

Treatment of Acne Scars With High Intensity Focused Radio Frequency

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ABSTRACT

In this multi-site case series, the efficacy of high intensity focused radiofrequency (RF) delivered to the dermis was evaluated for treating acne scars. A novel delivery system that uses insulated microneedles to deliver a desired thermal effect to multiple depths of the dermis while sparing the epidermis from RF injury was used. Four (4) healthy subjects from four different practices were evaluated and used in this case report. The subjects were treated between 3 or 4 times depending on the severity of the acne scars presented. The depth of thermal delivery was adjusted before each pass and all subjects received at a minimum, three passes to the treated area. Before and after photographs along with adverse effects were recorded. The theory behind the use of insulated needles with the active RF delivery at the distal tip is to allow for significant thermal injury to several layers of the dermis while avoiding thermal injury to the epidermis. This case report demonstrates significant improvement on acne scars and that all skin types should be safely treatable with minimum downtime realized.

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INTRODUCTION

Acne is the most common skin disease, having up to a prevalence of 100% in adolescence in the United States.¹ If not controlled properly, cystic and inflammatory lesions have the potential to leave acne scars (ice pick, pitted, box car, and rolling scar variants). The development of fractional laser resurfacing has revolutionized the treatment of acne scarring and is today considered the gold standard for treating acne scarring.²⁻⁴ Following the development of fractional technology with lasers, other energy sources were also used in fractionated patterns, such as radiofrequency and ultrasound. One of the limitations in treating acne scarring with fractional lasers is the risk of hyperpigmentation, particularly in ethnic and darker Fitzpatrick skin phototypes.⁵ Because radiofrequency energy is not specifically absorbed by melanin and can be delivered through an array of insulated microneedles at precise depths that spare the epidermis, it has been explored in the treatment of acne scars. Here we report a small case series of patients treated at four different dermatologic surgery practices.

METHODS

The Infini (Lutronic Inc.) delivers high intensity focused bipolar radiofrequency energy through an array of insulated 200 micron thick microneedles that are arranged in a 7 X 7 array (49 microneedles) with a total spot size of 10 X 10mm. Penetration depth can be controlled from 0.5mm to 3.5 mm. Controlling

the depth of the needle penetration allows for the creation of a latticework of focal RF injuries thus customizing the treatment, in this case deeper in the dermis for treating acne scars. The RF energy can be adjusted from power setting 1 (2.5 W) to a maximum of setting 20 (50 W) with an exposure (on) time that ranging from 10 ms to 1 second. Having insulated needles, except for the active tip, also insures maximum thermal injury zones in the target zone while allowing for little to no long-term damage to the epidermis. Patient downtime is usually no more than 4-8 hours.

Case 1

The patient is a 28-year-old resident physician who had severe acne in her teenage and young adult life requiring two course of isotretinoin. She presented complaining about the persisting acne scarring she was left with (Figure 1). Treatment options including ablative and nonablative fractional lasers and high intensity focused fractionated radiofrequency were reviewed. Her occupation would not allow for extended time off that would be required with ablative and nonablative fractional resurfacing. Additionally she was of mixed Northern European and Middle Eastern heritage with the ability to tan with sun exposure. We opted to treat her with the fractionated radiofrequency device for the sake of less downtime and to minimize any risk of pigment changes.

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"Controlling the depth of the needle penetration allows for the creation of a latticework of focal RF injuries thus customizing the treatment, in this case deeper in the dermis for treating acne scars."

The patient underwent three treatments over a course of six months. The treatment protocol was as follows: The patient was anesthetized with topical Lidocaine 23%/Tetracaine 7% for 45 minutes. The topical anesthesia was removed with sterile gauze and then the area was prepped with chlorhexidine and then saline soaked gauze. The settings were: Three passes, 1st pass: 3mm depth/Level 12/300ms, 2nd pass: 2mm depth/Level 10/200ms 3rd pass: 1mm depth/Level 8/160. The patient was able to return to work the same day of treatment with minimal discomfort after each of the three treatments. She noted her swelling was mild and lasted 1-2 days. She did not experience any bruising or epidermal changes. She also did not notice any flare in her acne during the recovery period. On follow-up three months following her third treatment, she noted high satisfaction and rated her improved to be >95% from baseline (Figure 1).

FIGURE 1. Infini Case 1. Photo courtesy of Dr. Ibrahim.



Case 2

The patient is a 30-year-old Hispanic male who had severe cystic acne as a teenager and into his early 20s, treated with a course of isotretinoin at age 14. He presented complaining of significant residual acne scarring on the face (Figure 2). He had received no cosmetic treatments in the past and was initially treated with a 1540-nm Erbium:Glass nonablative fractional laser (StarLux-500™, Palomar Medical Technologies, Inc., Burlington, MA) utilizing an extra deep (XD™) handpiece. After three treatments spaced one month apart, the patient did not appreciate significant improvement in his scarring and treatments with high intensity focused fractionated radiofrequency were initiated.

He has since undergone four treatments spaced a month apart. The treatment protocol has been as follows: The patient was anesthetized with topical Lidocaine 15%/prilocaine 5%/phenylephrine for 60 minutes. The topical anesthesia was removed with sterile gauze and then the area was prepped with chlorhexidine. The settings have varied during his treatments. His first two treatments utilized a two pass technique, 1st pass: Level 10/400ms, with depths of 1.5 mm over the zygoma, temples, and forehead, and 2.0 mm on the lower cheeks, upper lip, and chin; 2nd pass: 1 mm depth/Level 10/300ms to the entire face. His third and fourth treatments utilized a three pass technique, with similar settings to his prior treatments but with an additional pass at Level 10/300ms, depth of 1.5 mm to the cheeks. Following each treatment, topical triamcinolone cream and a combination antioxidant serum containing L-ascorbic acid, alpha tocopherol, and ferulic acid solution were applied. The patient reported mild swelling and erythema for 1-2 days after his treatments without bruising or pigmentary changes. The patient did experience significant discomfort during the treatment itself but this resolved immediately upon completion. At three-month follow-up after his fourth treatment, he expressed satisfaction with his results and rated his improvement to be 50% from baseline (Figure).

FIGURE 2. Infini Case 2. Photo courtesy of Dr. Weiss.



Case 3

The patient is 49 years old and had a history of cystic acne. He presented with significant acne scarring, had been on Accutane several years before and wanted to improve the appearance of his scars.

The patient underwent three treatments over a course of three months. The treatment protocol was as follows: The patient was anesthetized with topical Lidocaine 23%/Tetracaine 7% for 60 minutes. The topical anesthesia was removed with sterile gauze and then the area was prepped with chlorhexidine.

Treatment 1 consisted of 2 passes. The first pass was as follows: Left forehead at depth of 0.75mm, power at level 4, and duration of 80ms. Right forehead at depth of 1mm, power at level 6, and duration of 60ms. Both cheeks at a depth of 2.25mm, power at level 7, and duration of 130ms. Lower eyelids were treated at depth of 0.75mm, power at 6, and duration of 60ms. The second pass treated only both cheeks at depth of 1.5mm, power level of 5, and the duration at 100ms.

Treatment 2 consisted of 2 passes. The first pass was as follows: Left & right forehead at depth of 1mm, power at level 6, and a duration of 60ms. Temples at depth of 1mm, power at 8, and a duration of 60ms. The nose was treated at a depth of 2mm, power at 8, and duration of 90ms. Both cheeks at a depth of 2.25mm, power at level 9, and duration of 110ms. The chin was treated at depth of 2.5mm, power of 9, and duration of 110ms. The second pass treated both cheeks at depth of 1.5mm, power level of 8, and the duration at 90ms, and the nose at 1.5mm, power of 8, and duration of 60ms.

The third treatment also consisted of 2 passes. The first pass was as follows: The full forehead at a depth of 1mm, power level at 7, and duration of 70ms. The nose at a depth of 2mm, power of 8, and duration of 90ms. The cheeks at a depth of 2.5mm, power of 10, and duration at 110ms. The chin was at a depth of 2.5mm, power of 10, and duration of 110ms. The second pass was as follows: The full forehead at 0.5mm, power of 5, and duration of 50ms. The nose at a depth of 1.5mm, power of 8, and duration of 60ms. The cheeks at 2mm, power of 8, and duration of 90ms. The chin at a depth of 2mm, power at 8, and duration of 80ms.

No epidermal changes were experienced.

FIGURE 3. Infini Case 3. Photo courtesy of Dr. Mayoral.



Baseline

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Case 4

The patient is a 26-year-old Hispanic male presented with acne scarring from teenage years. No prior treatments were performed on this patient before the focused RF sessions. Anesthesia was achieved by a 5% topical lidocaine cream applied for 60 minutes plus the application of cold air (Cryo5, Zimmer) at a flow level of 5.

The patient underwent 4 sessions. Each session included 3 passes with the identical settings. The final photo is 2 months after the last treatment.

The settings were: First pass at a depth of 2.25mm, power level of 12, and the pulse duration at 300ms. Second pass was at a depth of 1.75mm, power level at 9, and the pulse duration of 180ms. The third pass was at a depth of 1.25mm, power level of 7, and a pulse duration of 120ms.

The patient reported some swelling for 2-3 days but otherwise was asymptomatic.

FIGURE 4. Infini Case 4. Photo courtesy of Dr. Ross.



Pre Treatments

Post 4 Treatments

FIGURE 5. Infini treatment downtime. Photo courtesy of Dr. Cohen.



Pre Treatment

Immediately Post

24 Hours Post

CONCLUSION

High Intensity Focused RF with insulated microneedles is a relatively new option to treat acne scarring in the United States. Potential advantages of this technology include the ability to treat the full spectrum of skin types with less downtime than

ablative and non-ablative fractional lasers. Using microneedles with focused RF thermal injury to the dermis should allow for improved outcomes over non-thermal microneedle delivery with fewer treatments and reduced epidermal injury. We are currently in the process of carrying out further studies to better characterize the efficacy of this treatment modality and to establish optimal treatment parameters.

DISCLOSURES

Dr. Omar Ibrahimi has received funding for research and consulting; Dr. Robert Weiss has received funding from equipment loan and clinical consulting; Dr. Flor Mayoral has received funding for clinical consulting; Dr. E. Vic Ross has received funding for consulting agreement and speaker honoraria. Dr. Joel Cohen has received funding for consulting and clinical studies.

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