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Paradoxical Hypertrichosis after Laser-Assisted Hair Removal

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Abstract

***Background**: Laser hair removal has become one of the most common medical procedures; it is a relatively safe with limited side effects. Hair induction after laser-assisted hair removal has been previously rarely reported.*

***Objective:** To review the prevalence and features of this paradoxical effect.*

***Methods:** This is a retrospective study that included all patients who underwent laser hair removal during 3-years period with a long pulsed alexanderite laser during the time period from October 2001 to October 2004.*

***Results:** 1 patient of 329 (5.2%) treated with the long – pulsed alexandrite laser (755 nm) reported increased hair after laser hair epilation, in comparison with the control group (30 patients), this side effect occurred predominantly on the face and the neck with skin type and 1V.*

***Conclusion:** Hair induction is a real but rare side effect of laser hair removal.*

Introduction

Unwanted facial and body hair is a common problem generating a high level of interest for treatment innovations[1]. In 1996, the US Food and Drug Administration (FDA) approved laser epilation for clinical practice[2]. Since then, advances in laser technology has led to the development and distribution of numerous red and infrared lasers and light sources to address this issue.[1] Laser-assisted hair removal is the most efficient method of long-term hair removal currently available, moreover several hair removal systems have been shown to be effective in this setting: ruby laser (694 nm), alexandrite laser(755 nm),diode laser(800 nm) and the neodymium : yttrium-aluminium-garnet (Nd : YAG) laser (1064 nm),with or without the application of carbon suspension[3]. They target melanin in the hair follicles with pulse durations in the millisecond range[4,5]. According to the theory of selective photothermolysis, the light energy is absorbed by melanin in the hair shaft and is transformed into thermal energy, causing damage to the hair follicle structure. The short pulses (usually shorter than the thermal relaxation time of the follicle) limit the thermal damage to the follicles and, therefore, surrounding tissue is spared[6,7]. Some laser irradiation parameters such as wavelength, fluence, pulse duration, spot size have been shown to influence the damage of the follicles, however, the role of some patients'factors such as hair growth cycle is still under debate[8]. Laser hair removal is considered to be a safe procedure. Side effects are mainly a result of epidermal damage caused by melanin. They occur more often in darker skin types and tanned skin. Concurrent epidermal cooling reduces the incidence

of side effects, which include hypopigmentation, hyperpigmentation, superficial crust/vesicle formation, and scarring. The vast majority of side effects are transient in nature, even though permanent ones (e.g. Hypopigmentation, scar formation) have been reported in the literature[9,10]. In some patients terminal hair has been observed to appear in areas where it was not present before laser treatments. It occurs mainly in adjacent areas to the ones that laser epilation was applied and in areas where vellus hair is being treated. Several names have been proposed: terminal hair development, hair induction, terminalization, and paradoxical effects[11,12].

Patients and methods

This is a retrospective study included all patients who underwent laser hair removal at laser center of Saudi German Hospital, Riyadh, Kingdom of Saudi Arabia during 3-years period with a long pulsed 755-nm alexandrite laser (cynosure apogee 6200 model 105-0030-000) during the time period from October 2001 to October 2004.Laser procedures for the face were done by well trained dermatologists but those for the other body areas were done by well trained nurses under the direct supervision of the dermatologists. All the patients who underwent laser therapy during the previously mentioned period were contacted and those who reported increased hair growth or noted by the clinic staff to exhibit increased hair growth after laser hair removal were included by this study. Post-laser hypertrichosis was defined as occurring if patients developed a definite increase in hair density, color, coarseness, or a combination of these at treated sites when compared with baseline clinical photographs in the absence of any other known causes of hypertrichosis. Full history and clinical examination in addition to investigations including full blood picture, plasma testosterone, plasma cortisol, urinary 24-hour 17-hydroxy-and ketocorticosteroids, dehydroepiandrosterone sulphate levels, prolactin levels, FSH, LH, ovarian scan and radiography of the pituitary fossa.

Results

Of 329 patients, 19 reported post laser epilation hypertrichosis during 3-year period. Two of them were excluded as one of them proved to have polycystic ovary and the other used minoxidil 2% spray for the scalp. Regarding the other 17 patients, laser treatments were considered the most likely cause for hypertrichosis in those patients, because hypertrichosis occurred exclusively at treated sites. All the 17 patients had black hair and skin phototype III and 1V. The median age, race, skin type, hair color, and treatment settings for these patients and compared with the comparison group are summarized in Table (1). Hair induction in all patients occurred on the face and the neck area.13 patients decided to continue laser therapy with gradual good response. There was no statistically significant difference between the patients and the control group regarding the sex, mean age, skin phototypes, hair color, laser fluences, mean number of sessions and the mean interval of sessions.

Table 1. Comparison between patients and control groups.

	Patients N=17 (%)	Control N=30 (%)
Sex		
Male	0 (0%)	0 (0%)
Female	17 (100%)	30(100%)
Mean age, y ±SD	31.2±8	33.4±9
Skin phototype		
□	8 (47%)	13 (43%)
1v	9 (53%)	17 (57%)
Hair color	Black: 17 (100%)	Black: 30 (100%)
Fluence, J/cm^2 mean ±SD	15±4.2	16±3.1
No. of treatments, mean ±SD	6±2.1	5.2±2.6
Average time interval between treatments, in weeks, Mean ±SD	8.4±3	7.5±4

Photo 1. Paradox hypertrichosis in cheek.

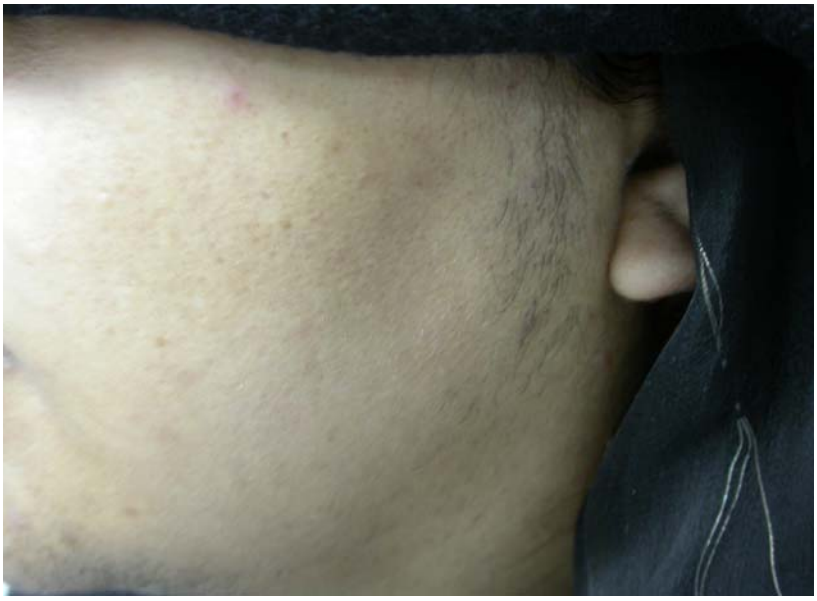

Photo 2. Paradox hypertrichosis in chin.

Discussion

Paradoxical effect of laser assisted hair removal is one of the most recently recorded side effects after several years after the FDA approved laser hair removal devices. It was recorded at 2002 by Morenos et al[13] and Hirsch et al[14]. The ratio of terminal hair to vellus hair increases with age, as approximately 25% of healthy women developed terminal pigmented hair around the lip, the areola, and over the lower abdomen and the amount of hair increases until menopause occur[15,16]. All hair follicles are formed during gestation and no further neogenesis occurs after birth[17], therefore transformation of local vellus hair follicles to terminal pigmented hair follicles should be the route of events in the cases of hair induction. All the studies recorded small percentage of this side effect in relation the total number of patients, for example Paraskevas K et al[18] recorded 4.5%, Abdulmajeed A et al[19] recorded 0.6% in comparison to our study which showed 5.2%, our relatively high percentage may be due the darker skin types of our patients (type and 1V) indicating a possible greater tendency of hair follicle transformation from vellus to terminal in such individuals. This could be the reason why most reports on hair induction have been published from physicians working in Spain, Greece, and Iran, countries where the majority of the population has darker skin types.[20-21]Regarding age of the patients, there was no significant difference between the patents and the control group, this result coincide with that of Abdulmajeet A et al[19] .Regarding the dose, the average fluence in our patients is 16.5 J/cm^2 which is at lower effective standard ranges in the literature[22,23] but we could not use higher doses due the skin type and the results of the test doses which was done before starting treatment, this may support some authors[19] who suggested that the cause might have been suboptimal fluences. All the paradoxical effects are on the face and the neck, this result goes hand in hand with the results on many authors [18-19-21] who reported that the hair induction almost affect the face and the neck. We can not evaluate the age and sex as risk factors due to the fact that most laser hair removal is conducted in adult women.

Conclusion

Paradoxical hypertrichosis after laser-assisted hair removal is a real but rare event that clinicians and their patients should be aware about and should be included in the informed consent form. Dark skin types and using suboptimal laser fluences may be considered as risk factors, with more predilections to the face and the neck. Prospective studies would characterize this phenomenon more completely with better understanding of other risk factors.

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التأثير العكسي لأستخدام ليزر ازالة الشعر

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يعتبر استخدام اشعة الليزر واحداً من اكثر الوسائل شيوعاًفي ازالة الشعرالغير مرغوب فيـه حيـث انهـا وسيلة آمنة نسبياً ذات اعراض جانبية محدودة وقد سجلت حديثاً احد الاعراض الجانبية التي لم تكن معروفة سابقاً وهي التأثير العكسي والذي يعني زيادة نمو الشعر في بعض الأماكن المعرضة لأشعة الليزر ومن هنا كانت فكـرة البحث وذلك لدراسةهذا التأثير العكسي والكشف عن بعض ملابسات حدوثه وقد اجرى هـذا البحـث علـى كـل المرضى الذين تم اجراء جلسات الليزر لهم في الفترة من اكتوبر 2001م.حتى اكتـوبر 2004م.وكـان عـددهم 329وقد اظهرت النتائج حدوث هذا العرض الجانبي في 5.2% من الحالات وخاصة ذات البشرة الداكنة وذلك عند استخدام جرعات قليلة نسبياً من أشعة الليزر وكان هذا التأثير واضحاً على الوجه والرقبة وطبقـا لهـذه النتـائج نستخاص ان هذا التأ ثير العكسي قد يحدث في قلة من المرضى ويجب إعلام المريض بذلك قبل البدء في العـلاج ونوصي بمزيد من الدراسات للكشف عن ملابسات اخرى لحدوثه.