

Promising Results with 2% Minoxidil Solution in Loose Anagen Hair Syndrome in a Pediatric Age Group: A Case Report

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Abstract: Loose anagen hair syndrome (LAHS) is a relatively infrequent cause of hair loss, characterized by poor anchoring of anagen hairs to the follicle, resulting in frequent painless hair loss with gentle pulling. Topical minoxidil may benefit LAHS patients, particularly those with severe symptoms. We reported 2 cases of childhood LAHS (8 - 10 years, boys) successfully treated with topical treatment with minoxidil 2% solution. The successful use of minoxidil is encouraging and may be a reasonable first - line therapy for patients with disease at the severe end of the LAH syndrome spectrum.

Keywords: loose anagen hair, minoxidil, topical treatment, floppy sock appearance

1. Introduction

Evaluation and management of noninfectious non scarring childhood alopecia can be challenging. The differential diagnosis of childhood Alopecia areata includes tinea capitis, trichotillomania, alopecia triangularis congenitalis, and loose anagen hair syndrome; repeated episodes of telogen effluvium; and atrichia of infancy with papular lesions, vitamin D-resistant rickets, and Clouston syndrome.^{1,2}

Loose anagen hair syndrome (LAHS) is a relatively infrequent cause of hair loss, characterized by poor anchoring of anagen hairs to the follicle, resulting in frequent painless hair loss with gentle pulling.³ Due to abnormal premature keratinization in the inner root sheath, hair and the inner root sheath are poorly adherent in LAS. Most cases require no treatment as hair spontaneously returns to normal within a few years.⁴

Topical minoxidil has been the mainstay therapy for androgenetic alopecia till date.⁵ It is a hair growth stimulator which increases hair length and diameter.⁶ Topical minoxidil is available as solution and foam formulations. The solution contains alcohol and propylene glycol which are required for dissolving minoxidil and increase uptake in tissues. Topical minoxidil may benefit LAHS patients, particularly those with severe symptoms.⁷

LAHS is predominantly seen in young girls between 2 and 6 years, being under diagnosed in boys because of hairstyle differences.⁸ We reported successful use of topical treatment with minoxidil 2% solution for loose anagen hair syndrome.

2. Case Details

Two boys, one of 8 years and other one of 10 years, presented with diffuse hair thinning over scalp and did not grow over time. Parents have normal hair and scalp. There was no Family history of hair and scalp disease. There was

no history of any preceding stressors or repeated pulling of hair by child or any other individual. There was no h/o any developmental delay. Scalp examination revealed diffuse, thin, lusterless brown hair with reduced density over scalp, hair shafts of varying lengths. Hairs of eyelashes and eyebrows were normal. Hair pull test was positive in both the cases with easily pluckable hair >70%. Telogen effluvium, trichotillomania, diffuse type alopecia areata were the clinical differential diagnoses. On light microscopy predominantly anagen hair were present which were devoid of root sheaths with floppy sock appearance of the cuticle. All other blood investigations were within normal limits.

Based on the history and physical examination, hair condition was compatible with loose anagen hair syndrome. The parents and child were advised on the natural course of the disease and to avoid activities that would result in further hair loss such as pulling. Intervention was done with minoxidil 2% lotion twice daily application for 2 months. Photographic evaluation was done at baseline and after 2 months. Side effect profile monitored for every 4 weeks. Both patients Showed significant improvement in hair density with improved hair shaft quality over scalp over the period of 2 months without any adverse effects.



Figure 1 (A) Before treatment; **(B)** After 2 months of treatment with topical minoxidil 2% solution



Figure 2: Floppy sock appearance on light microscopy

3. Discussion

LAHS is a sporadic or autosomal dominant disorder with incomplete or variable penetrance. The key features of the condition are short hair length, excessive shedding of hair and alteration of hair texture.⁹ The main pathogenesis of the disease is weakened adhesion between the inner root sheath and the cuticle of anagen follicles. Electron microscopy detected vacuolization and intercellular edema in Huxley cells, and dyskeratotic changes of Henle cells and cuticle cells of both the inner root sheath and hair shaft.¹⁰

In a study of 374 children referred for alopecia over a 10-year period observed that nearly 10% of patients were diagnosed with LAHS.⁷ A detailed history, clinical examination, hair loss evaluation tests and dermoscopy aid in establishing the diagnosis of loose anagen hair syndrome. Diagnosis is essentially clinical, and the hallmark feature is ability to extract anagen hairs painlessly by hair pull test. At least 3–10 loose anagen hairs must be present for LAHS. Trichogram shows >70% of anagen hairs. Microscopy of hairs shows distorted and ruffling of the cuticle that has been described as “floppy sock appearance” which is a characteristic sign of LAHS. Some of the hair bulbs are angled to the shaft resembling mouse tail.¹¹

Minoxidil is a potassium channel opener, causing hyperpolarization of cell membranes and it is also a vasodilator, it is speculated that, by widening blood vessels and opening potassium channels, it allows more oxygen, blood and nutrients to the follicle. This can also cause follicles in the telogen phase to shed, usually soon to be replaced by new, thicker hairs in a new anagen phase.¹² Most cases of LAHS resolve spontaneously; however, the successful use of minoxidil therapy in infants is encouraging and may be a reasonable first-line therapy for patients with disease at the severe end of the LAHS spectrum.¹³

Chandran NS et al.,¹⁴ reported a case of loose anagen hair treated by applying 5% topical minoxidil solution with a tapering regimen for 20 months showed significant improvement in hair density. The effect was still observed 28 months after cessation of medication. Cranwell WC¹⁵ reported a case of loose anagen hair where a girl, did not respond to topical minoxidil, showed improvement in hair

color, hair pattern, hair density, and hair length to oral minoxidil. Her hair remained normal after the discontinuation at the 12-month follow-up visit.

While minoxidil is generally safe and inexpensive, there are some considerations when prescribing to pediatric patients. Rare cases of reversible generalized hypertrichosis have been reported in children using excessive amounts of minoxidil for alopecia areata, so caution should be used.¹⁶ Another consideration in pediatric patients is excessive systemic absorption, which could potentially cause cardiovascular symptoms such as tachycardia, palpitations and dizziness, so patients and their caregivers should be advised to monitor for side effects.¹⁷

The successful use of minoxidil is encouraging and may be a reasonable first-line therapy for patients with disease at the severe end of the LAHS syndrome spectrum.

4. Conclusion

Loose anagen hair syndrome had a relatively low frequency of presentation in the daily clinic. The knowledge of the clinical and trichological characteristics makes the diagnosis possible. Treatment with topical 2% minoxidil is associated with good clinical response. More research is needed to fully understand the cause of this condition and to improve the limited treatment options available.

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