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Correspondence and Communications

CO_2 laser treatment for burn scarring☆

Dear Sir,

Burn scars are usually characterised by a combination of hypertrophic and keloid scars that are often very challenging to treat. They are a consequence of abnormal collagen deposition by fibroblasts exhibiting a hypersensitive response to growth factors.[1] These scars can have a profound effect on patients both functionally and psychologically due to their poor cosmesis and debilitating symptoms.[2] Currently there is no reliable or satisfactory treatment available to address the long-term sequelae of burns, however, more recently the use of laser-based treatments has been attributed to a paradigm shift in the management of burn scarring. Numerous different laser and light-based technologies have been described, including the use of a carbon dioxide (CO_2) laser,[3,4] yet very little data exists focusing on patient satisfaction with this treatment.[5] The purpose of this study was to describe our use and investigate our patients' experience of a fractional CO_2 laser to treat burn scars.

We retrospectively analysed the notes of all patients undergoing laser treatment for burn scarring from 2011–2015 at the Welsh Centre for Burns and Plastic Surgery, Morriston Hospital, Swansea, UK. Data including mechanism and total body surface area (TBSA) of the injury were extracted. Additionally, a three-part patient satisfaction questionnaire was designed and mailed to all patients. Formal ethical review was not required and letters of exemption were acquired from our trust's Research Ethics Committee and Research and Development office. Our practice is to wait 3-6 months after the wounds have healed before considering intervention and our usual cohort have scars that are several years old prior to treatment. We used the Ultrapulse® CO_2 laser (Lumenis, Santa Clara, California) which has three modes; ActiveFx™, DeepFx™ and SCAARFx™, with differences between them including depth of scar penetration. These modes were used in different combinations according to thickness of the patients scarring. Both general anaesthetic with injection of local anaesthesia or local anaesthetic alone was used. Additionally, application of topical local anaesthetic and cooling of the area was performed in the immediate postoperative period. No more than two areas were treated in a single sitting to limit postoperative discomfort. All patients were provided with an emollient and course of antibiotics. Antivirals were prescribed for patients undergoing facial scar treatment. All patients were advised to use sunscreen to reduce the risk of post-inflammatory hyperpigmentation and were reviewed initially at two weeks post-treatment and three monthly thereafter.

A total of 22 patents underwent treatment with the mean age being 23 years (range 3-56). On average the burn scars were 11-years-old. The mechanism of injury was scald in 54.5%, flame burn in 40.9% and chemical burn in 4.5%. Average burn TBSA was 20.8%. All sustained mixed thickness burns and had undergone surgery previously in the form of excision and skin grafting as well as conventional scar treatments such as massage, pressure garments, silicone gel and steroid injections. Each patient underwent two laser treatments on average. The postal survey response rate was 55% ($n = 12$). Tight bands were a concern in all patients pre-treatment, followed by uneven scarring in 81.8% and pain and pruritus in 72.7%. Following treatment, improvements in the stiffness and unevenness of the scar was reported by 72.7%, with 54.5% rating the improvement as moderate to significant. 63.6% felt improvement in the softness of their scars. Figure 1 illustrates pre and post-treatment appearances of a patient's facial scars. Pain improved in 45.5% of patients and pruritus in just over a quarter (27.2%). Discomfort following treatment was the main complaint and occurred in 90.9%, with 54.5% recording it as moderate to severe. Bleeding was common, reported by 81.8%, but was considered mild in the majority (63.6%). 72.7% also reported transient swelling of the treated area. In one patient treatment resulted in raised purple scarring over the right shoulder despite producing good results on the opposite side. Overall, 91.7% of patients viewed laser treatment positively and would recommend it, with 72.7% highly recommending it.

Fractional lasers produce columns of thermal damage ultimately resulting in neocollagenesis and collagen remodelling.[3] It is these changes in collagen histological architecture that may be responsible for the improvements observed by our patients. Despite a number of studies reporting the use of fractional CO_2 lasers for burn scarring very few have investigated patient satisfaction, and although positive results have been reported, they are not specific to the CO_2 laser.[2] In our experience treatment with the ablative CO_2 laser resulted in encouraging levels of patient satisfaction, and whilst our experiences are limited by a small cohort

☆The study was presented at the American Society of Laser Medicine and Surgery meeting April 2016 at Boston, USA.

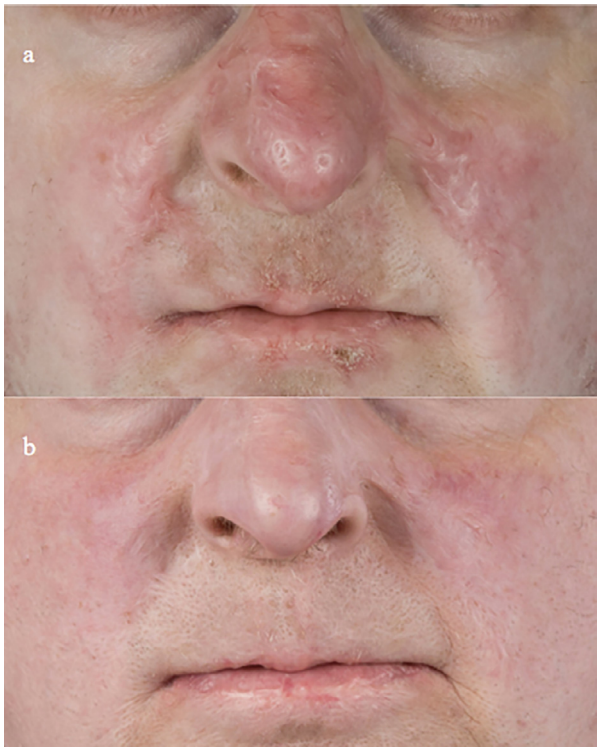

Figure 1 Pre (a) and post-treatment (b) appearance of facial burn scars. Improvements in scar thickness and skin texture were observed following four treatments. The patient also reported improvements in facial animation.

and retrospective data collection, this study provides an important insight into a patient's perspective for its use in the treatment of burn scars.

Conflict of interest

None.

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