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A giant epidermal nevus of the face treated with a CO_2 and dye laser combination: a case report and literature review

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ABSTRACT

Epidermal nevi (EN) are cutaneous hamartomas present at birth, usually occurs in the trunk, the face, or the limbs, appearing as a patch of overgrowing skin. They may be small and localized, but they may interest extensive areas of the body. A 20 years old man came to our attention for an EN interesting all the face. The treatment protocol consisted of a session of CO_2 laser in order to vaporize thicker areas, followed by a session of dye laser on the area to prevent scarring. This treatment was performed under local anesthesia and sedation in three surgical sessions spaced 3 months from each other. Two sessions of dye laser spaced apart 6 months were performed during follow-up to further improve the esthetic outcome. The patient was followed for 2 years with no recurrence. Although surgery is still considered the gold standard in EN management, it is not always feasible. This novel combination technique can obtain optimal cosmetic results with no relapse within the period of follow up. Although further trials on a more significant number of patients are required, the combination of CO_2 and dye laser promises to become a valid therapeutic alternative when treating giant EN of the face.

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Epidermal nevus; CO_2 laser; dye laser

Introduction

Epidermal nevi (EN) are benign, often focal hamartomas present or appearing shortly after birth and growing together with the child. Clinical lesions start as tan, velvety patches and then develop into hyperpigmented and papillomatous plaques. Histologically, these lesions show papillomatous hyperplasia of the epidermis and mature sebaceous glands in the dermis. EN is distributed along Blashko's lines and are associated with defects in the ectoderm and mosaicism (1). When associated with other conditions (usually neurological issues), they constitute epidermal nevus syndrome. Giant epidermal nevus (GEN), when affecting the face and/or characterized by extensive body surface involvement, can often be psychologically devastating. EN therapy is still a challenge. Various therapies have been proposed to manage this condition, such as topical retinoids, topical and intralesional steroids, peelings, fluorouracil, podophyllin, cryosurgery, dermabrasion, and oral retinoids. These treatments have been associated with variable results, and a high risk of recurrence is usually present (2). Although resolutive, traditional surgery is usually associated with scarring and does not apply to large areas. Laser devices are becoming more and more exploited in the management of this condition (3). For the first time, we report using a combination technique between a surgical ablative laser and a vascular laser to treat a GEN.

Case report

A 20-year-old man came to our attention for a GEN interesting a big part of the body and all the face. The patient did not present any other health-related issues. The nevus was present since birth and started to have a more warty appearance during adolescence. Due to the presence of the nevus, the patient had a very poor quality of life and problems of self-esteem and asked for the removal of the lesion present on the face. Photos and informed consent related to the risk of the procedure were obtained. Clinical Photographs (Nikon D5500, Nikon Corporation, Tokyo, Japan) were taken before, during, and after treatment, and a melanin and hemoglobin multispectral digital analysis (Antera 3D, Miravex Limited, Dublin, Ireland) was simultaneously performed. The treatment protocol consisted of a session of a fully ablative CO_2 laser with a 7 "focal length and a minimum spot size of 900 mm. The device was always used in H and Smart Pulse modes (SmartXide Punto, DEKA M.E.L.A, Calenzano, Italy), with a power of 3 W and a frequency of 10 Hz (Impulse Energy 300 mj) in order to vaporize the thicker areas of the region. The power was then lowered down to 0.3 W to refine the more sensitive areas; in the same surgical session a dye laser treatment was performed (Synchro VasQ, DEKA M.E.L.A, Calenzano, Italy) (spot 12 mm, Fluence 7 J/cm^2, exposure time 0.5 ms) on the area to prevent scarring. The researchers performed therapies under local anesthesia and sedation using propofol, midazolam, and the presence of an anesthetist and resuscitation specialist. Local anhestesia was performed using a

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combination of lidocaine 20 mg/ml and adrenaline 0.0125 mg/ml (Xylonor, Septodont s.r.l., Milan Italy). The face was divided into three areas, and three surgical sessions spaced 3 months from each other (one for each area) were necessary to complete treatment. The patient was followed 2 years after this treatment with no recurrence of the lesion. Two sessions of dye laser (spot 12 mm, Fluence 4 J/cm^2, exposure time 0.5 ms) spaced apart 6 months were performed during follow-up (6 months after the last combined laser session) to further improve the esthetic outcome. Clinical pictures showed, after all treatments, a significant improvement of the GEN in the facial area, obtaining an optimal cosmetic result (Figures 1–6). Also, melanin and hemoglobin multispectral analysis confirmed the obtained results (Figures 7–9). The results reported in this paper are, to our knowledge, the first in the medical literature to highlight an excellent esthetic outcome after the treatment of such an extensive GEN of the face.

Discussion

In recent years, different types of laser devices have been described for the treatment of EN. The choice of a laser treatment may be influenced by the clinical features of the lesion (3). The CO_2 laser treatment is the method of choice for the removal of extensive epidermal nevi (4). In most cases, it is possible to obtain an excellent cosmetic result.

Two independent researchers (L.B. and A.G.A.) performed a systematic research in three different databases (PubMed/Medline, Google Scholar, Scopus/Embase). Articles published from January 1, 2010, up to March 7, 2021, were included. The keywords used were "laser" AND "epidermal nevi," "epidermal nevus," "giant epidermal nevus." All article's titles and abstracts were screened.

Various types of lasers have been proposed in the management of this kind of lesion. Ablative lasers (CO_2 and erbium lasers) seem to be the most common in managing the condition, while others lasers, such as Q-switched neodymium-doped yttrium aluminum garnet (Nd-Yag) and 308 nm excimer lasers, have been proposed (5). These kinds of devices give a good result on linear and small EN. GEN, however, may be more challenging to treat, given the risk of scarring in esthetic areas associated with ablation.

A polish group achieved excellent results when treating three patients with linear epidermal nevi with CO_2 laser. The control visits confirmed the complete removal of the nevus without scars and recurrences (3).

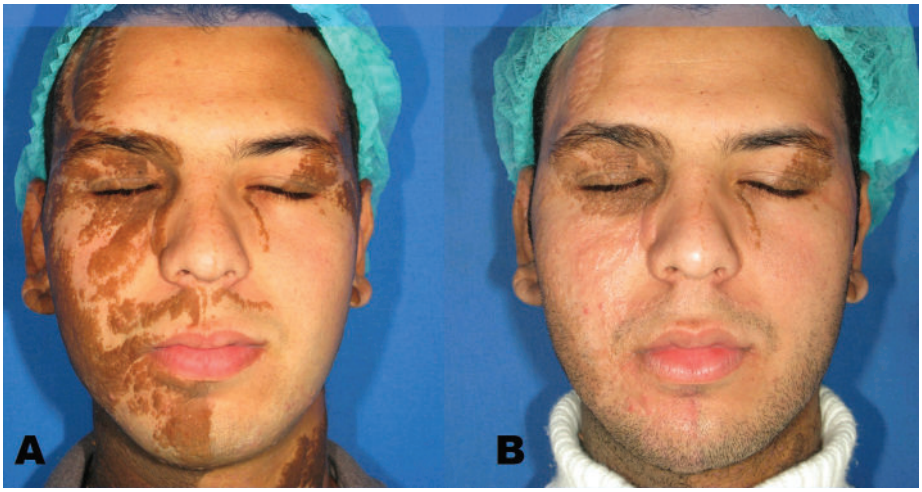

Figure 1. Patient before (a) and two years after (b) combined treatments, frontal picture.

Figure 2. Patient before (a) and two years after (b) combined treatments, right side.

Figure 3. Patient before (a) and two years after (b) combined treatments, left side.

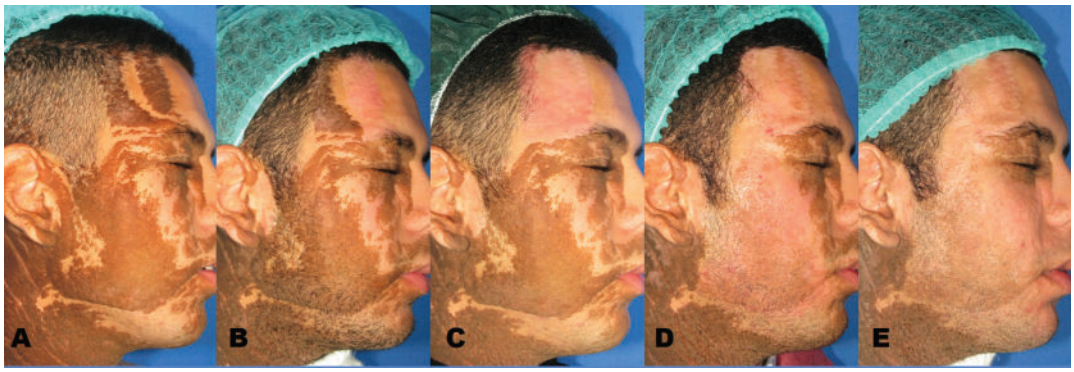

Figure 4. Right side before treatment (a) and after one (b), two (c), three sessions of treatment (d), and then after two years of follow up (e).

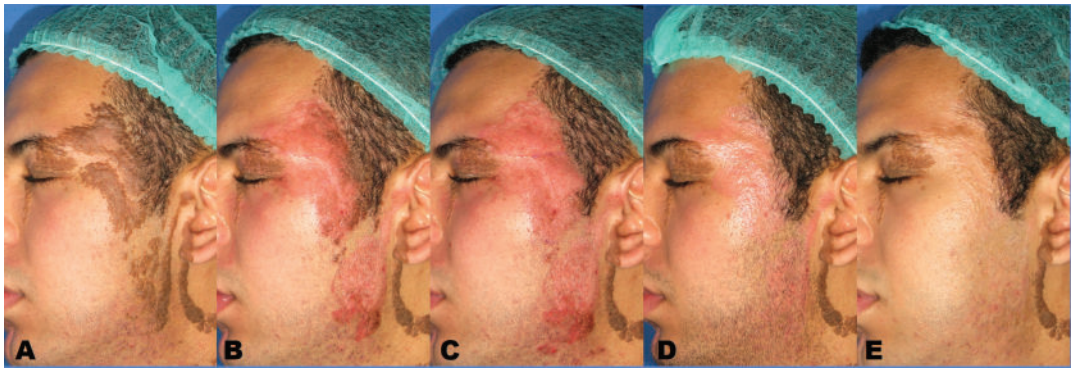

Figure 5. Left side before treatment (a) and after one (b), two (c), three sessions of treatment (d), and then after two years of follow up (e).

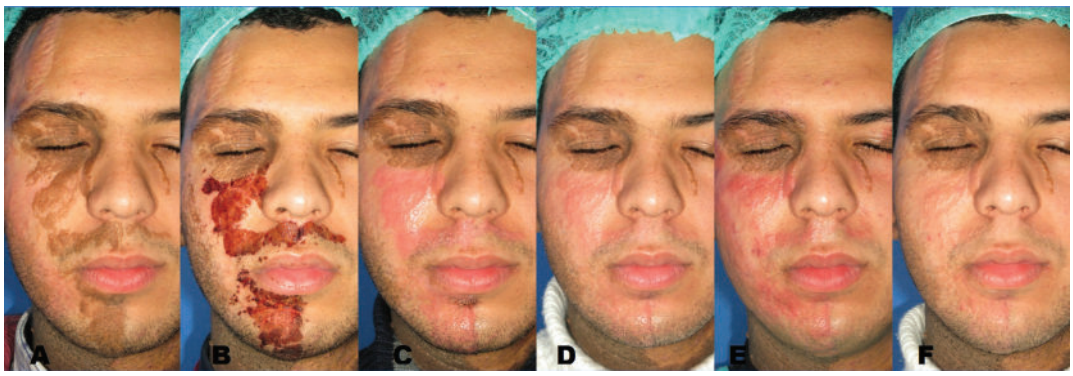

Figure 6. Frontal picture before treatment (a), right after first treatment (b) and after one (c), two (d), three sessions of treatment (e), and then after two years of follow up (F).

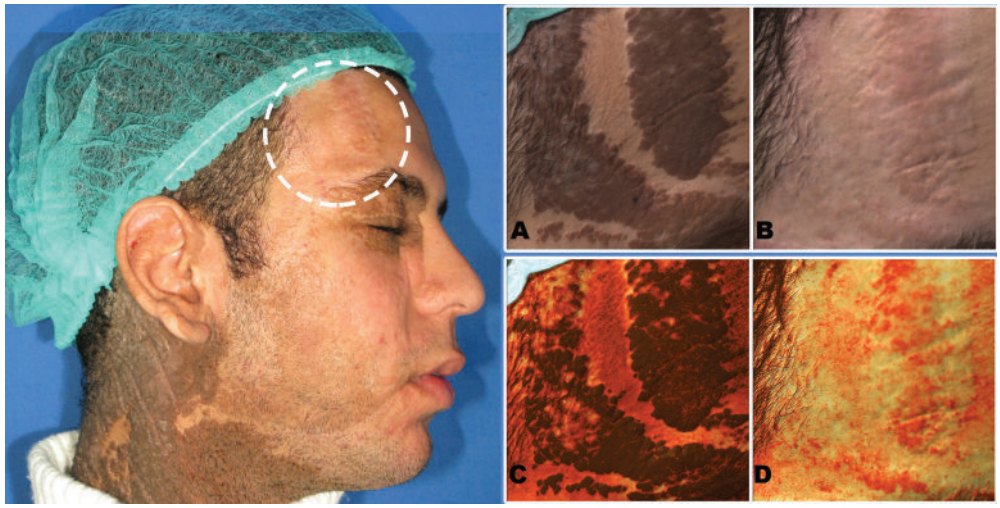

Figure 7. Right side temple. Melanin multispectral digital analysis before (a) and after (b) all treatments. Hemoglobin multispectral digital analysis before (c) and two years after (d) combined treatments.

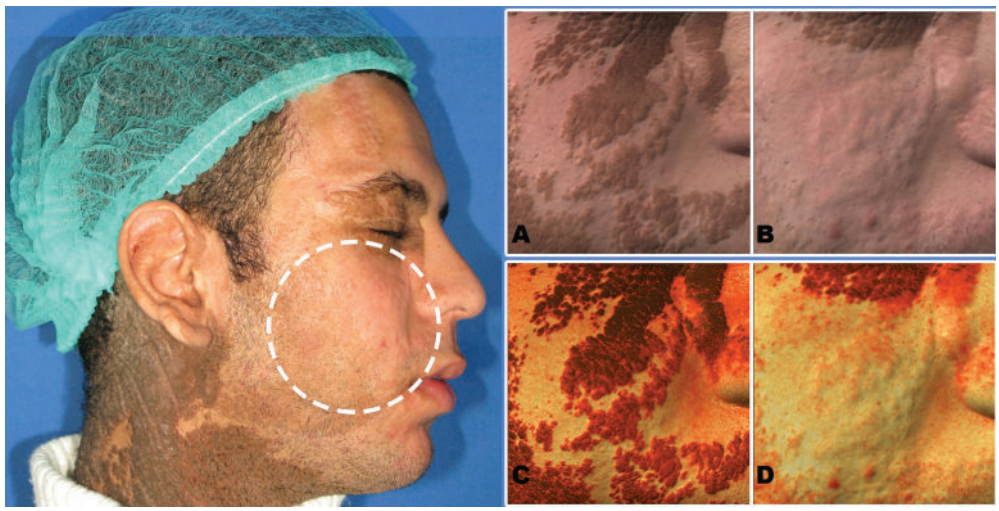

Figure 8. Right side cheek. Melanin multispectral digital analysis before (a) and after (b) all treatments. Hemoglobin multispectral digital analysis before (c) and two years after (d) combined treatments.

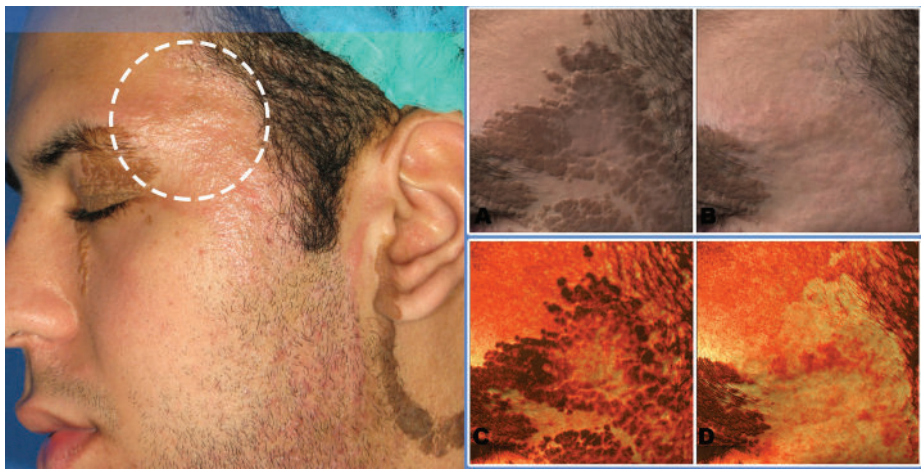

Figure 9. Left side temple. Melanin multispectral digital analysis before (a) and after (b) all treatments. Hemoglobin multispectral digital analysis before (c) and two years after (d) combined treatments.

A French group conducted a retrospective study in which they evaluated the use of various laser devices in 70 patients with epidermal or sebaceous nevi. While EN showed satisfactory results in most cases, sebaceous nevi showed a strong tendency to relapse and develop scars after treatment (5). The same group reported a clinical case of inflammatory linear verrucous epidermal nevus (ILVEN) treated with a 2940 nm erbium (Er Yag) fractional laser with an excellent esthetic result. Partial relapse was observed after 6 months of follow-up (6).

A Spanish study showed the case of a three-year-old patient with skin phototype IV presenting with a hemicorporal epidermal nevus. The lesion was treated with CO_2 laser only in the axillary region due to the risk of scarring, and then with six sessions of Q-Switched Nd: YAG in the rest of the lesion, showing good improvement (7).

Different authors presented single cases in which they dealt successfully epidermal nevus with CO_2 laser ablation experiencing a good clinical outcome (8–12).

Another Spanish group reported 20 patients treated with CO_2 lasers affected by EN or ILVEN with good cosmetic results. ILVEN showed inferior results compared to the other group of nevi (13).

Various papers report the use of Er-Yag laser with good results, although comparable to the ones obtained by CO_2 laser, with no difference apart from re-epithelialization (14).

An Israeli group proposed using a 532 nm picosecond on six subjects with epidermal nevi. All patients had outstanding cosmetic results (15). The same group had previously proposed combining cryotherapy and CO_2 laser to treat resistant EN, with acceptable results (16).

We report for the first time a combination treatment consisting of the use of dye laser after CO_2 ablation with good cosmetic results. The dye laser, which was used after the CO_2 laser, acts in two different ways, reducing the vascular component that feeds keloid-type healing and controlling the regenerative process to promote non-hypertrophic healing (17). This laser is more effective when the inflammatory process is still present, so both lasers must be used in the same session (18). Wound repair after surgery is a well-defined process (19) characterized by three consecutive phases: an inflammatory reaction, a proliferative process leading to tissue restoration, and tissue remodeling. It is not the same for wound repair after ablative CO_2 and dye laser. A laser explicitly targeting the early phases of wound healing may be the key to scar minimization (20). Clinical investigations of early laser treatment to reduce scar formation have previously used single laser exposure of various types (21). Using laser combination techniques, superior clinical results have been reported in preceding studies. Laser combinations are currently being examined for their complementary, additive, and sometimes synergistic action (22). Sessions of dye laser after the surgical procedure may help reduce the minimal scarring left in the area, further improving the esthetic result.

Conclusion

Combined CO_2 laser and dye laser is a new effective modality for treating EN affecting extensive areas of the face. Our experience shows an overall patient improvement that may represent a reasonable procedure to perform in a case that could not be treated with other solutions. Subsequent sessions of dye laser may help to improve the cosmetic outcome of the procedure. Of course, prospective studies with a more significant number of participants would be necessary to confirm the findings of this preliminary report.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Consent statement

Consent for the use of photos for scientific purposes has been obtained from the patient.

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