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Case Report

Management Of Female Pattern Hair Loss (FPHL) Using Autologous Mesenchymal Stem Cells : Report Of Two Cases.

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Abstract

Background and objective: The cause of FPHL in young women remains elusive. Many conventional treatments often fail because of the complexity and failure to diagnose the cause. We report here two young women who were treated with bone-marrow-derived autologous Mesenchymal Stem Cells (MSCs) and their Extracellular vesicles (EVs) for FPHL.

Methods: Under local anesthesia and sedation 40 ml of autologous bone marrow was aspirated from iliac crest and mesenchymal stem cells were cultured. One million per kg body weight was injected at multiple sites in scalp area of hair loss using 30 gauge needle. Fifty million Mesenchymal stem cell-derived extracellular vesicles (MSC-EVs) was added to to 50 ml of 1% glyecrine and was given in a metered dose of 2 ml of the gel was applied to the scalp area daily.

Results: There were no adverse effects due to the treatment, and within six months, there was significant regrowth of the hair in both patients in areas of intradermal injection and surrounding areas.

Conclusion: MSCs and MSC-derived EVs treatment is a potential and successful method to treat FPHL, which does not respond to conventional management. Early intervention will save from psychological distress and depression in young women.

Keywords: Female Pattern Hair Loss, Mesenchymal stem cells extracellular vesicles; psychological stress

INTRODUCTION

Female pattern hair loss (FPHL) continues to be an unresolved issue in men and women, which is characterized by a reduction in the density of hair in the region of the crown and frontal scalp with retention of the frontal hairline. Many causes have been attributed, including stress, hormonal changes, and high levels of androgens. Because of the suspected role of androgens, it is also called androgenetic alopecia (AGA). There is no specific age as it can start from puberty to postmenopausal, where the incidence is quite high.[1,2] It was suggested that less than 45% of women have a full head of hair in their lifetime.[3] The incidence of FPHL varies between 2-11.8% depending on the age of the patients. [4-6]

Many treatments have been recommended, from Minoxidil,[7] seven anti-androgen therapy,[8] estradiol valerate,[9] melatonin10 and so on, and all the drugs need to be taken for a long duration of time. Secondly, all the drugs have their own adverse effects, some more serious than others. Recent studies have shown that Mesenchymal Stem Cells (MSCs) have the potential to reverse the process of FPHL. We report here two cases of FPHL treated with time intradermal injection of MSCs and local application of extravesical bodies (EVs) isolated from MSCs for 3 months.

CASE REPORT I

A twenty-five-year-old emotionally disturbed patient presented to the clinic with hair loss of a few years' duration, and during this period, she had many different treatments, which included Minoxidil and PRP injections. The clinical examination revealed a pattern of hair loss consistent with Ludwig Grade II (**Figure 1A**) with extensive thinning across the entire top of the scalp and back and sides of the head, making

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the scalp clearly visible, with a significant reduction in hair density and an excellent parting width. All her blood investigations were within normal limits, including complete blood count, thyroid-stimulating hormone (TSH), and testosterone (37 ng/dL; range 30-70 ng/dL) and estrogen (200 pg/mL). She was advised to undergo mesenchymal stem cell therapy, for which she agreed, and a plan was made. Under sedation and local anesthesia using an 11-gauge Jamshidi needle, bone marrow was aspirated from the right anterior iliac crest. Mesenchymal stem cells were cultured as described before. Two hundred million cells were cultured. Fifty million MSCs were injected intradermally in the scalp at different areas using a 30-gauge needle. Of the remaining 150 million cells, extracellular vesicles (EVs) were isolated and added to 150 mL of 1% glycerol. After cell injection, 2 ml of glycerin was applied to the area of hair loss and gently massaged. The patient was seen again after 4 months (**Figures 1A, 2A, and B**). The patient was quite happy and satisfied with the result. At 18 months follow-up, there was no loss of the gained hair growth.

Figure 1. A. Shows the picture of the scalp of a 25-year-old young lady 25 year old showing Female pattern hair loss.
B. Six months post-treatment showing the reversal of hair loss in the scalp.

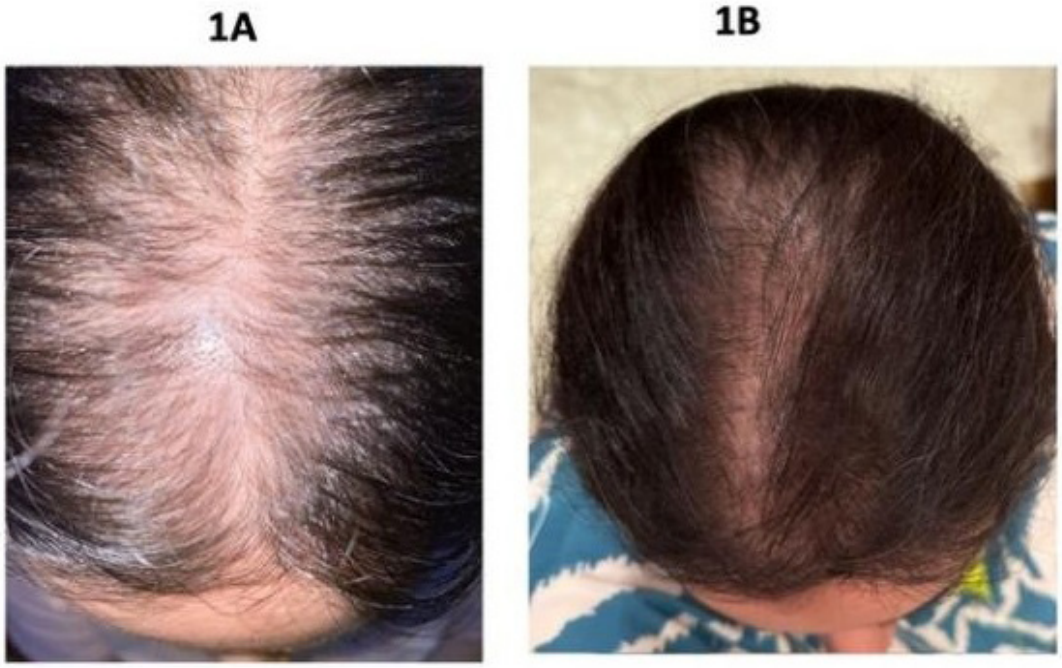
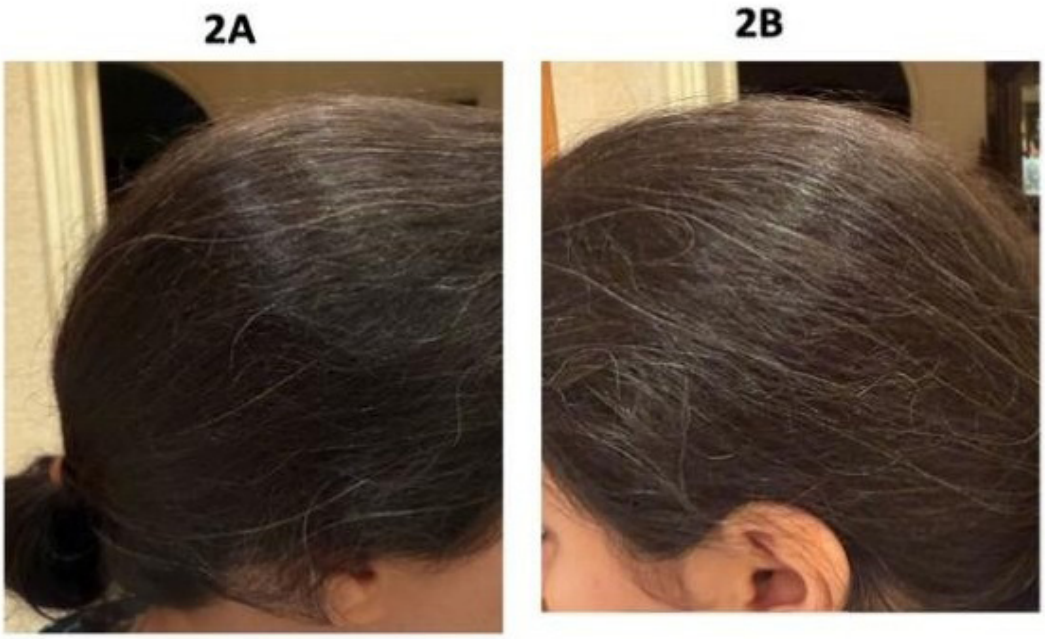


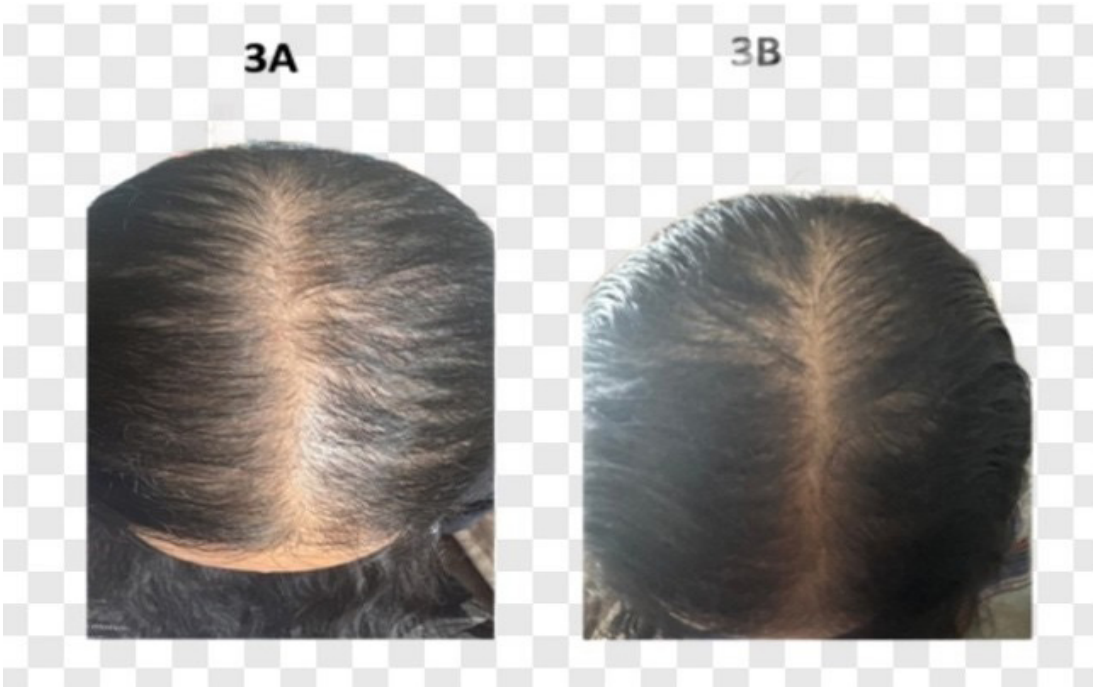
Figure 2. A. Photograph shows the lush growth of the hair on the left side of the head.
B. Photograph shows the lush growth of the hair on the right side of the head.



CASE 2

A 21-year-old healthy, intelligent college-going girl presented with a history of losing hair for the last four years. She had a history of thin scalp density and reduced scalp visibility. She was seen by many specialists, dermatologists, and was ruled out of any diseases. She underwent many treatments, including alternative medicine. She used local and topical administration of corticosteroids, PRP, minoxidil, and contact irritants. All her blood investigations, including estradiol, TSH, testosterone, prolactin level, and complete blood picture, were within normal limits. **Figure 3A** shows the frontal view of the scalp, showing a significant reduction in hair density and a wide parting. Injection of 50 million Autologous bone marrow-derived MSCs was recommended, and use of MSCs-EVs for 3 months. The patient followed through with treatment, and **Figure 3B** shows the results after 6 months.

Figure 3. A Photograph of the 21-year-old female with Ludwig II grade Female pattern hair loss.
B Post-treatment of the 21-year-old with new hair growth.



DISCUSSION

Our results show that the use of MSCs intradermally, followed by local application of the EVs, gave very gratifying results in the reversal of loss of FPHL. All the modalities tried failed to dent the reversal of the process. It was shown that MSCs possess plenty of regenerative peptides, including angiogenesis factors, and suppress any immune hyperactivity that had caused the primary hair loss. We have used two routes of delivery of the regenerative factors, one by direct intradermal injection and the second by providing EVs as a local application.

Elmaadawi et al (2018)11 treated 11 patients with resistant alopecia areata and androgenetic alopecia using stem cells and concluded that autologous bone marrow-derived mononuclear and stem cells were safe and efficacious in reversing hair loss. Chemotherapy-induced hair loss is a common occurrence, but the hair loss is regained in a few weeks to months, and rarely is hair loss persistent as chemotherapy-induced alopecia (PCIA). Norooznezhad and his group (2023)12 treated such a patient with monthly subcutaneous injections of mesenchymal stromal cells derived EVs for 3 months with restoration of hair growth. Recently, Bento, Matos, and Ribeiro Junior (2025)13 treated a patient with alopecia areata due to a psychological disorder with six-monthly sessions of stem cell-derived exosomes, with laser pre-treatment. Post-treatment, the regrowth of the hair was satisfactory. Our two cases of young women who had loss of hair due to unexplained reasons differ from other reported patients in the literature, in whom the hair loss was due to a disease process.

In conclusion, our study shows that MSCs and MSC-derived EVs are a potential therapeutic modality which should be readily utilized in cases of failure of hair regrowth when other treatment options fail. This will alleviate the psychological distress that leads to anxiety, depression, and low self-esteem, impacting daily life and relationships, particularly in young women.

We believe that long-term follow-up is needed to confirm whether this therapy maintains the positive outcomes achieved during initial treatment and continues to sustain hair growth.

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