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Intravenous Iron Therapy for Iron Deficiency-Related Hair Loss: A Retrospective Study

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Abstract **Original Research Article**

Iron deficiency is a common nutritional disorder that may manifest with hair loss, significantly affecting patients' quality of life and psychological well-being. This retrospective study aimed to evaluate the efficacy of intravenous iron therapy in patients presenting with iron deficiency-related hair loss. Medical records of patients treated between January 2023 and January 2024 were reviewed. Eligible patients had confirmed iron deficiency (serum ferritin <100 ng/mL) associated with hair loss and had either failed oral iron supplementation, experienced gastrointestinal intolerance, or demonstrated poor treatment adherence. Intravenous ferric sucrose or ferric carboxymaltose was administered according to standard protocols. Clinical and biological parameters, including hemoglobin, mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration (MCHC), and ferritin levels, were assessed before and after treatment. Among 109 patients who received intravenous iron, 85 women presented with hair loss and were included in the analysis. Mean age was 47 ± 14 years. Baseline mean ferritin and hemoglobin levels were 20 ng/mL and 11.72 g/dL, respectively. Significant improvements in hematological and iron status parameters were observed after treatment. At three months, complete resolution of hair loss was achieved in 60% of patients, partial improvement in 36%, and persistent hair loss in only 4%. Patients with complete resolution had significantly higher baseline hemoglobin levels compared with those without complete improvement (12.02 vs. 11.26 g/dL, p = 0.02). Intravenous iron therapy appears to be an effective treatment for hair loss associated with iron deficiency, leading to substantial clinical improvement in most patients. Larger prospective studies using validated hair loss assessment scales are needed to confirm these findings and further define the role of intravenous iron supplementation in the management of iron deficiency-related hair loss.

Keywords: Iron deficiency, Hair loss, Alopecia, Intravenous iron therapy, Ferritin, Iron deficiency anemia, Ferric carboxymaltose, Ferric sucrose.

INTRODUCTION

Iron deficiency is the leading cause of anemia in adults. Anemia is defined as a reduction in circulating hemoglobin levels below expected values for individuals of the same age and sex.

The World Health Organization (WHO) defines anemia thresholds as 120 g/L of hemoglobin for non-pregnant women and 130 g/L for men.

According to the WHO, iron deficiency is a pathological condition resulting from an iron deficit in the body. Diagnosis relies on serum ferritin measurement, with the lower normal threshold varying by clinical context: from 20 µg/L in young women to 100 µg/L in the presence of inflammatory disease, heart failure, or renal insufficiency. Clinical manifestations include mucocutaneous pallor, cognitive fatigue, brittle nails and hair, atrophic glossitis, asthenia, tachycardia, dyspnea, dizziness, and tinnitus, all potentially exacerbated by physical exertion [1].

Hair loss is a frequent manifestation of iron deficiency and carries significant psychological impact.

The objective of this study is to evaluate the efficacy of intravenous iron supplementation in the treatment of iron deficiency-related hair loss.

Materials and Methods

This is a retrospective, descriptive, and analytical study conducted from January 2023 to January 2024. Data were collected retrospectively from patient records and systematic consultations conducted before and after the injectable iron protocol. The study included all patients with true iron deficiency (serum ferritin < 100 ng/L) presenting with hair loss, managed in the day hospital unit and treated with intravenous iron supplementation. Two injectable iron formulations were administered: ferric sucrose and ferric carboxymaltose.

Enrolled patients had previously received at least three months of oral ferrous iron supplementation (80 mg twice daily) without clinical improvement, or had experienced digestive intolerance or poor therapeutic adherence.

Exclusion criteria included: dialysis patients, patients receiving erythropoietin (EPO), patients who did not complete the protocol, and patients who experienced an allergic reaction to the subcutaneous test.

Patients received one to six doses of injectable iron (carboxymaltose or sucrose):

- Ferric carboxymaltose: one 10 mL vial (500 mg) per infusion, one injection per week for a maximum of two weeks.
- Ferric sucrose: two 100 mg vials (200 mg total) per infusion, one injection per week for one to three weeks.

The following parameters were assessed: patient characteristics, biological diagnostic criteria (hemoglobin, MCV, MCHC, serum ferritin), symptoms associated with hair loss, modalities of injectable iron prescription, and clinical and biological monitoring.

Treatment efficacy was assessed three months after the last injection based on complete resolution, partial improvement, or persistence of hair loss. Biological follow-up was performed before treatment, at week 1, and at months 1 and 3.

Statistical analysis was performed using SPSS Statistics version 20. The chi-square test was used for categorical variables and Student's t-test for continuous variables.

Ethics Statement: This retrospective study was conducted in accordance with the Declaration of Helsinki. Informed consent was obtained from all participants. Formal IRB approval was not required by our institution for retrospective observational studies involving standard-of-care data.

Results

Of 109 patients who received iron infusions at the center, 85 presented with hair loss. Mean age was 47 ± 14 years (range 19–85). All patients with hair loss were women (100%).

The main medical histories were menopause and arterial hypertension (23.5% each), gynecological bleeding and thyroid disorders (17.5% each). Medication history included antiplatelet agents and anticoagulants in 5.9% of patients.

Table 1. Main medical histories of study patients

Medical History	N	%
Arterial hypertension	20	23.5
Diabetes mellitus	5	5.9
Renal insufficiency	6	7.1
Thyroid disorder	15	17.6
Surgical history	11	12.9
Menopause	20	23.5
Hormonal contraception	11	12.9
Mechanical contraception	3	3.5
Anemia	2	2.4
Gastrointestinal blood loss	1	1.2
Atopic background	5	5.9
Gynecological bleeding	15	17.6

Table 2: Main medications consumed by patients

Medication	N	%
Proton pump inhibitor	2	2.4
Anticoagulant	1	1.2
Antiplatelet agent	4	4.7

All patients had iron deficiency (mean ferritin 20 ng/mL). Hypochromic microcytic anemia was present in 35.3%: mild in 11.8%, moderate in 22.4%, and severe in 1.2% (Table 3).

Table 3: Baseline laboratory data before the first injection

Parameter	Mean	Minimum	Maximum	SD
Hemoglobin (g/dL)	11.72	7	15	1.47
MCV (fL)	82.1	61	96	7.81
MCHC (g/dL)	31.95	26	38	2.40
Ferritin (ng/mL)	20	1	79	21

At one-week post-treatment, hemoglobin and ferritin improved significantly, with persistent anemia in only 10% of patients. Hemoglobin continued to rise at follow-up while mean ferritin decreased from 182.8 to 119.77 ng/mL (Table 4).

Table 4: Biological follow-up after treatment

Parameter	Before	Week 1	Month 1 / Month 3
Hemoglobin (g/dL)	11.72	12.75	13.95
MCV (fL)	82.1	85.05	92.06
MCHC (g/dL)	31.95	32.47	36.42
Ferritin (ng/mL)	18.38	182.80	119.77

Patients with complete resolution had higher baseline hemoglobin than those without (12.02 vs 11.26 g/dL, p = 0.02). No significant difference was found for age, menopausal status, or baseline ferritin (Table 5).

Table 5: Statistical analysis

Variable	Complete improvement	No complete improvement	P value
Age	46.35	48.5	0.43
Menopause (N)	11	9	0.60
Mean ferritin before treatment	19.84	16.18	0.54
Mean hemoglobin before treatment	12.02	11.26	0.02

DISCUSSION

Hair loss does not pose a life-threatening risk, but causes significant psychological distress and impairs quality of life.

Hair is a rapidly proliferating organ requiring substantial nutritional and iron inputs. The human scalp contains approximately 100,000 follicles [1], 90% of which are in the anagen phase and require proteins, vitamins, and minerals to produce healthy hair.

The relationship between micronutrients and hair loss has been studied since the 1960s [2]. Iron stands out as a key micronutrient, though its specific role in hair loss remains debated.

Diagnosis of iron deficiency combines clinical evaluation — seeking a source of blood loss — with biological assessment including ferritin, serum iron, transferrin, TIBC, and soluble transferrin receptors [3].

A 2013 Korean study showed significantly lower ferritin in women with female pattern hair loss versus controls (49.27 ± 55.8 vs 77.89 ± 48.32 µg/L; P < 0.001), and 22.7% of men with alopecia had ferritin below 70 µg/L [1].

Our study demonstrated high efficacy of IV iron on hair loss: 60% complete resolution and 36% partial improvement, with meaningful quality-of-life gains. The exclusively female population reflects the greater psychological impact of hair loss on self-image in women [4].

These findings contrast with Soung et al., where oral iron therapy in women with hair loss did not yield statistically significant results (p = 0.2) [4], suggesting that the intravenous route may offer superior bioavailability and clinical efficacy.

CONCLUSION

Intravenous iron therapy led to complete resolution of hair loss in more than half of patients in this retrospective cohort. Future comparative studies with larger samples and validated objective hair loss scales are warranted. Beyond iron repletion, identification and treatment of the underlying cause of blood loss — particularly gastrointestinal sources in men and postmenopausal women — remains essential.

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