

# Effect of Mesotherapy Injections Combined with Topical Minoxidil on Frontal Hair Loss

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## Abstract

**Background:** Frontal hair loss is a common cosmetic and psychological concern among adult males and may result from androgenetic alopecia, occupational mechanical stress, environmental exposures, or a combination of these factors. Mesotherapy has emerged as a minimally invasive therapeutic approach that delivers nutrients and bioactive substances directly to hair follicles, while topical minoxidil remains a well-established treatment for promoting hair growth.

**Case Presentation:** A 31-year-old male presented with progressive frontal hairline recession and temporal thinning associated with prolonged occupational use of protective headgear and exposure to a hot, humid coastal environment. Clinical examination revealed marked frontal and bitemporal recession with an M-shaped hairline pattern, diffuse thinning in the frontal-temporal regions, and increased scalp visibility. The patient underwent six sessions of scalp mesotherapy consisting of vitamins, minerals, amino acids, hyaluronic acid, vasodilatory agents, and growth-promoting peptides, combined with twice-daily application of 5% topical minoxidil.

**Clinical Outcome:** Following six weeks of treatment, standardized photographic assessment demonstrated a substantial increase in frontal and temporal hair density, reduced scalp visibility, improved hairline uniformity, and enhanced follicular coverage. Improvements in hair texture and overall scalp appearance were also observed. The patient reported high satisfaction with the treatment outcome, with noticeable reduction in the characteristic M-shaped recession pattern.

**Keywords:** Hair Loss, Androgenetic Alopecia, Mesotherapy, Minoxidil, Frontal Hairline Recession, Occupational Stress, Traction Alopecia.

## 1. Introduction

Hair loss represents one of the most frequently encountered cosmetic and dermatological concerns among adult males worldwide (Saoji et al., 2024). Although androgenetic alopecia remains the most common cause of progressive hair thinning, recent studies have demonstrated that environmental pollutants, oxidative stress, vascular impairment, lifestyle factors, and chronic mechanical stress may contribute to follicular miniaturization and disease progression (Dhurat & Daruwalla, 2021; Samra et al., 2024). Additionally, the hair loss affecting the frontal and temporal scalp regions is particularly distressing because of its prominent impact on facial appearance, self-esteem, and quality of life (Toader et al., 2024).

The pathogenesis of hair loss is multifactorial and often involves a combination of genetic predisposition, hormonal influences, reduced follicular vascularization, oxidative stress, and inflammatory mechanisms. Prolonged use of protective headgear, excessive heat exposure, and chronic

mechanical traction can exacerbate follicular stress and contribute to progressive recession of the frontal hairline. Early identification of reversible contributing factors may improve therapeutic outcomes and preserve follicular viability.

Topical minoxidil remains one of the most extensively studied and clinically recommended treatments for androgenetic alopecia. Its mechanism of action includes prolongation of the anagen phase, enhancement of vascular endothelial growth factor (VEGF) expression, and stimulation of follicular proliferation, ultimately promoting increased hair density and thickness (Messenger & Rundegren, 2004; Suchonwanit et al., 2019). In recent years, mesotherapy has gained popularity as an adjunctive treatment through the intradermal administration of vitamins, amino acids, minerals, hyaluronic acid, and growth-promoting substances directly into the scalp (Aledani et al., 2024). This approach aims to improve follicular nutrition, enhance local circulation, and stimulate

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dormant follicles.

Although several studies have evaluated regenerative approaches for hair restoration, evidence regarding combined mesotherapy and minoxidil therapy remains limited. This case report presents a patient with frontal hair loss associated with occupational and environmental stressors who demonstrated substantial clinical improvement following combined mesotherapy and topical minoxidil therapy.

## 2. Case Presentation

### 2.1 Patient Information

A 31-year-old male presented with a progressive history of frontal hairline recession accompanied by

temporal thinning. The patient reported gradual worsening of hair density over the frontal scalp region. This hair loss resulted in visible scalp exposure and increasing cosmetic concern. However, the patient had no history of systemic disease, dermatological disorders, endocrine abnormalities, or previous hair restoration treatments. General health status was reported as good, and no significant medication history was identified. Family history of hair loss was not documented. Table 1 shows the baseline demographic and clinical characteristics of the patient. These findings suggest an early-stage pattern of frontal hair loss with preserved general health, making the patient an appropriate candidate for conservative therapeutic intervention.

*Table 1. Baseline Patient Characteristics*

Variable	Findings
Age	31 years
Gender	Male
Primary complaint	Frontal hairline recession
Associated finding	Temporal thinning
General health	Good
Previous treatment	None
Scalp inflammation	Absent
Family history	Not specified

### 2.2 Clinical Examination

Clinical examination revealed marked frontal and bitemporal recession forming a characteristic M-shaped hairline pattern. Diffuse thinning was evident within the frontal-temporal regions, with increased scalp visibility. In contrast, hair density within the parietal and occipital scalp remained relatively preserved. Hair texture was curly to wavy, predominantly dark black, with occasional gray strands. Scalp examination showed no erythema, scaling, inflammation, or signs of active dermatological disease. Several contributing factors were identified during history taking. The patient reported prolonged daily use of occupational protective headgear, creating sustained mechanical traction and compression of the scalp. Additionally, he worked in a hot and humid coastal environment, exposing the scalp to chronic thermal stress. These factors were considered potential contributors to follicular dysfunction and reduced scalp microcirculation. A component of androgenetic alopecia was also suspected because of the characteristic frontal recession

pattern. Figures 1 and 2 showed the patient's baseline clinical presentation before treatment. The frontal view demonstrates a characteristic M-shaped recession pattern with reduced hair density across the frontal scalp, while the temporal view reveals noticeable thinning and scalp exposure in the temple region.

## 3. Treatment Protocol

The patient underwent a combined therapeutic approach consisting of mesotherapy injections and topical minoxidil administration.

### 3.1 Mesotherapy Procedure

The mesotherapy formulation contained a combination of vitamins including biotin, vitamin B12, vitamin B-complex, vitamin C, and vitamin E. Additional components included calcium, zinc, iron, magnesium, cysteine, methionine, arginine, hyaluronic acid, vasodilating agents, and follicular growth-promoting peptides. These substances were selected to improve



*Figure 1. Baseline frontal scalp view demonstrating M-shaped recession and reduced frontal hair density*



*Figure 2. Baseline temporal view showing visible scalp exposure and thinning within the temple region.*

follicular nutrition, enhance keratin synthesis, increase tissue hydration, and stimulate follicular regeneration. A total of six treatment sessions were performed. Multiple microinjections were administered into the affected frontal and temporal scalp areas at a depth of approximately 1–2 mm using standard mesotherapy techniques. Sessions were performed at biweekly intervals over a six-week treatment period.

### **3.2 Adjunctive Minoxidil Therapy**

The patient was instructed to apply 5% topical minoxidil twice daily to the frontal and temporal scalp regions throughout the treatment period. Treatment adherence was excellent, with no reported interruptions or adverse reactions. Table 2 shows the treatment regimen implemented in this case study.

*Table 2. Treatment Regimen*

<b>Component</b>	<b>Details</b>
Mesotherapy sessions	6
Frequency	Every 14 days
Duration	6 weeks
Injection depth	1–2 mm
Treatment area	Frontal and temporal scalp
Adjunct therapy	Minoxidil 5%
Minoxidil frequency	Twice daily

#### 4. Clinical Outcomes

Clinical assessment was conducted through standardized photographic documentation obtained before treatment initiation and after completion of the six-week treatment protocol using identical positioning and lighting conditions. All photographs were obtained using standardized lighting conditions, camera positioning, and patient orientation to facilitate objective comparison. Substantial improvement was observed at follow-up. Hair density increased significantly throughout the frontal and temporal regions. Scalp visibility was reduced, and previously sparse temple areas demonstrated enhanced coverage. The frontal hairline appeared fuller and more uniform, contributing to a noticeable reduction in the characteristic M-shaped recession pattern. Improvements

in hair texture, shine, and overall cosmetic appearance were also documented. The patient reported high satisfaction with treatment outcomes. Table 3 describes the clinical changes observed following six weeks of combined mesotherapy and topical minoxidil therapy. Compared with baseline findings, the patient demonstrated noticeable improvement in frontal hair density and temporal scalp coverage, accompanied by a marked reduction in scalp visibility. The frontal hairline appeared more uniform and aesthetically defined, while hair texture showed enhanced quality and appearance. These objective clinical improvements were consistent with the patient's subjective assessment, which reflected a substantial increase in treatment satisfaction by the end of the intervention period.

*Table 3. Clinical Changes Following Treatment*

<b>Clinical Parameter</b>	<b>Baseline</b>	<b>Week 6</b>
Frontal density	Reduced	Improved
Temporal coverage	Sparse	Enhanced
Scalp visibility	Marked	Reduced
Hairline uniformity	Poor	Improved
Hair texture	Moderate	Improved
Patient satisfaction	Low	High

Figures 3 and 4 showed the clinical outcome following six weeks of combined mesotherapy and topical minoxidil therapy. The post-treatment frontal view showed a noticeable increase in hair density with improved continuity of the frontal hairline, while the temporal view shows enhanced follicular coverage and a significant reduction in scalp visibility. These findings showed successful restoration of hair density in the frontal-temporal regions and support the effectiveness of the treatment protocol in improving both hair growth and overall scalp appearance.

#### 5. Discussion

Hair loss is increasingly recognized as a multifactorial disorder influenced by genetic susceptibility, environmental exposures, vascular factors, and mechanical stress (Gokce et al., 2022). This case report emphasized on the notable improvement in frontal hair density following a combined treatment approach utilizing mesotherapy and topical minoxidil. The observed clinical response has also supported the concept that addressing multiple pathogenic mechanisms simultaneously may enhance therapeutic effectiveness.



*Figure 3. Post-treatment frontal view demonstrating increased density and improved hairline continuity*



*Figure 4. Post-treatment temporal view showing enhanced follicular coverage and reduced scalp visibility*

Mesotherapy has been proposed as a targeted delivery system capable of bypassing systemic circulation and directly supplying hair follicles with nutrients essential for growth and regeneration (Gupta et al., 2023). Additionally, the vitamins, minerals, amino acids, and hyaluronic acid contained within the mesotherapy formulation may improve follicular metabolism, keratin synthesis, hydration, and

tissue repair (Prikhnenko, 2015). Furthermore, vasodilatory agents and peptide-based growth stimulators may enhance scalp microcirculation and activate dormant follicles, thereby supporting hair regeneration (Gupta et al., 2023). Minoxidil remains a cornerstone of hair loss management because of its ability to prolong the anagen growth phase, increase follicular size, stimulate VEGF expression,

and promote cellular proliferation within hair follicles (Messenger & Rundegren, 2004; Suchonwanit et al., 2019). The simultaneous use of minoxidil and mesotherapy may therefore provide synergistic benefits through complementary biological pathways. While mesotherapy enhances local nutrient availability and tissue health, minoxidil promotes sustained follicular growth and vascular support (Tang et al., 2022).

An interesting aspect of this case is the apparent contribution of occupational and environmental factors. The patient reported prolonged use of protective headgear, which may have produced chronic traction forces and scalp compression. Such conditions can impair follicular oxygenation and contribute to traction-related alopecia. Additionally, chronic exposure to high temperatures and humidity may increase follicular stress and alter scalp physiology. Because these factors are potentially reversible, early intervention may result in more favorable outcomes than cases involving advanced genetically mediated alopecia alone. The rapid improvement observed within six weeks is noteworthy. Several factors may explain this response. First, treatment was initiated relatively early in the disease course before extensive follicular miniaturization occurred. Second, the absence of systemic disease likely supported optimal follicular recovery. Third, strict adherence to both mesotherapy sessions and minoxidil application maximized therapeutic effectiveness. Finally, the combined treatment strategy addressed nutritional, vascular, and regenerative aspects of follicular health simultaneously.

Current evidence-based guidelines recognize minoxidil as an established treatment for androgenetic alopecia, while the role of mesotherapy continues to evolve as additional clinical evidence becomes available (Kanti et al., 2018). Although randomized controlled studies remain necessary to establish standardized protocols, the present case contributes to growing clinical observations suggesting that mesotherapy may serve as a valuable adjunctive therapy in selected patients. Future investigations involving larger patient populations, objective hair counts, trichoscopic analysis, and longer follow-up periods are required to validate these findings and determine long-term efficacy.

## 6. Conclusion

This case report demonstrated that combined mesotherapy and topical minoxidil therapy may provide substantial clinical improvement in frontal hair loss associated with occupational and environmental stressors.

Within six weeks, increased hair density, improved temporal coverage, reduced scalp visibility, and enhanced patient satisfaction were observed. Therefore, early intervention, treatment compliance, and correction of reversible contributing factors likely contributed to the favorable outcome, supporting further investigation of this combined therapeutic approach.

### 6.1 Strengths and Limitations

This case highlights the potential effectiveness of combined mesotherapy and topical minoxidil therapy in managing early-stage frontal hair loss associated with occupational and environmental stressors. On the other hand, few limitations were also reported. The case report followed a single-patient design and short follow-up duration of six weeks. Also, objective measures such as trichoscopy, phototrichogram analysis, and hair counts were not performed. Therefore, the findings should be interpreted cautiously and cannot be generalized to larger populations without further controlled studies.

### Declaration Statements

#### *Ethical Considerations*

Written informed consent was obtained from the patient for publication of this case report and accompanying clinical photographs. All identifying information was removed to protect patient confidentiality.

#### *Conflict of Interest*

The author declares no conflict of interest.

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#### *Author Contributions*

Dr. Muhannad Abdulrhman Halawani conceived the study, collected clinical data, administered treatment, interpreted findings, prepared the manuscript, and approved the final version for publication.

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