TOPICAL MINOXIDIL 5% INDUCED MALE SEXUAL DYSFUNCTION
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Abstract
Minoxidil is an antihypertensive vasodilator medication. It also slows or stops hair loss and promotes hair regrowth in some people. The exact way that this medicine works is not known.
If hair growth is going to occur with the use of minoxidil, it usually occurs after the medicine has been used for several months and lasts only if the medicine continues to be used. Hair loss will begin again within a few months after minoxidil treatment is stopped.
Adverse reactions include irritation of the skin, itching, contact dermatitis, and dryness of the scalp or flaking. An increase in the absorption of minoxidil from the scalp can occur in patients with damaged skin, leading to increased side effects.
Minoxidil may cause serious side effects, including unwanted facial/body hair, dizziness, fast/irregular heartbeat, fainting, chest pain, swelling of hands/feet, unusual weight gain, tiredness, difficulty breathing especially when lying down.
Erectile dysfunction (impotence) is the inability to get and keep an erection firm enough for sex. Erectile dysfunction can be caused by Physical causes, Hormonal disorders, Structural/anatomical disorder, drugs induced, and Psychological causes.
We report a case of erectile dysfunction in a young patient not known to have any medical illness. In the view of unyielding clinical and laboratory evaluation, a drug-induced erectile dysfunction and decreased libido were suspected.
Because of the use of topical minoxidil 5% over the last 4 months, and the improvement of the patient's condition, including palpitation, chest tightness, dizziness, and erectile dysfunction and libido after discontinuation of topical minoxidil 5%, and the recurrence of symptoms following it's re-administration, and after ruling out organic and psychogenic causes, we concluded that topical minoxidil 5% was the cause of the patient's clinical picture and should be considered as a cause of unexplained erectile dysfunction and decrease libido.

Introduction
Minoxidil is a potent direct-acting peripheral vasodilator agent that reduces peripheral resistance and produces a fall in blood pressure (1).
Topical minoxidil is available without a prescription as 2% solution, 5% solution, and 5% foam. Due to evidence in support of the greater efficacy of minoxidil 5% solution compared with minoxidil 2% solution in men, use of the 5% concentration is recommended (2).
Side effects from minoxidil are infrequent. The most common side effects are contact dermatitis and irritant dermatitis (3). Nevertheless, due to the potential for systemic absorption when the scalp skin barrier is not intact, caution should be used in patients with cardiovascular disease. Hypertrichosis of the face may occur (4), but generally is not a problem for men.
Sex is a multifaceted activity. Though essentially it is meant for procreation, it has also been a source of pleasure, a natural relaxant, it confirms one’s gender, bolsters one's self-esteem and sense of attractiveness for mutually satisfying intimacy and relationship (5).

Sexual dysfunction is any problem that prevents a person from desiring or enjoying sexual activity. Male sexual dysfunction impaired or inadequate ability of a man to carry on his sex life to his own satisfaction. Symptoms include difficulties in starting and maintaining an erection, premature ejaculation, inability to ejaculate, and loss of desire.

Many factors may contribute to sexual dysfunction, or diminished potential for pleasure experienced during any stage of intimate physical activity, including desire, arousal, and orgasm. These include structural damage, disease processes, depression and other mental health conditions (6), and medications (7).

Case report
A 35 years old male, married, a father of a single daughter patient, not known to have any medical illness previously, he quitted smoking 4 years ago, and practicing a regular daily physical fitness exercise.

Presented to internal medicine clinic with a racing heart, chest tightness, and occasional dizziness over the last 3 weeks, two weeks ago he noticed that he has a soft erection, which progressed over days until morning erection and libido were lost.

For two months, he has had an itchy and burning scalp; which referred by him to the use of topical minoxidil 5% that started 4 months ago 1cc twice daily to treat his male pattern baldness.

On clinical examination blood pressure was at the lower limits of the normal range; 90/60-100/70, without orthostatic hypotension, and his pulse was 110 bpm and regular. His scalp was erythematous with multiples scratches. On external genitalia examination, no abnormality detected.

Laboratory evaluation revealed normal FBS, KFT, LFT, and blood sugar level.

ECG showed sinus tachycardia with no other abnormality.

Two-dimensional echogram also within normal parameters.

D-Dimer was negative.

His hormonal profile was as follow:
T4: 1.57 ng/dl (0.932 - 1.71).
TSH: 1.10 uIU/ml (0.270 – 4.20)
TESTOSTERONE 422.7 ng/dl (249.0 – 836.0)
PROLACTIN 5.30 ng/ml (1.39 – 24.2).
LH 9.04 mIU/ml (2.4 – 12.6)
FSH 4.95 mIU//ml (3.5 – 12.5)

Urological counseling revealed no organic cause for his complaint, and asked to refer the patient to a psychiatric clinic.

Psychiatric counseling informed that the patient almost has a normal psychological condition apart from anxiety due to his impotence and loss of libido.

Because topical minoxidil 5% was the only drug used by the patient it was discontinued. Over 3-4 days of discontinuation the patient started to regain his libido, and morning erection, as well as palpitation and chest tightness, decreased significantly. Ten days of discontinuation the patient free of any symptom, and regain his sexual
Two weeks later, the patient resumed minoxidil application for 2 weeks again symptoms reappeared. Again, the drug was discontinued and the symptoms disappeared.

**Discussion**

A literature search did not reveal any case reports on the association between topical minoxidil 5% solution use and erectile dysfunction. However, we report this case of impotence related to topical minoxidil 5% solution therapy. Our patient is a young healthy man, and the organic and psychological cause of erectile dysfunction were ruled out. Small amounts of the applied minoxidil are absorbed and appear in the systemic circulation: 2-5 mg/day may be systematically available as compared with effective antihypertensive oral doses in the range of 10-40 mg/day (8). Although the amount absorbed is relatively small, it is conceivable that the use of topical minoxidil causes systemic cardiovascular effects.

As with other topically applied drugs, inflammation or disease processes associated with decreased integrity of the epidermal barrier (e.g., excoriations of the scalp, severe sunburn, scalp psoriasis) may increase percutaneous absorption of minoxidil and potentially increase the likelihood of systemic adverse effects (9).

Serum and 24-hour urinary minoxidil determinations showed enhanced systemic minoxidil absorption, which was probably secondary to the irritant dermatitis in some patient (10).

The arteriolar vasodilation induced by minoxidil activates the peripheral sympathetic nervous system (SNS) via carotid and aortic baroreceptor reflexes. In tandem with activation of the SNS, both the pulse rate and cardiac output increase (11,12). Minoxidil administration evokes an increase in plasma renin activity, largely due to activation of the SNS (13-15). The activation of the renin-angiotensin axis elicits an increase in plasma and urinary aldosterone levels (13-15). As well as, minoxidil possesses alpha-adrenoceptor agonist activity in addition to potassium-channel-opening activity (16).

As a part of erection biology, the peripheral nervous system helps transmit the central impulses to the end organ. Sympathetic pathways generally provide inhibitory impulses, whereas parasympathetic and somatic innervation is pro-erectogenic, the most important component responsible for penile erection is the corpus cavernosum; smooth-muscle relaxation within this tissue is the endpoint of all stimuli resulting in an erection, Alpha-adrenergic agents induce smooth muscle contraction and result in DE tumescence (17). Antagonism of alpha-adrenergic signaling enables other independent relaxatory pathways to predominate within the penile trabecular smooth muscle (18). Allergic dermatitis which manifested by the patient as itchy and burning scalp, which is seen on examination as an erythematous and scratched scalp, leads to increase in absorption of topical minoxidil systematically. This increase in absorption leads to low blood pressure values manifested as dizziness. Because of arteriolar vasodilatation caused by absorbed minoxidil and the direct adrenergic effect of minoxidil; sympathetic system activated. Sympathetic system activation flagged by chest tightness and racing heart also led to corpus cavernosum smooth muscle contraction and result in DE tumescence.

In the patient reported here, the absence of organic and psychological cause of erectile dysfunction, and the indirect effect on minoxidil on the sympathetic system suggests that erectile dysfunction most likely induced by topical minoxidil 5%.

**Conclusion**

Attributing a clinical condition to specific drug intake, after exclusion of other potential causes, may prove a complicated scenario. Topical minoxidil 5% application should be considered as a cause of unexplained erectile dysfunction.
References

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**Cite an Article**