

A comparative study between fractional microneedling radiofrequency with systemic isotretinoin and fractional microneedling alone in the treatment of rosacea

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Abstract

Introduction: Rosacea is a chronic inflammatory disease presenting with facial flushing, non-transient erythema, papules/pustules, telangiectasia, and phymatous changes. Secondary manifestations, such as itching, burning, or stinging, are often observed in patients with rosacea. The pathogenesis of rosacea is not fully understood, but immune dysfunction, Demodex infection, neurovascular dysregulation, and exposure to ultraviolet radiation represent contributing factors.

Aim: To evaluate and compare effectiveness of fractional micro-needling radiofrequency with systemic isotretinoin and micro-needling alone in the treatment of rosacea.

Material and methods: A cross-sectional comparative study between fractional microneedling radiofrequency with systemic isotretinoin and micro-needling alone in the treatment of rosacea was carried out in a private outpatient clinic and Al-Yarmouk teaching hospital from January 2022 to June 2023. Group A comprised 25 patients treated with systemic isotretinoin (10 mg/day) for 6 weeks and fractional microneedling radiofrequency for 16 weeks. Patients received a session every 2 weeks during the first 2 months of treatment then one session per month. Group B comprised 25 patients treated with fractional microneedling radiofrequency for 16 weeks. The patients received a session every 2 weeks during the first 2 months of treatment then one session per month. Measurement of baseline serum lipid profile, complete blood count, and liver enzyme levels was done to all patients receiving isotretinoin. All patients in both groups were instructed to use sunscreen and emollients. Follow-up of all patients was carried out for 3 months after treatment. Patients were assessment according to the Grade system of rosacea, patient satisfaction, and relapse rate. Relapse rate: no relapse (0), relapse (1). Patient satisfaction: poor (0), fair (1), and good (2).

Results: There was no significant difference in the mean severity score for rosacea between group A and group B, before, after 8 weeks, and after 16 weeks. Patients in group A showed higher good satisfaction (72%) than group B (32%). During the follow-up period the relapse rate was higher in group B (32%) than in group A (16%), the percentage reduction (response rate) of the mean of severity score was 41.37% after 8 weeks and 91.37% after 16 weeks in group A, and 34.48% after 8 weeks and 82.75% after 16 weeks in group B.

Conclusions: Fractional microneedling radiofrequency is a safe and effective method in the treatment of rosacea, and so it can be used when there are contraindications to other lines of therapy, when patients are resistant to long-term oral therapy, and when patients (including pregnant women) choose not to take oral or topical drugs.

Key words: effectiveness, isotretinoin, fractional microneedling radiofrequency.

Introduction

Rosacea is a chronic inflammatory disease presenting with facial flushing, non-transient erythema, papules/pustules, telangiectasia, and phymatous changes [1]. Secondary manifestations, such as itching, burning, or stinging, are often observed in patients with rosacea [2]. The pathogenesis of rosacea is not fully understood [3],

but immune dysfunction, Demodex infection, neurovascular dysregulation, and exposure to ultraviolet radiation represent contributing factors [4, 5]. Rosacea is classified into 4 subtypes: erythematotelangiectatic, papulopustular, phymatous, and ocular. Evolution of one subtype into another is not implied in this classification [6]. In 2017, a phenotype-based approach for diagnosis and classifica-

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tion was recommended [7, 8]. According to the severity of the clinical symptoms and signs, rosacea is graded from 1 to 3, where grade 1 is mild disease, grade 2 is moderate, and grade 3 is severe disease [9]. General skin care is recommended for all rosacea patients and represents an important component of the therapeutic regimen including encouragement to practise gentle skin care, with a focus on moderation in cleansing and moisturising and the use of sun screens, due to the impairment of the epidermal barrier function as well as the sensitive and easily irritated nature of the facial skin [10]. Topical treatments of rosacea include topical brimonidine, topical oxymetazoline, topical azelaic acid, topical ivermectin, topical metronidazole, and topical minocycline recommended for the treatment of papules/pustules [11]. Topical or systemic tranexamic acid [12], doxycycline 40 mg modified release, isotretinoin, and minocycline have been recommended as treatment for reducing papules/pustules [11]. Oral β -blockers might be useful to treat persistent erythema and flushing [13]. Laser (pulsed dye laser) and intense pulsed light (IPL) therapy are recommended for the treatment of erythema, and mainly telangiectasia [11]. Microneedling radiofrequency delivers bipolar radiofrequency directly to the dermis using an array of microneedles [14]. FMR has been reported to improve skin laxity and wrinkles [14]. Bipolar radiofrequency has been reported to induce profound neoelastogenesis and neocollagenesis, which has been suggested as a potential mechanism of clinical efficacy [15]. Moreover, FMR has been shown to have a therapeutic effect on inflammatory skin diseases, such as acne [16]. Microneedling radiofrequency also reduced the expression of markers related to inflammation, innate immunity, and angiogenesis in immunohistochemical staining of tissue obtained after FMR treatment [17]. Isotretinoin is a naturally occurring retinoid resulting from the metabolism of vitamin A. 13-cis-RA and at-RA are 2 physiologically interconvertible isomers that differ in their elimination half-lives: approximately 20 h and 1 h, respectively [18]. The mechanisms of action include modulation of proliferation and differentiation, anti-keratinisation, alteration of cellular cohesiveness, anti-acne, and anti-seborrheic effects, immunologic and anti-inflammatory effects, induction of apoptosis, and effects on extracellular matrix components [19, 20].

Aim

The aim of the study was to evaluate and compare effectiveness of fractional micro-needling radiofrequency with systemic isotretinoin and micro-needling alone in the treatment of rosacea.

Material and methods

A cross-sectional comparative study between fractional microneedling radiofrequency with systemic isotretinoin and microneedling alone in the treatment

of rosacea was carried out in a private outpatient clinic and Al Yarmouk teaching hospital from January 2022 to June 2023. Group A comprised 25 patients treated with systemic isotretinoin (10 mg/day) for 6 weeks and fractional microneedling radiofrequency for 16 weeks; the patients received a session every 2 weeks during the first 2 months of treatment then one session per month. Group B comprised 25 patients treated with fractional microneedling radiofrequency for 16 weeks; the patients received a session every 2 weeks during the first 2 months of treatment and then one session per month. Measurement of baseline serum lipid, complete blood count, and liver enzyme levels was done to all patients receiving isotretinoin. All patients in both groups were instructed to use sunscreen and emollients. Follow-up of all patients was carried out for 3 months after treatment. Patients were assessed according to the Grade system of rosacea, patient satisfaction, and relapse rate. Erythema-telangiectatic rosacea grading: absent (grade 0); mild (grade 1) – occasional flushing, mild erythema; moderate (grade 2) – frequent flushing, moderate erythema, telangiectasis present; and severe (grade 3) – severe flushing, marked erythema, and many telangiectasias. Papulopustular rosacea grading: absent (grade 0); mild (grade 1) – few papules/pustules (< 5), mild perilesional erythema, little tendency to flush; moderate (grade 2) – several papules/pustules (> 5 but < 10), significant coalescing erythema around lesions, tendency of temperature intolerance and flushing; and severe (grade 3) – many papules/pustules (> 10), plaques of coalescing erythema, oedema may be present, scaling, and dermatotic changes may be present, marked intolerance of temperature change with resultant flushing. Relapse rate: no relapse (0), relapse (1). Patient satisfaction: poor (0), fair (1), and good (2). Parameters for patient satisfaction: 1. Compliance with RX. 2. Free of clinical symptoms. 3. Coast versus effects. 4. Better life style. 5. Self-confidence with a healthy looking face (better cosmetic results).

Results

During the study duration of 18 months a total of 50 patients were diagnosed to have rosacea, 25 patients in group A and 25 patients in group B, with an age range from 20 years to 56 years. The mean age in group A was 40.04 \pm 7.46 years, and the mean age in group B was 38.2 \pm 9.63 years (Table 1).

Gender distribution: group A – 7 (28%) male and 18 (72%) female; group B: 8 (32%) male and 17 (68%) female, as shown in Table 2.

Group A comprised 25 patients treated with systemic isotretinoin (10 mg/day) for 6 weeks and fractional microneedling radiofrequency for 16 weeks; patients received a session every 2 weeks during the first 2 months of treatment then one session per month. Erythematotelangiectatic rosacea presented in 17 (68%) of the patients

Table 1. Age distribution in group A and group B

Age [years]	Group A	Group B
20–30	3 (12%)	4 (16%)
31–40	9 (36%)	11 (44%)
41–50	10 (40%)	8 (32%)
51–60	3 (12%)	2 (8%)
Total	25 (100%)	25 (100%)

Table 3. Effect of treatment with systemic isotretinoin and fractional microneedling radiofrequency on mean severity score

Group A	Mean	SD	P-value
Before treatment	2.32	0.56	
After 8 weeks	1.36	0.64	< 0.0001
After 16 weeks	0.20	0.41	

Table 5. Comparison between the effectiveness of treatment in both groups

Parameter	Mean	SD	P-value
Before treatment:			
Group A	2.32	0.56	1.000
Group B	2.32	0.63	
After 8 weeks:			
Group A	1.36	0.64	0.332
Group B	1.52	0.51	
After 16 weeks:			
Group A	0.20	0.41	0.127
Group B	0.40	0.50	

and papulopustular rosacea in 8 (32%) of the patients. The mean \pm SD severity score before therapy was 2.32 ± 0.56 , and after 8 weeks of therapy it fell to 1.36 ± 0.64 , p -value < 0.0001. More declines were observed after 16 weeks of therapy, when the mean was 0.20 ± 0.41 , p -value < 0.0001 (Table 3). The percentage reduction for mean of severity score (response rate) was 41.37% after 8 weeks and 91.37% after 16 weeks. The effectiveness of treatment in erythematotelangiectatic rosacea was comparable to that of papulopustular rosacea, with response rates of 92.13% and 89.49%, respectively.

Group B comprised 25 patients treated with fractional microneedling radiofrequency for 16 weeks; the patients received a session every 2 weeks during the first 2 months of treatment and then one session per month. Erythematotelangiectatic rosacea presented in 14 (56%) patients and papulopustular rosacea in 11 (44%) of patients. The mean \pm SD severity score before therapy was

Table 2. Sex distribution in group A and group B

Sex	Group A	Group B
Male	7 (28%)	8 (32%)
Female	18 (72%)	17 (68%)
Total	25 (100%)	25 (100%)

Table 4. Effect of treatment with fractional microneedling radiofrequency alone on mean severity score

Group B	Mean	SD	P-value
Before treatment	2.32	0.63	
After 8 weeks	1.52	0.51	< 0.0001
After 16 weeks	0.40	0.50	

Table 6. Comparison between patient satisfaction in both groups

Patient satisfaction	Group A	Group B
Good	18 (72%)	8 (32%)
Fair	6 (24%)	16 (64%)
Poor	1 (4%)	1 (4%)
Total	25 (100%)	25(100%)

2.32 ± 0.63 , and after 8 weeks of therapy it fell to 1.52 ± 0.51 , p -value < 0.0001. More declines were observed after 16 weeks of therapy: the mean was 0.40 ± 0.50 , p -value < 0.0001 (Table 4). The percentage reduction for mean severity score (response rate) was 34.48% after 8 weeks and 82.75% after 16 weeks. The effectiveness of treatment in erythematotelangiectatic rosacea was comparable to that for papulopustular rosacea, with response rates of 82.30% and 83.48%, respectively.

There is no significant difference in mean severity score between group A and group B before, after 6 weeks, and after 12 weeks, as show in Table 5.

In group A, patient satisfaction was good in 18 (72%), fair in 6 (24%), and poor in one (4%) of the patients, while in group B, patient satisfaction was good in 8 (32%), fair in 16 (64%), and poor in one (4%) of the patients (Table 6). During the follow-up period the relapse rate was higher (32%) in group B than in group A (16%), with a non-relapsing rate of 84% in group A and 48% in group B (Table 7).

Discussion

From the results above, it is apparent that there is no significant difference in effectiveness of treatment with fractional microneedling radiofrequency with systemic isotretinoin (group A) and fractional microneedling alone (group B) in the treatment of rosacea. However,

Table 7. Comparison between relapsing and non-relapsing rates in both groups

Parameter	Group A	Group B	P-value
Non relapse	21 (84%)	17 (68%)	0.189
Relapse	4 (16%)	8 (32%)	0.189
Total	25 (100%)	25 (100%)	

group A showed a higher response rate (91.37%) when compared with group B (82.75%). Group A also showed a higher percentage of patients with good satisfaction (72%) compared to group B (32%), while the relapse rate was higher (32%) in group B than in group A (16%). No side effects were reported during the treatment apart from mild dryness in group A, which resolve with use of emollients. The results in group A contributed to a synergistic effect of isotretinoin due to its anti-inflammatory effects [21], its ability to regulate innate immunity by negatively modulating the expression of TLR2 in keratinocytes [22], and reduce sebum production and sebaceous gland size, thus improving disrupted sebaceous gland function [23] and inhibit angiogenesis [24]. Microneedling radiofrequency reduced the expression of markers related to inflammation, innate immunity, and angiogenesis [17]. When comparing this result with previous studies that used isotretinoin alone, one study show comparable result with a response rate of 91%, but with higher dose and longer duration [25], while another 2 studies showed lower response rates than group A (91.37%) and group B (82.75%). In the first study a marked improvement in 57% of patients was seen with isotretinoin treatment, and marked improvement in 55% of patients treated with doxycycline [26]. In the second study the response rate was 62.5% for patients treated with isotretinoin [27]. Group A also showed a higher response rate (91.37%) than intense pulsed light (IPL) in the treatment of rosacea (77.8%), while the response rate in group B was (82.75%), which is comparable to that of intense pulsed light (IPL) (77.8%) [28]. The results in both group A and group B appear to be comparable to those of pulsed dye laser in the treatment of rosacea, which shows moderate to excellent results in 85% of patients [29, 30]. The results in both group A and group B were also comparable to results associated with use of a new 532 nm, variable-pulse-structure, dual-wavelength, KTP laser incorporating cryogen spray cooling, which showed a success rate of 89% [31]. This result supports a previous study which concluded that FMR is a safe and effective treatment for post-inflammatory erythema, with potential anti-inflammatory and anti-angiogenetic properties [32].

Conclusions

Fractional microneedling radiofrequency is a safe and effective method in the treatment of rosacea and can be used when there are contraindications to other lines of therapy, when patients are resistant to long-term oral

therapy, and when patients (including pregnant women) choose not to take oral or topical drugs.

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Ethical approval

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Conflict of interest

The authors declare no conflict of interest.

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