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Surgical and resurfacing applications of CO₂ laser

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Background: CO₂ lasers are now widely used around the world. Based on their ablative and fractional resurfacing effects, there are multiple growing indications for CO₂ lasers. In this topic, I share my 5 years' experience in using CO₂ lasers.

Methods: I used CO₂ ablative effect to treat many skin lesions with variable pathology such as rhinophyma, tuberous sclerosis, verrucous nevi, keloids and warts. Regarding fractional resurfacing, I used CO₂ laser mainly to treat post acne scars, striae, post burn scars and wrinkles.

Results: Regarding the ablative effect, CO₂ laser is very effective in removing rhinophyma, tuberous sclerosis, verrucous nevi and keloids with no recurrence and minimal scarring after two years follow up. CO₂ laser removed warts without scarring, but still the main problem is the recurrence. Regarding the fractional resurfacing, results were excellent with and good with post acne scars and post burn scars.

Conclusion: Ablative effect of CO₂ laser can replace surgery in many indications with many advantages such as no general anesthesia, low cost and no residual scarring. Post acne scars should be treated with multiple therapeutic methods.

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Fractional laser assisted cutaneous drug

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Therapeutic efficacy of topical drugs depends on their ability to penetrate different skin layers. Topical drugs have a poor total absorption with only 1%-5% bioavailability. The major rate-limiting step for drug absorption is passage through the stratum corneum, which is impermeable to hydrophilic and large molecules greater than 500 Da. Currently available strategies that overcome the skin barrier include chemical biomodulation and physical techniques. Physical drug delivery systems include microdermabrasion, microneedling, radiofrequency, sonophoresis, electroporation, iontophoresis and laser. The most common fractional laser systems used in drug delivery include fractional Er:YAG laser 2940 nm, fractional CO₂ laser 10600 nm and fractional Er:Glass laser 1550 nm. I show clinical studies that use this facility for multiple indications including non-melanoma skin cancer, onychomycosis, vitiligo, alopecia, scars, warts, infantile haemangiomas and cosmetic purposes. Optimal laser parameters and pharmacokinetics of the drug should be taken into consideration to reach the best results of this modality of drug delivery. Researches in this field are rising; both in dermatologic and systemic scope.

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