Fractionated CO_2 Laser Skin Resurfacing

170

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Ablative laser skin resurfacing may produce dramatic effects, with significant risk, side effects, and healing time. Improvements in the appearance of lentigines and rhytids, lessening of photoaging changes, and softening of scarring due to acne and other causes are appreciated. Efforts are always being made to find devices and treatment strategies that lessen the healing time and side effect profile of the full-ablative short-pulse CO_2 and erbium-YAG lasers while extending the clinical applications.

Moderate to deep chemical peels and dermabrasion can achieve results comparable to laser skin resurfacing in smoothing the skin and eradicating rhytids, with some similarities in healing. There are technical, financial, and experiential reasons a given surgeon may prefer one modality over another.

The last 5 years have seen the introduction of multiple lasers in CO_2 (10,600 nm) and Er:YAG (2,940 nm) wavelengths that utilize fractionated photothermolysis, or fractionated laser skin resurfacing, to ablate the skin in columns of various widths and to various depths while leaving a portion of the skin surface intact (Graber et al. 2008; Ciocon et al. 2011; Preissig et al. 2012). Various treatment strategies are possible, as procedural discomfort is quite variable depending on treatment parameters and intended clinical effect. Downtime and risk of complications are likewise variable.

Reepithelialization time and duration of erythema are both significantly less with fractional CO_2 laser treatment as compared to fully ablative CO_2 laser skin resurfacing. The fractional CO_2 lasers are particularly suitable as skin resurfacing tools in a spa setting where a series of 3–6 light treatments are done over a several-month period with only topical anesthesia. This allows the patient to gradually build the effect with a minimal investment of recovery time and minimal risk of complications. Most of these fractional CO_2 lasers are also used at higher-energy settings with multiple passes in the surgical suite approximating the effect appreciated with full-ablative laser skin resurfacing.

The author has owned an eCO_2 fractionated CO_2 laser sold by Lutronic USA over the past year. The eCO_2 fractionated CO_2 laser has largely supplanted the Sciton dual-mode Er:YAG laser the author has used primarily for skin resurfacing over the past 17 years. The eCO_2 laser has also proven quite suitable for supervised use in treatments up to full-face performed by the nurse practitioner/aesthetician the author has worked with for over 12 years. Results of treatment are

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appropriate and impressive enough to insure this device will find good use in our practice for some time to come.

Key Elements of Procedure

Patient Selection and Preparation

Patients with Fitzpatrick 1 or 2 skin type are much easier to perform skin resurfacing on. Fractionated lasers do allow very light treatments, and an initial test patch and effective clinical treatment on darker skin types are possible. Skin resurfacing on darker skin types is advised only after optimal skin preparation, initial testing of the patient, and with the appropriate treatment of a tolerant and informed patient by an experienced clinician.

All patients should avoid sun exposure for a month before and 2 months after surgery. Patients who tan readily or have significant dyschromia benefit from preoperative treatment with bleaching creams such as 4 % hydroxyquinone and/or a retinoid such as tretinoin 0.05 % cream.

Preoperative counseling includes a frank informed consent, which dispels any misinformation the patient may bring to the visit. A discussion of expected downtime and review of procedural and postoperative photographs of similar patients will promote a realistic appraisal of the plan at hand. In patients with no history of herpes simplex outbreak who are undergoing upper facial treatment only, such as periocular treatment, I do not generally prophylax with an antiviral medication, and I have only seen two outbreaks of herpes simplex ever in over 1,500 such patients. Patients undergoing lower face or full-face laser are prophylaxed with valacyclovir (Valtrex) 500 mg twice daily, beginning 2 days preoperatively and continuing for 5 days postoperatively. Antibiotic prophylaxis is generally determined by other patient issues.

Procedure

Light full-face laser is generally performed in an office procedure room. Depending on the patient and expected intensity of treatment, topical anesthesia and cooling may suffice. Alternatively, nerve blocks and tumescent anesthesia using a buffered 0.2 % lidocaine mixture (epinephrine 1:800,000) to the entire face allows for moderate to heavy multiple pass treatment in the office. General anesthesia is preferred by many patients and surgeons for these heavy treatments and may be mandated by other concurrent surgical procedures.

There are a number of treatment paradigms used by different practitioners. The author has generally achieved good results in the eyelid using 2–4 passes with the 120 μm handpiece, 60–80 mJ energy, static mode, density 100. For both lower eyelids, typical total energies of 0.600–1.500 kJ are administered. In treating the full-face, 1–2 passes with the 300 μm handpiece at similar energies to those noted above are generally administered, followed by 2–4 passes with the 120 μm handpiece as described in the eyelid. Lesser energies and densities are commonly utilized in "spa"-type treatments, with greater use of the machine's "dynamic" mode, as opposed to the "static" stamping mode the author has preferred generally in the face.

It is appropriate to use higher-energy settings and multiple passes in areas of thick skin with the most profound wrinkles, such as the perioral area. An extra 2–3 passes are often needed in those areas. Thinner skin areas such as the eyelids generally receive energies on the lower end of those employed elsewhere on the face, as do the cheeks and the angle of the mandible. The neck and decolletage regions may be treated but at lower- energy settings than the face and with caution by experienced surgeons (Fig. 170.1a, b).

Postoperative Care

Immediately postoperatively the patient's treated skin is occluded with petrolatum ointment such as Vaseline or Aquaphor Natural Healing Ointment.

Alternatively, a sheet dressing such as second Skin (Spenco) may be applied and taped in place or held with a compressive stockinet. Dressings must be changed every day, and are not generally extended beyond two days in our practice. The ointments are generally reapplied after soaking with a dilute cool solution of white vinegar (1 ml

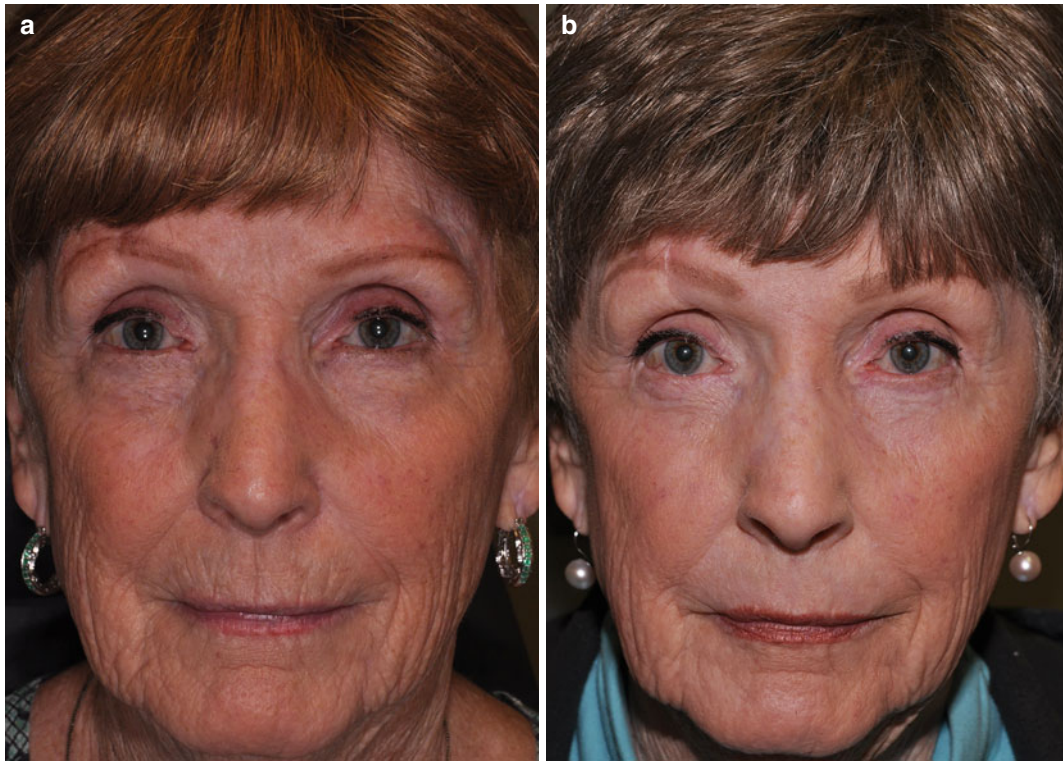

Fig. 170.1 (**a**) Preoperative patient with dyschromia and extensive rhytids. (**b**) Same patient 6 months post lower blepharoplasty and full-face eCO_2 laser skin resurfacing. Note reduction in rhytids and dyschromia

vinegar/50 ml water) approximately every 3 h while awake.

Patients are seen routinely at days 1, 6, and 12–14. Patients undergoing very light fractional treatment who have had prior treatments may be able to follow the postoperative regimen at home and resume full makeup within 24–48 h. With more extensive treatment, cover-up makeup can be worn 8–14 days after surgery. Erythema is variable, lasting days to 6 months, depending on the patient's skin and depth of therapy. Ultraviolet light exposure is strictly avoided for the first month postoperatively. In patients in whom postinflammatory hyperpigmentation is likely to be a problem, this is initially apparent 4–6 weeks postoperatively.

Conclusion

Fractional CO_2 laser treatment laser skin resurfacing is an effective treatment for photoaging skin changes. Appropriate case selection, patient counseling, and preparation yield optimal results with appropriate surgical technique and postoperative care. Equivalent results to fully ablative CO_2 and Er:YAG laser skin resurfacing can be obtained with lesser amounts of postoperative erythema and risk of hypopigmentation. A series of light treatments with topical anesthesia may be performed in a spa setting for patients who prefer that approach.

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