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Case Report

Dermatology Section

Could Topical Minoxidil Cause Non-Arteritic Anterior Ischemic Optic Neuropathy?

HABIBULLAH AKTAS[1], SEVIL ALAN[2], ELIF BETÜL TÜRKOGLU[3], ÖZGE SEVIK[4]

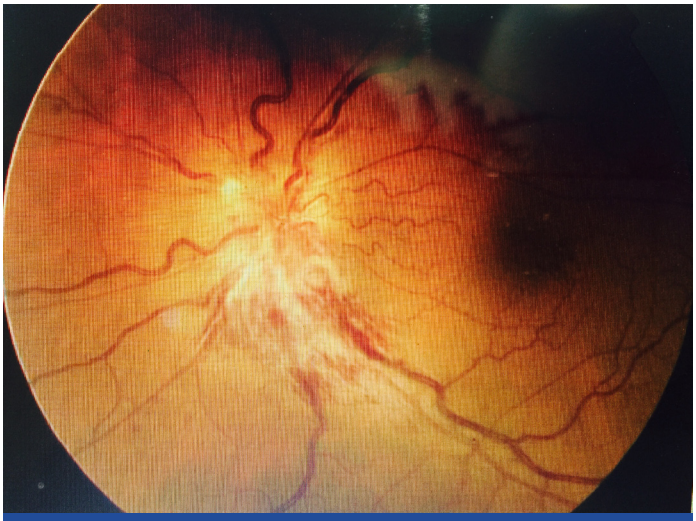
ABSTRACT

Minoxidil hair formulation is commonly used for the treatment of male or female androgenic alopecia. Minoxidil is a Health Canada and US FDA-approved medication for hair loss in men and women. The drug is marketed as 2% and 5% topical solutions. This over-the-counter product is considered safe, but should be used with caution. Furthermore, minoxidil is an orally active vasodilator for treatment of severe hypertension. Typical side effects of minoxidil are faster heart rate, augmented heart function and stroke volume (which can be associated with reduced vascular resistance upon baroflex stimulus), retained sodium and water and abnormal hair growth. The most common adverse reactions of the topical formulation are limited to irritant and allergic contact dermatitis on the scalp. Herein, we report a non-arteritic anterior ischemic optic neuropathy caused by topical 5% minoxidil treatment that was resolved after discontinuation of minoxidil.

Keywords: Androgeneticalopecia, Eye, Optic nerve, NAION

CASE REPORT

A 42-year-old healthy male presented with sudden blurring of vision at his left eye. The best corrected visual acuities were 10/10 in the right eye and 6/10 in the left eye. In eye examination, moderate optic disc swelling with some bleeding points within was observed [Table/Fig-1]. Colour test was normal, and there was no smoke and alcohol use in the patient's personal history. No other health problems including hyperlipidemia, diabetes, obstructive sleep apnea, orserebrovascular accident history (which can cause or associate to NAION) were determined. However, in the patient's detailed history, there was a high amount of topical minoxidil solution (5%) used topically for androgenetic alopecia (120 ml per month for 1 year namely two fold its normal dose) before vision problems started. He was prescribed low dose aspirin to prevent the other eye involvement. Within months, blurred vision improved to 9/10 in the left eye. The patient continued topical minoxidil use and he was not aware of any vision problem upon continued use. Eleven months later, he again experienced blurred vision in his other (right) eye. In an ophthalmological examination, the best corrected visual acuity was 8/10 at right eye and optic disc edema was seen with swelling of optic disc. This time, the patient stopped using topical minoxidil solution. His vision gradually improved moderately to 10/10. Months later his ophthalmological examination revealed a bright optic disc appearance indicating a vascular accident sequela. To assess the relationship of medication use to adverse effect, the patient's Naranjo probability algorithm score was calculated and supported a possible drug-induced reaction (Naranjo score = 4). The Naranjo adverse drug reaction probability scale involves 10 'yes', 'no' or 'unknown or non-applicable' questions. The adverse drug reaction are assigned to a probability category on the basis of the total score as 'definite'= ≥9, 'likely'=5-8, 'possible'=1-4, 'unlikely= ≤ 0 [1].



[Table/Fig-1]: Swelling of optic disc in his left eye

DISCUSSION

Minoxidil was first administered in the clinic in the early 1970s for alleviation of hypertension, but its use was more amenable for the treatment of alopecia [2]. Currently, minoxidil is approved for topical therapy of Androgenetic alopecia (AGA) and is available as 2% and 5% solutions and as a 5% foam formulation [3]. Minoxidil may stimulate hair growth by increasing the anagen phase of the hair cycle, but the exact mechanisms remain elusive. Major adverse reactions include reflex activation of the adrenergic nervous system, postural hypotension, renal sodium retention, and hypertrichosis [3,4]. The topical form was also taken to litigation for a number of side effects including severe hypotension [5]. Non-Arteritic Anterior Ischemic Optic Neuropathy (NAION) is relatively common optic neuropathy resulting from small vessel infarction of the anterior optic nerve caused by occlusion of the short posterior ciliary arteries [6]. It is one of the most common visually disabling diseases in adults over the age of 50. Cellular inflammation seems to be involved in the pathogenesis, development and progression of NAION. It is usually painless, sudden, unilateral vision loss and always resulting in swelling of the optic nerve head. Though several anatomic and vascular risk factors have been defined, much remains unknown about its pathophysiology [7].

Minoxidil is a direct vasodilator agent used as oral in hypertension treatment. It is generally used in refractory cases mostly together with diuretics and beta blockers in order to balance its fluid retention and tachycardia side effect [3,4]. Five percent topical solution of minoxidil is a popular baldness treatment method used all over the world. Although topical minoxidil is generally accepted as safe (shown in many studies), a considerable published article indicated that chronic use of topical minoxidil especially in 4

patients with coronary artery disease may carry significant systemic cardiovascular symptoms including tachycardia and minimal left ventricular hypertrophy due to increased cardiac output [2,3,8]. Systemic hypotension is another important side effect observed during topical minoxidil use [4,5]. One of the most common acute optic nerve diseases is NAION [9]. It causes short posterior ciliary artery occlusion and the consequences result in reduced blood flow and ischemia of the anterior optic nerve [10]. Individuals over 50 years of age are most affected by NAION [10]. Although NAION is thought to be associated with several etiological factors such as diabetes, hypertension, coagulopathies, hyperlipidemia and atherosclerosis, nocturnal arterial hypotension is a significant issue which could cause NAION due to hypoperfusion of the optic nerve head [10]. There was no known predisposing factor that could cause NAION in our patient except a high amount use of topical minoxidil. We absolutely know that it is impossible to establish a definite relationship between topical minoxidil use and NAION development without prospective or retrospective studies to follow both NAION cases and topical minoxidil users separately in sufficient time for the relationship. However, development of NAION in our young, otherwise healthy, patient without a predisposing etiology was given full attention. Therefore, the long-term and increased use of topical minoxidil may be another cause in development of NAION. Even though there is no definite cause-outcome relationship between topical minoxidil use and NAION development, a potential possibility should be kept in mind, when observing NAION cases and the use of topical minoxidil.

CONCLUSION

To our knowledge, there have been no previous reports about the severe ophthalmic side effect of topical minoxidil apart from the minor side effect like burning, irritation of eye and decreased visual acuity. So, it will be interesting to establish this rare adverse effect of minoxidil by conducting further long term studies taking large patient group.

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PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Dermatology and Venereology, Karabük Education and Researh Hospital, Karabük.
2. Consultant Dermatologist, Department of Dermatology and Venereology, Akdeniz University School of Medicine, Antalya.
3. Assistant Professor, Department of Ophtalmology, Akdeniz University School of Medicine, Antalya.
4. Consultant Ophtalmologist, Department of Ophtalmology, Karabük Education and Researh Hospital, Karabük.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Sevil Alan,
Department of Dermatology and Venereology, Akdeniz University School of Medicine, Antalya.
E-mail: alan_sevil@yahoo.com

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