Hyperpigmented Scar

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58.1 Medical History

A 23-year-old healthy Caucasian patient suffered from a deep dermal burn (IIb) 2 years ago due to contact with an open fire. Despite initial professional burn care and aftercare using silicone-based products, the patient developed an elevated hypertrophic scar in an area of 18×12 cm with an approximate height of 1 cm on her left lower leg. Repetitive treatments with cryotherapy and intralesional injections with triamcinolone acetonide at the local university hospital did not result in significant improvements; however, as a side effect of the treatment, brownish hyperpigmentations appeared in the treated area. At initial presentation in our clinic, the patient did not complain about any pain except some tension and pruritus but was severely disturbed by the appearance of the scar (■ Fig. 58.1).

? Questions to Medical History

- What is the rationale for the formation of postinflammatory hyperpigmentations after the initial therapy?
- Which therapeutic alternatives exist?
- Are there any medical precautions that should be considered for initiating any additional therapy?

■ Intervention 1

One pass using a Q-switched ruby 4 mm/4 J (Asclepion) under local anesthesia cream. Aftercare with fusidic acid and a class III steroid containing cream.

■ Interventions 2–6

Eight weeks later significant improvement of hyperpigmentation and some minor flattening (■ Fig. 58.2), five additional sessions with fractional CO_2 (Lumenis, UltraPulse, SCAAR FX 60–90 mJ, 1–3%, 300 Hz) under local anesthesia cream, additional 5-fluorouracil (5-FU)

■ Fig. 58.1 Baseline situation: elevated hypertrophic scar in an area of 18×12 cm with an approximate height of 1 cm on the left lower leg at initial presentation. Surrounding erythema due to mild reaction to the local anesthesia cream applied prior to the laser therapy

■ Fig. 58.2 Presentation 8 weeks after initial Q-ruby laser treatment

■ Fig. 58.3 Presentation 12 weeks after last laser treatment

50 mg/cc for drug delivery on the scar surface. Wound dressings with gauze, fusidic acid, and a class III steroid containing cream. Repetitive treatments approximately every 4–6 weeks apart.

? Questions Interventions

- Why use the Q-ruby first before initiating therapy with fractional CO_2 ?
- What is the rationale for the time intervals in between laser sessions?
- Potential risk of laser therapy?
- Why combination with 5-FU?

■ Intervention 7

Another pass using a Q-switched ruby 4 mm/4 J (Asclepion) under local anesthesia cream. Aftercare with fusidic acid and a class III steroid containing cream. Final results 12 weeks after last treatment shown in ■ Fig. 58.3.

■ Discussion

Hyperpigmented scars are relatively common; however, most frequently scar therapy is directed toward reducing possible symptoms like pruritus, pain or tension, and reduction of excess scar tissue through various

approaches. Nevertheless, using nanosecond or picosecond lasers with wave lengths of 532, 694, 755, or 1064 nm known from laser tattoo removal or treatment of benign pigmented skin lesions do have potential to improve appearance of hyperpigmented scars. In our case, treatment using a q-switched Ruby laser has been chosen as initial therapy simply due to the fact that the hyperpigmentation was the main concern of our patient. The hyperpigmentation was most probably a response to previous cryotherapy sessions; however, in darker-skinned patients, hyperpigmentations of scars are frequently seen without any previous therapy. Alternatively, a hydrochione-containing cream may be used, but they are often less effective compared to respective laser treatments [1]. Caution should be paid to possible melanocytic lesions, which can easily be ruled out through dermatoscopy and should be excluded from laser therapy.

The use of fractional CO₂ lasers for the improvement of hypertrophic scars has been demonstrated in numerous studies. Combining deep fractional ablation with high fluences and a low density to stimulate dermal matrix remodeling with superficial smoothening of the scar through ablation of individual scar strands, followed by extensive fractional surface ablation, has been shown to greatly improve widespread hypertrophic scarring [2–4]. On a molecular basis, the heat radiated into the treated tissue results in the activation of heat-shock proteins, predominantly from the HSP-70 family, as well as the alteration of remodeling factors like matrix-metalloproteases and antifibrotic isotypes from the transforming-growth factor beta family (TGF-β) [5, 6]. Although these processes have not yet been fully elucidated, clinical studies have shown a normalization of the dermal matrix architecture following fractional CO₂-laser treatment [7, 8]. Its combination with triamcinolone acetonide or 5-FU appears to further improve results and, in our experience, seems to minimize the total number of sessions necessary to achieve satisfying results [9, 10]. We usually allow the scar tissue to settle in between laser sessions for 4–8 weeks as scar tissue needs time for remodeling. While hypertrophic scars usually respond very well to fractional lasers, some caution should be paid when treating keloids as here, activation of the keloid with further enlargement is relatively frequently seen.

Take-Home Message

- Different scar types do benefit from combinational therapies. Interestingly, hyperpigmentations of scar do respond relatively well to QS-ruby or picosecond lasers.

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