

Treatment of Vitiligo with an Ablative Fractional CO₂ Laser Followed by Sun Exposure: A Case Report

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Introduction

Vitiligo is a common disease with a prevalence of about 0.5-1% for the general population. In many patients disease is resistant despite well-delineated and updated guidelines [1] on implementation methods for the many conventional and novel treatments. Various laser and light treatments, alone or combined have been shown to be effective but are available in only a few centers and require multifold sessions (UV-therapy, excimer laser or lamps, HeNe...). Sun exposure is an easy alternative in sunny regions such as the South of France. Despite their promising efficacy [2], dermabrasion or ablative laser resurfacing (e.g. Er :YAG) carry the possibility of scarring, infection and a worsening of the affliction. Fractional wounding-therapies (laser, dermaroller), by creating only microcolumns of ablation with islands of preserved-skin show a better safety profile. Microcolumns are more or less spared and more or less deep depending on the device and the settings used: density, energy, pulse duration and pulse shape for the lasers, length and diameter of the microneedles for the rollers. Recent case reports and case series have demonstrated their capacity for improvement in hypo-pigmented diseases (hypochromic scars, idiopathic guttate hypomelanosis or Vitiligo) : Firstly with non-ablative fractional devices [3-5], then with ablative fractional CO₂ lasers [6,7] or microneedling [8]. To our knowledge, only two prospective, randomized comparative studies have been conducted using ablative fractional CO₂ laser followed by UVB phototherapy [9] or sun exposure [10] for the treatment of stable non-segmental Vitiligo. Both suggest that this combination could effectively and safely be used as an alternative method for the treatment of refractory non-segmental Vitiligo. In the Shin et al. study on ten patients, despite moderate efficiency, mean improvement scores assessed by physicians, were significantly higher for those treated with half-body fractional CO₂ laser therapy followed by NB-UVB phototherapy, as compared to those treated with NB-UVB alone (p=0.034) and, according to subjective improvements, the combined method also showed significantly greater improvements (p=0.023). In the study by Helou et al. on ten patients, enhanced improvements were reported and again greater efficacy was reported for the laser-group as compared to the control-group with sun exposure alone. Moreover in both studies there were no noticeable adverse effects such as infection, scarring, Koebner phenomenon or aggravation of Vitiligo.

Case Report

A 58 year-old Caucasian woman who presented a 2 years history of non-segmental Vitiligo of the forearms and dorsum of the hands was treated with 3 monthly sessions of ablative fractional CO₂ laser (SmartXide DOT²- DEKA Italy: 20 W, 300 μs, SmartPulse, stack2 on the leg, stack 1 on the face, 700 μm dot spaced) and daily moderate sun exposure (until mild erythema, about 30 mins) during the beginning

of spring 2013 in Marseille, South of France. At the 3 month follow-up after the third session she presented a clear visible improvement of the treated lesions. Absolutely no adverse effects were reported. Unfortunately she did not continue with follow-up.

Discussion

Melanogenesis is the unique process of producing pigmented biopolymers (known as melanins) that are sequestered within melanosomes which can provide color to the human skin. The migration, distribution, differentiation, proliferation and function of melanoblasts (melanocyte precursors) and melanocytes are very complex processes and depend on a significant number of selected factors and signaling pathways that are not yet fully elucidated; however it is high time to “explore” new approaches that might bring out a change in opinion. Several mechanisms may contribute to explain the improvement of Vitiligo after fractional CO₂ laser sessions. Firstly, wounding therapies may regenerate de novo hair follicles by Wnt-dependant pathway as shown in 2007 in Nature by Itoh et al. [11] and after by Beachkofsky et al. [12]; moreover the role of hair follicles in the repigmentation of Vitiligo is longstanding knowledge [13]. Secondly, wounding therapies and fractional wounding-therapies may increase the penetration and the well-known efficiency of UV-radiation. Thirdly they may induce the activation, proliferation and migration of melanoblasts from the border areas or differentiation of stem cells from the dermis of lesions by initiating propigmenting cytokinic inflammatory cascades [2,14].

Conclusion

Vitiligo is still too frequently considered, according to public opinion, to be as untreatable disease and remains a challenge for dermatologists. Although our limited positive experience in 3 to 4 additional cases this year and the encouraging results of the literature may open up new possibilities for easy-to-perform treatments in sunny countries (with a fractional laser but also with a dermaroller and sun exposure), some patients showed no response. Additional studies are required amongst larger series of patients to understand the mechanisms involved in the repigmentation, optimize the protocol (laser settings, light, LED or sun exposure modalities) and to confirm efficiency and long-term safety.

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