

Original Articles

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Association of high frequency electrosurgery, fractional CO₂ laser and ND:Yap for acne scars treatment: a new approach model

Associação de eletrocirurgia de alta frequência, laser CO₂ fracionado e ND: Yap para tratamento de cicatrizes de acne: um novo modelo de abordagem

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ABSTRACT

Introduction: Acne scars treatment is challenging since, in the most of the cases, there are different types of scars in the same patient.

Objective: Associate three distinct acne scar treatment techniques in the same session in order to optimize results.

Methods: Retrospective observational study evaluating 25 patients with acne scars treated with the following sequence of associated techniques: high frequency electrosurgery, CO₂ laser and Nd:YAP laser.

Results: High patient satisfaction index and evident improvement in photographs in most of cases.

Conclusions: The combination of techniques in one session was safe and effective in the treatment of acne scars, a condition of great psychological impact to affected individuals.

Keywords: Acne vulgaris; Cicatrix; Laser therapy

RESUMO

Introdução: O tratamento das cicatrizes de acne é desafiador, uma vez que, na maioria dos casos, encontramos diferentes tipos de cicatriz em um mesmo paciente.

Objetivo: Associar três técnicas distintas de tratamento de cicatriz de acne em uma mesma sessão a fim de otimizar os resultados.

Métodos: Estudo retrospectivo observacional que avaliou 25 pacientes com cicatrizes de acne tratados com técnicas associadas na seguinte sequência: eletrocirurgia de alta frequência, laser CO₂ e laser Nd:YAP.

Resultados: Alto índice de satisfação dos pacientes e melhora evidente em fotografias padronizadas comparativas, na maioria dos casos.

Conclusões: A associação de técnicas em uma mesma sessão foi segura e eficaz no tratamento de cicatrizes de acne, condição de grande impacto psicológico para os indivíduos afetados.

Palavras-Chave: Acne vulgar; Cicatriz; Terapia a laser

INTRODUCTION

Acne is a common skin condition whose prevalence rates range from 35% to over 90% in adolescents, and can occur at any age, affecting 8% of adults between 25 and 34 years of age and 3% of those aged between 35 and 44 years.¹⁻⁴ When there is no intervention in the early stages of the disease, more severe conditions can develop into scars, which result from inflammatory damage in the connective tissue of the skin affected by acne, coursing with destruction of the epidermis, dermis and underlying fat.^{1,5}

This permanent acne sequel has great psychological impact, especially in young adults, and often leads to a decreased self-esteem and quality of life.⁵

Acne scars can be classified as follows: elevated (sub classified into hypertrophic, keloidal, papular and bridges), dystrophic and atrophic/depressed (sub classified into distensible and non-distensible). Non-distensible atrophic scars are further subdivided into superficial, medium and deep, the latter also called icepicks.⁵ Between 80% and 90% of people with acne scars experience loss of collagen (atrophic scars), while a small group exhibit hypertrophic and keloidal scars.^{2,6}

The treatment of acne scars is challenging, and the goal is to obtain as much improvement as possible – but not perfection. There are several treatment options that improve the appearance of acne scars: chemical peels, microdermabrasion, subcision, punch elevation, dermal grafting, lasers, needle assisted treatments, cutaneous filling, intralesional corticosteroid injections, cryotherapy and surgery in cases of hypertrophic and keloidal lesions.^{2,5-7}

In light of the variation of types of acne scars regarding their shape and depth in a same patient, it is necessary to combine different therapeutic methods in order to achieve more satisfactory outcomes.^{3,5}

The FDA approved the application of ablative fractional CO₂ laser for the treatment of acne scars in 2007, meaning that this therapy became the gold standard approach in this pathology.⁸ Previous clinical and histological studies have shown the efficacy of CO₂ laser in restoring the skin in cases of atrophic acne scars, with improvement in 50% to 80% of cases.^{8,9} This laser generates thermal energy that acts in the skin via thermal microzones, promoting contraction and neocollagenesis of the tissue.¹⁰

More recently, Cachafeiro *et al.* demonstrated the efficacy and safety of 1,340nm non-ablative fractional laser in the treatment of acne scars, with outcomes similar to those of microneedling.⁷ This laser has the advantage of generating selective damage to the dermis, protecting the epidermis, reducing recovery times and adverse effects.

In 2017, the authors of the present study described a new treatment option for atrophic acne scars: high frequency electrosurgery. Applied punctually with a needle in the scar, it promotes the immediate retraction of the scar and the decrease of local fibrosis. The method is straightforward, cost effective, easy to apply and provides positive results by destroying the scar, decreasing its diameter and stimulating local tissue regeneration.⁶

This study was aimed at evaluating the effectiveness of the combination of these three techniques in the same session: high frequency electrosurgery, fractional CO₂ laser and ND:YAP laser in the treatment of acne scars.

METHODS

A retrospective observational study included patients over 18 years of age of both genders with clinical diagnosis of atrophic acne scars who underwent at least three treatment sessions with the associated techniques in the following sequence:

high frequency electrosurgery, CO₂ laser, and Nd:YAP laser, from January to December 2016, at a private practice in the city of São José do Rio Preto, São Paulo, in Southeast Brazil.

Patients younger than 18 and use of other therapies in addition to the treatment proposed in this study were exclusion criteria. The study was approved by the Research Ethics Committee of the Faculdade de Medicina de São José do Rio Preto, SP, Brazil. The sessions were performed with a minimum interval of one month.

Patients initially underwent topical anesthesia with 7% lidocaine + 7% tetracaine for 15 minutes. Treatment with high-frequency electrosurgery began with a thin, needle-shaped tip. The application was performed with a Hyfrecator® device (New York, USA) so that the needle was placed in the center of the atrophic scar with pressure on the skin, following which the 15W current was triggered with the device set in *Low* mode. Immediately after the electric discharge there was retraction, elevation and whitening of the scar.

Next, the application of the Sculptor 10,600nm CO₂ laser (Industra Technologies Indústria e Comércio Ltda, São Carlos, São Paulo, Brazil) was carried out. With a 120 microns spot and parameters set at 35mJ, 300mtz, stacking 3, the laser was applied punctually, only on the scars. Immediately after, a further pass was performed over the entire area affected by the scars (35mJ, 100mtz and stacking 3).

Finally, the patients received the application of the 1,340nm ND:YAP laser (Etherea®, Industra Technologies Indústria e Comércio Ltda, São Carlos, São Paulo, Brazil) across the entire area affected by the scars, with parameters set at 110mJ, 3ms, 100mtz and 8mm tip.

Outcomes were evaluated through standardized photographs taken before and after the treatment, and analyzed by two independent dermatologist physicians not related to the research. Based on the appearance of the scars, the images were compared and classified into: *worse*, *unchanged*, *slight improvement*, and *significant improvement*. Patient satisfaction was assessed by an opinion survey that classified answers regarding the treatment into: *unsatisfied*, *satisfied*, and *very satisfied*.

RESULTS

Twenty-five patients (10 men and 15 women) participated in the study. The patients underwent 1 session per month, with the total number of sessions ranging from 3 to 10 (mean = 5.12).

The photographs based evaluation carried out by the independent physicians classified 1 (4%) patient as *unchanged*, 9 (36%) with *slight improvement* and 15 (60%) with *significant improvement*. Of the patients who had *slight improvement*, the majority (66%) underwent more than 4 sessions. Among the patients who experienced *significant improvement*, the majority (60%) underwent 5 or more sessions (Figures 1-4).

Regarding the patients' satisfaction, only 1 (4%) was *unsatisfied* with the treatment, while 16 (64%) were *satisfied*, and 8 (32%) *very satisfied* (Graph 1). Among those who were *satisfied*, the average number of sessions performed was 5.08, while



FIGURE 1: Before the treatment



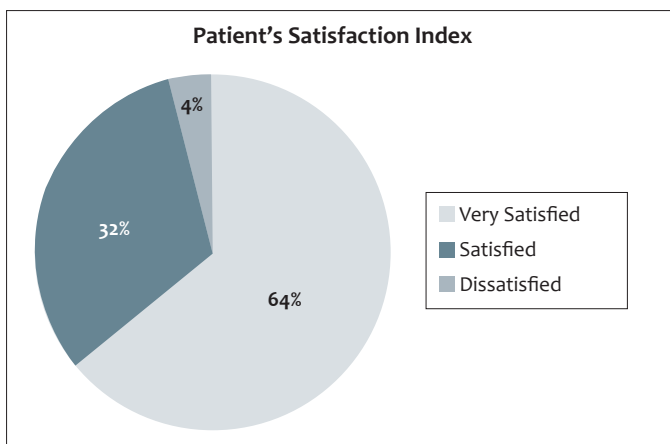
FIGURE 2: After the treatment (six sessions)



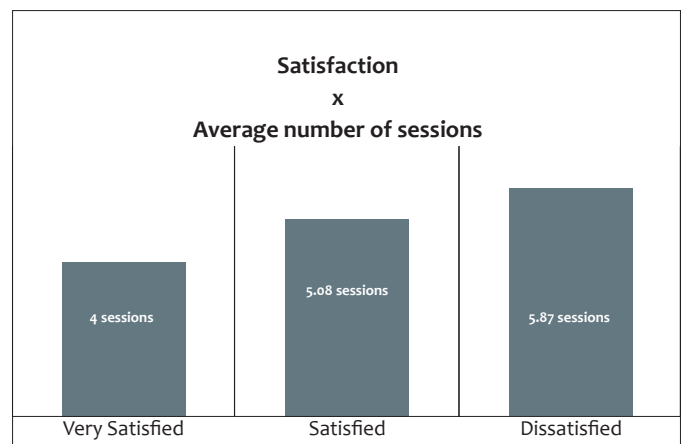
FIGURE 3: Before the treatment



FIGURE 4: After the treatment (three sessions)



GRAPH 1: Patient's Satisfaction Index



GRAPH 2: Patients' satisfaction / Average number of sessions

among those who were *very satisfied*, the average was 5.87 sessions (Graph 2). Adverse effects were considered mild, the most common being erythema in the first days, and mild pain during the procedure.

DISCUSSION

Fractional laser technology has been developed aimed at overcoming the limitations of conventional laser technologies. By creating microscopic zones of thermal damage, it preserves surrounding areas of skin that remain virtually untouched, facilitating the process of tissue regeneration and decreasing recovery time. Introduced in 2003, it had its use approved for the treatment of acne scars in 2007.¹¹

In a review article, Sheue *et al.* compared fractional technologies – ablative (e.g. CO₂) and non-ablative (e.g. ND:YAP), both of which used in the present study – in the treatment of acne scars. In the papers that included fractional ablative laser, scar improvement varied from 26% to 83%; while in the studies with non-ablative technologies, the improvement was somewhat lower, varying from 26% to 50%.¹¹

We believe that the association of these two technologies (ablative and non-ablative) in a single session yields much superior results than the isolated use of these technologies, shortening treatment time and increasing patient satisfaction. It is crucial to note that the authors of the present paper applied the CO₂ and ND:YAP lasers in this order, given that the edema caused by the latter would develop into tissue damage if subsequently exposed to CO₂ laser, which is attracted by water.

Since acne scars are difficult to treat, the authors of the present article have also decided to associate high-frequency electrosurgery (HFES), a simple, cost effective and straightforward method that leads to positive outcomes as demonstrated in a recent publication.

In light of the present study's results, it is possible to conclude that the association of the three therapies in a single session to treat acne scars led to an important degree of patient satisfaction, given that it is currently a difficult-to-treat condition. It was possible to observe that patient satisfaction and lesion improvement were greater among those who underwent a greater

number of sessions, meaning that the greater the number of sessions, the greater the improvement and the patients' satisfaction.

In addition, the improvement observed based on the analysis of the photographs evidences an important improvement in the scars' appearance.

CONCLUSION

The authors of the present study conclude that the association of high frequency electrosurgery, fractional CO₂ laser and ND:YAP laser in a single session and strictly observing this sequence of application, is safe and effective for the treatment of atrophic acne scars. ●

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