

Fractional CO₂ Laser in Treatment of Surgical and Trumatic Scars

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Abstract

Background: Scars result from chronic wound healing response , leaving behind fibrotic tissue due to irregular collagen formation . There are different types of scar including atrophic , hypertrophic, contracture and keloid scars. Available scar revision therapies depend on the type of scar , and range from topical creams for mild scarring , to grafting in the case of large , traumatic scars . Laser scar revision is an effective method for treating a wide rang of scars that improves skin texture and pigment as well as functional aspects .

Objective:To evaluate the results of using fractional CO₂ laser in the treatment of surgical and traumatic scars.

Patients and Methods: A prospective study in which 35 patients with surgical and traumatic scars situated on different areas of the face , and of different types and size , they were 10(28.6%) males and 25(71.4%) females , their ages ranged from (8-60) years, with a mean age (27.2±8) years . The study was conducted in a private clinic in Kalar City , Al-Sulaymania Province for the period from January 2015 to December 2016 . They were examined and assessed regarding the type of scars , size , duration and previous therapy as well as the reasons behind the consultation of doctor . The patients were divided into three groups according to the type of scar , atrophic , hypertrophic and keloid . All patients were treated by fractional CO₂ laser , different number of sessions were done at monthly interval after topical application of emila for induction of anesthesia , for 45 minutes . The response to treatment was classified into three degrees , good, moderate and poor response .

Results: The patients were divided into three groups according to the type of scar , they were atrophic scar 30(85.7%) patients , hypertrophic 3(8.6%) patients and keloid 2(5.7%) patients . The response to treatment in those with atrophic scars was good in 25(71.4%) patients and moderate in 5(14.3%) , while all patients with hypertrophic scars shows moderate response and those with keloid shows poor response. The sex and age had no significant effects on the response to treatment . Some patients 8(11.4%) developed hyperpigmentation at the site of therapy , specially those with darker skin (type-4) .

Conclusion: It was concluded that fractional CO₂ laser was a good therapeutic selection for the treatment of atrophic surgical and traumatic scars specially in those with white skin complexion .

Keywords: Scar , Atrophic , Hypertrophic , Keloid , CO₂ laser , Emila.

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Introduction

Scars are composed of new connective tissue that replaced lost substance in the dermis or deeper parts as a result of injury or disease, as part of normal reparative process [1]. Scars may be thin and atrophic, or the fibrous elements may develop into neoplastic overgrowths, as in hypertrophic and keloidal scars. Scars may be smooth or rough, pliable or firm, and tend at first to be pink or violaceous, later becoming white, but tend to become less noticeable in the course of time [1].

Many therapeutic measures are used in the treatment of the scars, some are medical, like intralesional injection of corticosteroids, topical medication like collagenase containing ointment or gels, others are surgical procedures, like surgical excision, radiotherapy, cryotherapy and laser therapy [2].

Many types of lasers are used in the treatment of different types of scars (atrophic, hypertrophic and keloid). CO₂ laser is one of the most commonly used in the treatment, both ablative and non-ablative CO₂ lasers are used [3]. CO₂ laser is absorbed by water (which makes up to 72% of the skin, they effectively ablate the skin to varying depths depending on the energy delivered. The CO₂ laser emits an invisible infrared beam of 10600nm and can be used in continuous wave or super-pulsed mode [4]. Water nonselectively absorbs laser energy, turning it instantly into steam, and producing ablative and thermal damage [5]. Used in the super-pulsed mode, the laser beam can be delivered in short bursts, allowing thermal

destruction of the epidermis and papillary dermis while limiting deeper thermal damage [6].

The thermal injury causes conformational changes within the collagen, leading to clinical tightening, so it is extremely effective at improving wrinkling, scarring and skin tone. Side effects include postinflammatory pigmentary changes, scarring and textural changes, and prolonged erythema [7]. Fractional resurfacing is a relatively recent treatment approach that creates thousands of microscopic MTZs per square centimeters to stimulate skin remodeling [8]. Both epidermal problems (pigmented lesions, actinic keratosis), and dermal lesions (rhytides, scars and telangiectasias) respond to fractional resurfacing [9].

The aim of the present study was to evaluate the efficacy of fractional CO₂ laser in treatment of surgical and traumatic scars.

Patients and Methods

A prospective study was done in the private clinic in Kalar City Al-Sulaymania Province, for the period from January 2015 to December 2016. In which [35] patients with surgical and traumatic scars, situated on different sites of the face, and of different types and size were seen, they were [10] males and (25) females, their ages ranged from (8-60) years, with a mean age of (27.2±8). They were examined and assessed regarding the type of scars, size, depth, thickness, duration, previous therapy, as well as the cause of scarring and for what purpose they consult the clinic, also detailed

medical history , regarding any infectious diseases like viral hepatitis , HIV disease , wart and herpes simplex infection . The patients were divided into three groups according to the type of scar (atrophic, hypertrophic and keloid). All patients were treated by fractional CO₂ laser (Korean made) , different number of sessions (3-6) were done at monthly interval , after topical application of emila for 45minits for induction of anesthesia .

The response to treatment was assisted by the processor , and classified into three degrees , good response (completely disappeared or only remnant trace) , moderate (decrease in the size and thickness or depth) and poor response (slight decrease in size and thickness) .

Results

A prospective study which include (35) patients with surgical and traumatic scars on different sites of the face , they were 10

(28.6%) males and 25(71.4%) females, with a mean age of (27.2±) years .

The results revealed , according to the type of scar (table-1) , that 30(85.7%) patients had atrophic scars , 3(8.6%) patients had hypertrophic scars and 2(5.7%) patients with keloid. Table-2 shows that the response to fractional CO₂ laser therapy in patients with atrophic scars was good in 25(71.4%) patients and moderate in 5(14.3%) patients , while all patients with hypertrophic scars shows moderate response , and those with keloid shows poor response . The age and sex had no significant effect on the response to treatment . Some patients 8(11.4%) patients developed hyperpigmentation at the site of the treatment , specially those with darker skin , the hyperpigmentation become obvious after healing of the wound of therapy , which was squealed by erythema and hyperpigmentation(around 15 days) .

Table (1): Type of scar in relation to number of patients.

Type of scar	No.of patients	Percentage
Atrophic	30	85.7
Hypertrophic	3	8.6
Keloid	2	5.7

Table (2): Response to treatment according to the type of scar.

Response	Type of scar	No. of patients	Percentage
Good	Atrophic	25	71.4
	Hypertrophic	Zero	Zero
	Keloid	Zero	Zero
Moderate	Atrophic	5	14.3
	Hypertrophic	3	8.6
	Keloid	Zero	Zero
Poor	Atrophic	Zero	Zero
	Hypertrophic	Zero	Zero
	Keloid	2	5.7
Total		35	100



Figure (1): Before treatment.



Figure (2): After treatment

Discussion

In this study the atrophic scars were the most common type and shows good response to treatment with fractional CO₂ laser . In comparison with other studies the response of atrophic scars was better than reported in United Kingdom and France, while concordant with those done in Arabia Sudia and India , most probably due to the difference in type of skin [9] , while the response of hypertrophic scars and keloid was comparable to other studies done in different countries[10] . Those difference in response most probably due to the type of skin , because most of Iraqi peoples had skin

type three and four . The complications of therapy in this study was limited (only transient hyperpigmentation) in comparison with other studies in which infections (bacterial , viral and fungal)were frequent [11,12,13] .

Concluions

It was concluded that fractional CO₂ laser Is a good therapeutic selection for the treatment of atrophic surgical and traumatic scars , specially in those with white skin complexion , with limited complications.

Recommendations

It was recommended to do an other study using fractional CO₂ laser incompenation with platelet rich plasma (P.R.P).

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