

Post-acne scar split face: A Comparative Study between Long Pulsed and Q-switched Nd : YAG Laser

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ABSTRACT

Background: Laser is a more promising option for post-acne scar treatment than other modalities. The process involved stimulating fibroblasts to fill and finish the scar defect, replacing the lost collagen and elastin dermal components.

Methods: : A total of 25 patients with different skin types suffering from mild, moderate and severe facial acne scars, were split face group: (Rt side with Long pulsed 1064nm Nd-YAG laser and Lt side with Q-switched 1064nm Nd-YAG laser)

Results: There was statistical significance differences in number of sessions among Rt side compared to Lt side. Also there was decrease in frequency of inflammation among Lt side compared to other side, and decrease in frequency of bleeding and edema among Rt side compared to other side and finally increase in frequency of hyperpigmentation Lt side compared to Rt side.

Conclusion: Q-switched and long-pulsed 1064 nm Nd-YAG lasers are considered an efficient and safe modality for the treatment of mild to moderate post-acne facial scars, particularly in elderly patients (30-40 years of age) with type 4 skin without the need for downtime, and in this study their daily activity was not disturbed, but we found that Q-switched is more effective and satisfied.

Keywords: Postacne scar ; Q-switched Nd: YAG laser; long pulsed Nd: YAG laser

INTRODUCTION

Acne occurs when hair follicles are clogged with dead skin cells and oil from the skin. It affects areas of the skin with a relatively large number of oil glands, including the ears, the upper chest and the skin of the back . Areas described include blackheads or whiteheads, pimples, greasy skin and potential scarring [1].

Treatment for facial acne scars remains a great challenge for both the patient and the dermatologist. Different therapeutic modalities, including chemical peels, surgical excision, punch grafting, dermabrasion and filler injection, have been used over the years, all with varying results. The variables described for these various outcomes are incomplete scar removal, poor intraoperative visualization, and transmission of infectious debris, scar worsening, tissue fibrosis and permanent pigment alternation [2].

Laser is an effective treatment for post-acne scar treatment and is more promising to use than other

modalities. The use of different laser types, including non-ablative and ablative lasers, is very helpful. The mechanism involved stimulating the fibroblasts in order to fill and complete the scar defect in order to replace the lost collagen and elastin dermal components [3].

The objective of this study was to evaluate the clinical efficacy, safety and long-term effects of long-pulsed and Q-switched 1,064-nm neodymium: yttrium-aluminum-garnet (Nd YAG) lasers in the treatment of acne scars.

METHODS

A pre & post intervention study on 25 patients aged more than 18 years old. The study was conducted between March 2019 to December 2019 in the outpatient clinics of Dermatology, Venereology and Andrology department, Zagazig University Hospitals after obtaining approval of Institutional Review Board. Written informed consent was obtained from all participants. The

study was done according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

The study included: a total of 25 patients with different skin types suffering from mild, moderate and severe facial acne scars, according to Goodman and Baron grading system. Split face group (Rt side with Long pulsed 1064nm Nd - YAG laser and Lt side with Q-switched 1064nm Nd-YAG laser).

Inclusion criteria:

Patients had post acne scars, age 18-44 years old and both sexes, male and female.

Exclusion criteria:

Exclusion criteria included keloidal tendency, pregnancy, active acne, immunosuppression, history of herpes simplex, concomitant isotretinoin use and patients who were using any topical treatments for acne scars.

No concomitant cosmetic procedures are allowed between the laser sessions and no topical drugs were prescribed except sunscreens and topical antibiotic creams in the post procedure period.

In this study, we used operator (1064-nm Q-switched Nd-YAG laser (Medlite IV; Continuum, Santa Clara, Calif) with an average fluence of 3.4J/cm², a 6-mm spot size, a 4-to 6-nano second pulse duration, and a repetition rate of 10 Hz. Overlapping pulses were delivered until the immediate treatment end point of mild to moderate erythema was achieved. A total of 6 treatments at 2-week intervals were administered.

We also used 1064-nm Long pulsed Nd-YAG laser with an average fluence of 14J/cm², a 3 nano second pulse duration, and a repetition rate of 1 Hz. Overlapping pulses were delivered until the immediate treatment end point of mild to moderate erythema was achieved. A total of 6 treatments at 2-week intervals were administered. We treated all patients with the same laser fluence and treatment density irrespective of their depth or morphological type.

The laser parameters were kept identical at each visit. We treated all patients with the same laser fluence and treatment density irrespective of their depth or morphological type. At the outset, the session takes around 10-15 minutes to be completed. We recommended 6 sessions, to be done 2weeks apart.

Skin care after laser session is critical for achieving successful results. Effective medications and management techniques can help to minimize expected effects of the procedure such as crusting,

discomfort, pruritus, erythema, and swelling. As known, immediately after the laser, skin is dry and desquamated and after some minute erythema and edema occur. The patients were instructed to avoid direct sun exposure for the next 4-5 days after each procedure and a topical nonocclusive antibiotic cream formulation e.g. fusidic acid was applied twice daily throughout the following 3 days after laser session.

The patients were allowed to wash their face gently using glycerin soaps. The patients were also encouraged to use a broad-spectrum sunscreen every morning 30 minutes before going out and repeated every two hours. Adverse effects seen were not significant and none of the enrolled patients had any long-term or permanent side effects from the procedure.

At the 3-month follow-up visit after the last laser session, the response to laser sessions was classified to excellent, good (moderate) and fair response. A positive response with either good or excellent results was documented in 43 patients corresponding to 86.6% of the patients. Excellent response was observed in a total of 17 patients (26.6%). Twenty six patients (60%) showed a moderate to good response while seven patients (13.4 %) showed fair response. Majority of patients in this study were of excellent to good response with 86.6% improvements of post acne scars after laser sessions.

Statistical analysis

Data collected throughout history, basic clinical examination, laboratory investigations and outcome measures coded, entered and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) (Statistical Package for the Social Sciences) software for analysis. According to the type of data qualitative represent as number and percentage, quantitative continues group represent by mean \pm SD, the following tests were used to test differences for significance;. Differences between frequencies (qualitative variables) and percentages in groups were compared by Chi-square test. Differences between parametric quantitative independent multiple groups by ANOVA test. P value was set at <0.05 for significant results & <0.001 for high significant result.

RESULTS

There were no statistical significant differences between the studied groups in age or sex distribution **Table (1)**. There were no statistical

significance differences between the studied groups in skin type, lesions or scar type **Table (2)**. There was statistical significant decrease in number of sessions among Rt side compared to Lt side. Also there was statistical significant decrease in frequency of inflammation among Lt side compared to other side, statistical significant decrease in frequency of bleeding and edema among Rt side compared to other side and finally statistical significant increase in frequency of hyperpigmentation among Group II compared to other group **Table (3)**.

There was a statistical significant differences decrease in scar improvement score in Rt side compared to other side in 1st, 2nd, 3rd and fifth sessions. Regarding difference in each group there was a statistical significance decrease in scar improvement score with increased number of sessions in all groups **Table (4)**.

There was statistical significant decrease in the degree of improvement among Rt side compared to other side in 1st& 2nd sessions. Also there was statistical significant increase in frequency of improvement among Lt side compared to other

side in 3rdsessions. In 5th sessions there was a statistical significance significant decrease in improvement among Rt side compare to other side. Regarding difference in each group there was a statistical significant decrease in degree of improvement with increase number of sessions in each group **Table (5)**.

There was statistical significance increase in frequency of bad response among Rt side compared to other side **Table (6)**. There was statistical significance increase in frequency of not satisfied among Rt side compared to other side **Table (7)**. There was statistical significance increase in mean age among excellent and good responded cases in groups.

There were statistical significant increases in frequency of female among excellent and good responded cases in Lt side. There were statistical significant increases in satisfaction among excellent and good responded cases in Lt side .There were no statistical significant relation between number of sessions and side effect among the studied group (**Figure 1**).

Table 1. Clinical data of the studied groups

	Variable	Groups (n=25)	
		No	%
Skin type	II	5	20
	III	10	40
	IV	10	40
Lesion	Mild post acne scar	10	40
	Moderate post acne scar	5	20
	Sever post acne scar	10	40
Scar	Boxcar	5	20
	Icepick	5	20
	Rolling	10	40
	Mix	5	20

χ^2 :chi square test

NS: Non significant (P>0.05)

Table 2. Number of sessions and Side effects of the studied groups:

Variable	Rt side (n=25)		Lt side (n=25)		t	P
	b		b			
Mean ± Sd	5.65 ± 0.56		5.68 ± 0.61		0.18	0.98
Range	5 - 6		5 - 6			
	No	%	No	%	χ^2	P
Inflammation	25	100	15	60	18.63	<0.001**
Bleeding	5	20	20	80	27.56	<0.001**
Edema	0	0	10	40	18.63	<0.001**
Hyperpigmentation	0	0	5	20	11.63	0.012*

SD: Standard deviation

t: t test

χ^2 :chi square test

*: Significant (P<0.05)

** : Highly significant (P<0.01)

Table 3. Final response among the studied groups

Variable	Rt side (n=25)		Lt side (n=25)		χ^2 fisher	P
	No	%	No	%		
Excellent	0	0	0	0	7.41	0.059
Good	5	2	14	0		
Moderate	5	0	6	56		
Mild	15	6	5	24		
		0		20		

χ^2 :chi square test

** : Highly significant (P<0.01)

Table 4. Satisfaction among the studied groups

Variable	Rt side (n=25)		Lt side (n=25)		χ^2	P
	No	%	No	%		
Very satisfied	0	0	5	20	4.26	0.23
Satisfied	10	40	9	36		
Slightly satisfied	5	20	6	24		
Not satisfied	10	40	5	20		

χ^2 :chi square test

*: Significant (P<0.05)

Table 5. Relation between age and response among the studied groups

Group	Variable	Excellent & good	Moderate & mild	T	P
Rt side	Age: (years)	(n=5)	(n=20)	1.49	0.16 NS
	Mean ± Sd	35.4 ± 0.55	30 ± 1.62		
	Range	34 – 37	28 – 32		
Lt side	Age: (years)	(n=11)	(n=14)	1.80	0.07 NS
	Mean ± Sd	33.5 ± 2.74	28.73 ± 0.91		
	Range	31 – 37	28 – 31		

SD: Standard deviation: Independent t test

NS: Non significant (P>0.05)

** : Highly significant (P<0.01)

Table 6. Relation between sex and response among the studied groups

Group	Variable	Excellent & good		Moderate & Mild		χ^2	P
		No	%	No	%		
Rt side	Sex:	(n=5)		(n=20)		9.38	0.002 **
	Female	0	0	15	75		
	Male	5	100	5	25		
Lt side	Sex:	(n=14)		(n=11)		0.24	0.62 NS
	Female	9	64.3	6	54.5		
	Male	5	35.7	5	45.5		

χ^2 :Chi square test

NS: Non significant (P>0.05)

** : Highly significant (P<0.01)

Table (7): Relation between satisfaction and response among the studied groups

Group	Variable	Excellent & good		Moderate & mild		χ^2	P
		No	%	No	%		
Rt side	Satisfaction:	(n=5)		(n=20)		9.38	0.009 **
	Satisfied	5	100	5	25		
	Slightly satisfied	0	0	5	25		
	Not satisfied	0	0	10	50		
Lt side	Satisfaction:	(n=14)		(n=11)		25	<0.001 **
	Very satisfied	5	35.7	0	0		
	Satisfied	9	64.3	0	0		
	Slightly satisfied	0	0	6	54.5		
	Not satisfied	0	0	5	45.5		

χ^2 : Chi square test

NS: Non significant (P>0.05)

** : Highly significant (P<0.01)

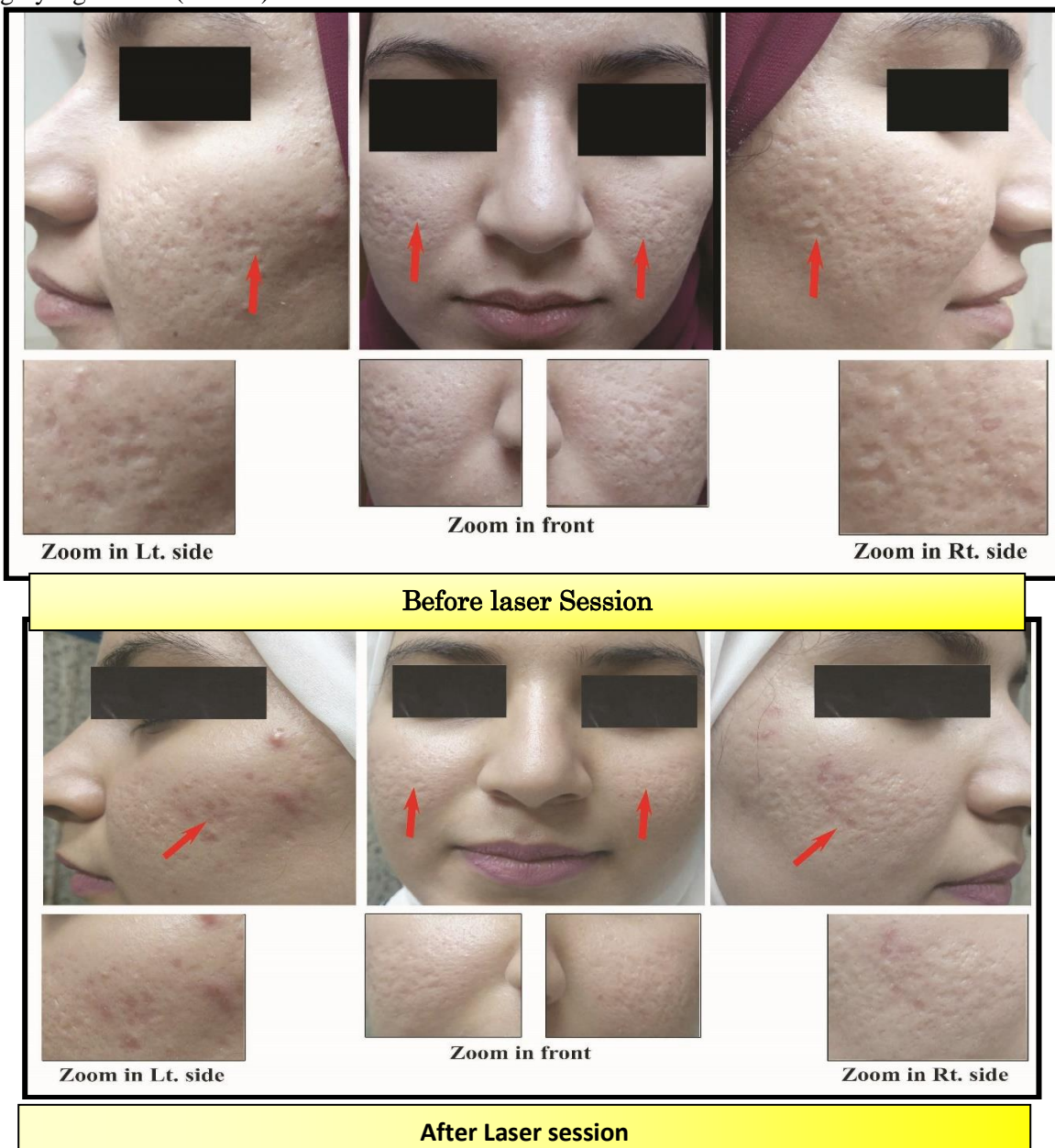


Figure (1): Female patient age 21 with post acne scars treated with long pulsed Nd_YAG laser on right side of face and Q-switched Nd_YAG laser on left side of face showing moderate response on left side.

DISCUSSION

Acne vulgaris is a common skin disease that results in scarring frequently. Scars that are secondary to acne can lead to physical disfigurement, and these acne scars can have a psychosocial impact. The best way to minimize and prevent acne scarring is to treat acne efficiently[4].

For both patients and dermatologists, treatment for acne scarring creates a challenge. Each type of scar has a distinct structure that requires a personalized approach. The selection of a treatment approach depends on factors such as acne scarring type and degree, patient preference, side effects, cost, and availability of treatment. To achieve the best cosmetic results, a multimodality approach is needed for scar treatment [5].

The results of this study were consistent with that reported by Friedman et al. 6, who reported 8.9% improvement in roughness analysis at mid-treatment (1 month after the third treatment session). This improvement increased to 23.3 %, 31.6 %, and 39.2 % respectively at 1, 3, and 6 months following the fifth treatment. With treatment, patients reported mild to moderate pain. Transient erythema and mild pinpoint petechiae were the only adverse effects noted.

The long, pulsed laser shows the efficacy of acne scarring as well. In one split face trial, 19 patients (Fitzpatrick skin type IV-V) were treated with the Nd-YAG laser alone on one side of the face and treated with a combination of 1,064 nm Nd-YAG and 585 nm pulsed dye lasers on the contralateral side. The combination laser produced more favorable results after three treatment sessions (32 % vs. 27 % improvement). This difference was notable when deeper scars were considered. The authors reported 37.5% versus 26.7% mean improvement for the combined laser when treating deep boxcar scars[7].

The results of this study were also consistent with the study by Friedman et al . 8, which included 11 patients with mild to moderate atrophic acne scarring (8 females, 3 males; ages 28-50 years; skin phototypes I-III) and showed significant qualitative and quantitative improvements in their facial acne scars. Improvement increased to 23.3%, 31.6%, and 39.2% at 1, 3, and 6 months after the fifth treatment, respectively. They received five treatment sessions with the Q-switched Nd-YAG laser 1064 nm (3.5 J/cm² fluence, 6 mm spot size);

improvements were increased to plateau by the 6-month evaluation. Several months after the last non-ablative laser session, continued improvements have been observed, suggesting that continued long-term dermal remodeling occurs even after the cessation of actual laser treatment.

Results of this study were consistent also with Yaghmai et al. 9, who directly compared the long pulsed 1,064 and 1,320 nm Nd_YAG lasers in a split face study of 12 patients (FST I–III). Average improvement was 28% for the 1,064 nm laser, compared to 22% for the 1,320 nm laser after three treatment sessions. At least 30% improvement was observed in 58% of patients in the 1,064 nm group, compared to 42% of patients in the 1320 nm group Erythema lasted for 4–5 hours in both groups; but, treatment with the 1,064 nm laser was associated with less procedural pain [10].

Results of this study were not consistent with that reported by Maluki and Falih 11 who had reported that the efficacy of the Q-switched laser for atrophic acne scars is conflicting. In one study of 10 Iraqi patients (FST III), there were no significant improvements seen after five treatments with the 1064 nm Q-switched laser.

Results of this study were not consistent with the study of Azar and Falih 12 using Q-switched Nd-YAG laser (1064 nm) in the treatment of atrophic facial scars of acne vulgaris was statistically insignificant, although it is an easy procedure and well tolerated by the patients.

The Nd-YAG laser (1064 nm) has been shown to provide a safe and effective non-invasive therapy for mild to moderate facial acne scarring. The results are long lasting and continue well beyond the last treatment, indicating ongoing remodelling of collagen after the laser treatment sessions have been completed. Nonablative treatment with the Q-switched Nd_YAG laser (1064 nm) offers significant advantages to patients in terms of its minimal recovery period and minimal risk of infectious and pigmentary complications[6].

Q-switched and long-pulsed 1064 nm Nd-YAG lasers are considered an efficient and safe modality for the treatment of mild to moderate post-acne facial scars, particularly in elderly patients (30-40

years of age) with type 4 skin without the need for downtime, and in this study their daily activity was not disturbed, but we found that long pulsed is more effective and satisfied.

CONCLUSION

Q-switched and long-pulsed 1064 nm Nd-YAG lasers are considered an efficient and safe modality for the treatment of mild to moderate post-acne facial scars, particularly in elderly patients (30-40 years of age) with type 4 skin without the need for downtime, and in this study their daily activity was not disturbed, but we found that Q-switched is more effective and satisfied

Conflicts of interest: no conflicts of interest

Financial disclosures: no disclosures

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To Cite:

Gharib, K., Ahmed, S., Khater, E. Post-acne scar split face: A Comparative Study between Long Pulsed and Q-switched Nd : YAG Laser. *Zagazig University Medical Journal*, 2024; (273-279): -. doi: 10.21608/zumj.2021.77651.2243