Therapeutic Effects of Growth Factor Cocktail Treatment in Patients with Androgenetic Alopecia According to the Depth of Microneedle

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Background: Growth factor treatment in combination with microneedling in androgenetic alopecia (AGA) patients is safe and effective. However, there is a lack of studies examining the effect of treatment according to the depth of the microneedle.

Objective: The aim was to evaluate differences in efficacy according to the depth of microneedle.

Methods: This study was performed on 6 male and 5 female AGA patients who were treated with topical growth factor cocktail (GFC) with microneedling every 2 weeks for 3 months. The scalp was divided into right and left sides and treated with microneedle depths of 0.5 and 0.3 mm, respectively. GFC was topically applied using a microneedle medical device. Treatment efficacy was evaluated by phototrichogram and digital photograph analysis on 6 repeated treatments for 3 months.

Results: Phototrichogram of the 0.5- and 0.3-mm-treated sides of the scalp showed 19 and 12 cm² increase in hair density and 2.6- and 1.8-μm increase in hair diameter, respectively. These results were statistically significant (p < 0.05). In terms of density, the 0.5-mm depth was significantly more effective than the 0.3-mm depth (p < 0.05). With regard to diameter, the effect according to microneedle depth was not significantly different (p > 0.05).

Conclusion: GFC treatment with microneedling is effective and safe and a microneedle depth of 0.5 mm appears to be more effective than that of 0.3 mm. More research is necessary to confirm these results and determine the most effective depth for microneedling by investigating various depths. (Korean J Dermatol 2016;54(3):184∼189)

Key Words: Androgenetic alopecia, Depth of Microneedle, Growth factor

INTRODUCTION

Approved therapeutic options for androgenetic alopecia (AGA) are limited. Recently, new treatment approaches have been under active investigation. Growth factor cocktail (GFC) is an effective treatment for AGA and GFC with microneedling is more effective than without microneedling. Microneedling is used to treat AGA by stimulating hair growth and facilitating drug delivery. However, evidence regarding the most effective depth of the microneedle is insufficient; however, there have been reports on scalp thickness and the distance from the scalp skin surface to the dermal papillae (DP) or bulge. Based on previous studies, here we investigated the therapeutic effect of this treatment according to differences in depth of the microneedle.

MATERIALS AND METHODS

1. Patient groups

A total of 11 patients with mild to moderate AGA were enrolled in this study. Exclusion criteria for this study included patients who were treated for AGA within the previous year, infectious disease, immunodeficiency, and keloid history. Six male patients between 26 and 49 years of age with male pattern hair loss (MPhL) II, III, IV, or V according to the Norwood-Hamilton grading scale and 5 female patients between 34 and 49 years of age with female pattern hair loss (FPhL) II according to the Ludwig scale were enrolled in the study. This study was approved by the
Institutional Review Board of Myongji Hospital and performed according to the guidelines laid out by the Declaration of Helsinki. All patients provided informed consent.

2. Materials and treatment regimens

A 3-month split study was conducted at the Department of Dermatology, Myongji Hospital, Myongji Medical Foundation, Goyang, Korea, from September 2013 to December 2013. All subjects underwent GFC treatment with microneedling. The right and left sides of the scalp were treated with different depth of microneedle and no other treatments, such as topical minoxidil solution or finasteride, were administered.

1) Growth Factor Cocktail

The major components of the GFC used in this study included 25,000 ng of superoxide dismutase-1 (SOD), 15,000 ng of basic fibroblast growth factor (bFGF) and vascular endothelial growth factor (VEGF), 12,500 ng of keratinocyte growth factor-2 (KGF-2), stem cell factor (SCF), noggin, and 10,000 ng insulin-like growth factor-1 (IGF-1). The cocktail was provided by PNP Biopharm and Mediway (Seoul, Korea).

2) Microneedle

The microneedle device (Dr Back 10 story FNS FN-1; Dongbang Medicare, Bundang, Korea) consisted of nine 32-G microneedles with automatic vertical movements and an adjustable depth of needle from 0.1 to 2.0 mm.

3) Treatment

Depth of microneedle was applied differently on each side of the scalp i.e., that is, 0.5 mm was used on the right side and 0.3 mm was used on the left side (Fig. 1). The GFC, provided as a freeze-dried powder, was dissolved in 5 mL normal saline prior to use. Approximately 2.5 mL of GFC solution was topically applied to the scalp with microneedling. Each patient received 6 treatments at 2-week intervals for a period of 3 months.

3. Measurement of parameters

Prior to treatment, each patient’s scalp was divided into the right and left sides and this division was marked by a tattoo to ensure reproducibility. A phototrichogram (Folliscope 2.8, Lead M, Seoul, Korea) was taken of a fixed area marked by a tattoo on each side of the scalp in order to measure hair density and diameter at the baseline, at the end of treatment, and at the 3 month follow up examination.

4. Statistical Analysis

Wilcoxon matched-pairs signed-rank test was performed using STATA/SE (Version 12, StataCorp, College Station, TX, USA) to test efficacy both before and after treatment on each patient. A student’s t-test was performed to compare differences in treatment effects between the right and left sides of the scalp. A p-value < 0.05 was considered statistically significant.

RESULTS

1. Patient characteristics

A total of 11 patients with a mean age of 41.8 ± 7.6 years were enrolled in this 3-month study. Of these, 6 patients were male with a mean age of 40.5 ± 9.1 years and 5 patients were female with a mean age of 43.4 ± 6.1 years. The MPH group included one type II, one type III, one type IV and three type V patients. The FPH group was made up of five type II patients (Table 1).

2. Efficacy assessment

All patients were treated with GPC with microneedling once every 2 weeks for a period of 3 months. Phototri-

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