPSS Version 22.0 (SPSS, Chicago, IL).

Results

Fourteen patients with androgenic alopecia were enrolled and received the needleless scalp PRP treatment. The mean age was 37 years (range, 26–70 years). Sixty-four percent of patients were men. Eighty-six percent of patients showed improvement in overall hair restoration based on the Jaeschke scale (average score 2.2). There was an almost perfect interobserver agreement at 0.85 Kappa. On the questionnaire, 93% of patients stated that they would recommend this treatment to others, and the overall satisfaction score was 81%. Pain was reported as 0% during and after the treatments. Patients reported that their comfortability was 100% during the procedure and 99% in the 24 hours after treatment. There were no adverse events throughout the study. The whole-blood platelet count for the 6 randomly sampled patients was 259,000 μL (range, 197,000–340,000 μL).

Given that the T1 time point occurred during the time of the COVID-19 pandemic, several patients did not return to clinic for final photographs but instead chose to electronically send in their surveys and photographs. An analysis was done to see if ratings for pre/post photographs taken in the office versus those sent in by patients from home were different. In fact, the scores were higher when the after photographs were captured in the office (2.9 vs 0.78).

Gender and pretreatment severity of male pattern hair loss or Female pattern hair loss did not appear to impact photograph ratings. However, the more advanced the hair loss before treatment, the more the trend toward potential gain with PRP seemed to be. Additionally, the age of the patient appeared to impact photograph ratings, in that the scores were higher in the older group (>40 years old; 3.4 versus 1.5). Patient demographics and analysis results are summarized in Table 1. Representative male and female patients at 6 months after 3 consecutive sessions of needleless scalp PRP are shown in Figures 1 and 2.

Discussion

Our study found that needleless PRP was very well tolerated, with patients reporting no pain and excellent comfortability during and in the 24 hours after treatment. This in turn can improve patient compliance and adherence to PRP therapy. Based on our data for needleless PRP, 86% of patients improved according to expert review of photographs, the satisfaction rate was 81% and 93% of patients indicated that they would recommend the treatment series to others. For comparison, Schiavone and colleagues[2] reported a clinically important improvement of needled PRP for androgenic alopecia of 40% to 55%. Tawfik and colleagues[3] reported a satisfaction rate of 71%,

and Gkini and colleagues[4] incidentally also reported a satisfaction rate of 71%. Other studies have reported satisfaction rates ranging from 48% to 100%. For studies evaluating hair density and diameter, the average increase in those parameters across the literature ranges from 15% to 50%.

One limitation of our study is the relatively small number of patients. Another limitation is the lack of a control arm. Future research might compare needled with needleless PRP in a split head study to test the 2 delivery methods directly, as well as a saline placebo treatment arm to assess the baseline effect of the needleless jet mechanical stimulation of the scalp.

We have shown that needleless PRP for treating androgenic alopecia in men and women is a viable hair restoration option. Patients who fear needles and want a painless experience, but still yearn for the benefits of PRP, may improve with needleless PRP therapy.

References

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