

CASE REPORTS: COMBINATION OF A NEW RADIOFREQUENCY DEVICE AND BLUE LIGHT FOR THE TREATMENT OF ACNE VULGARIS

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Abstract

Acne vulgaris is the most common skin disease treated by physicians. Current topical and oral treatments may have short- and long-term negative consequences. Since radiofrequency (RF) energy has been shown to reduce sebum production and 410-nm blue light has been shown to kill *Propionibacterium acnes* (*P. acnes*) cells, these modalities in combination should be a highly effective treatment of acne vulgaris with little or no downtime or risk. This case report describes the efficacy and safety of RF energy (Accent™, Alma Lasers Inc, Buffalo Grove, IL) and blue light (BLU-U®, Dusa Pharmaceuticals, Inc, Wilmington, MA) used in combination to treat grade 4 cystic acne and acne scars in an Asian woman of skin type IV. The results were considered excellent by both investigators and the patient, with improvement in the skin tone as an added cosmetic benefit.

Introduction

Affecting more than 80% of young people, acne vulgaris is the most common skin disease treated by physicians. Current topical and oral medications are designed to counteract microcomedone formation, sebum production, and inflammation as well as kill the *Propionibacterium acnes* (*P. acnes*) cells. Issues about the short-term tolerability and long-term risks of retinoid and antibiotic use have generated interest in alternative therapies.¹

Excessive sebum secretion and *P. acnes* play major roles in the pathogenesis of acne. Radiofrequency (RF) energy appears to decrease sebum secretion,² and blue light (410 nm) destroys *P. acnes*.³ These therapies combined may provide efficacy better than either modality alone, and without downtime or significant risk of adverse effects.

This report describes the use of RF and blue light to treat grade 4 cystic acne and scarring in an Asian woman.

Case Report

A 23-year-old Asian woman (skin type IV) presented with a 4-year history of severe cystic acne, trials of multiple topicals and antibiotics, with adverse reactions to oral contraceptives. She refused to consider treatment with oral isotretinoin, prompting the clinician to prescribe an alternative combination therapy with RF and blue light energies. The patient provided signed informed consent to treatment. The Accent™ RF (Alma Lasers Inc, Buffalo Grove, IL) device uses both unipolar and bipolar RF energy to raise the temperature of a treatment area of approximately 200 cm², the size of an average adult male's hand. The BLU-U® (DUSA Pharmaceuticals Inc, Wilmington, MA) device emits 10 J of blue light energy (410 nm) in 16 minutes and 40 seconds (10 mW/sec).

The patient underwent a series of 9 treatment sessions at 2-week intervals. In each session, the patient's lower cheeks and forehead were treated first with the RF device and then

with blue light. Anesthetic and analgesia were not used before, during, or after treatment.

Before RF treatment the areas to be treated were lubricated with mineral oil to facilitate easy movement of the head. The RF device was quickly moved in random fashion over each area for 30 seconds and the epidermal temperature was measured with an infrared thermometer. If the temperature was below 40°C, the RF energy was increased and the RF treatment repeated. The RF energy setting was changed until a 30-second treatment resulted in an epidermal temperature between 40°C and 45°C, at which time a series of 4 30-second RF treatments were given. Each area received 3 passes with the unipolar headpiece (average energy 160-180 watts) and then one pass with the bipolar headpiece (average energy 70 watts). After removing the mineral oil, the same areas were exposed to BLU-U blue light for 20 minutes.

The results of treatment are shown in Figures 1 and 2. The RF treatment not only decreased the patient's sebum secretion and reduced the active acne cysts, it also improved her acne scarring. The patient's skin tone also improved markedly, and she reported no pain during RF treatment. Slight erythema (due to retained heat in the skin), if present, persisted for only a few minutes. Peeling, postinflammatory hyperpigmentation, and pain after treatment were not observed. The outcome was judged excellent by both the patient and investigator. Although the final photograph is shown immediately following the ninth treatment session, there was marked improvement following the fifth treatment session. The patient was discharged from active treatment with topical adapalene .1% cream and has maintained complete remission of cystic acne for over 8 months.

Discussion

Nonablative RF energy is still relatively new to aesthetic medicine.⁴ When a high-frequency RF current is passed through skin tissue heat is generated in proportion to the

impedance of the tissue.⁵ RF energy also tightens skin by stimulating neocollagenesis, a favorable secondary effect in adults with skin laxity.⁶ Neocollagenesis also thickens the dermis and provides a more radiant skin tone. Further study is needed to more completely understand the potential clinical benefits of RF in the treatment of acne vulgaris.

The ThermaCool® monopolar RF device (Thermage Inc, Hayward, CA) was the first RF device used successfully in the treatment of moderate to severe acne.² Unlike many other RF devices, the Accent RF requires no disposables and the technique takes only 5 minutes to treat the entire acne-prone area of one cheek. If the forehead and other cheek are also treated, total treatment time is increased to 15 minutes.

Figure 1a-c. A 23-year-old Asian woman (skin type IV) with grade 4 cystic acne and scarring before treatment. Photographs courtesy of Martin Braun MD.



Figure 2a-c. A 23-year-old Asian woman (skin type IV) with grade 4 cystic acne and scarring immediately after 9 treatments with the RF-blue light combination. Photographs courtesy of Martin Braun MD.



In this study, the Accent RF treatment was essentially painless; in fact, if a patient has any pain, the RF is immediately terminated and the skin temperature is measured. Pain during treatment indicates excessive RF energy during the 30-second time frame. Due to the lack of any pain, analgesics are not necessary to perform the procedure comfortably. This speeds up treatment times, keeps costs down, and facilitates discharge.

The susceptibility of bacteria to blue light destruction and the favorable safety profile of blue light make this modality an ideal treatment of acne vulgaris, alone or in combination with RF energy. *P. acnes* and other bacteria are sensitive to visible light because they synthesize porphyrins, specifically protoporphyrin IX (PpIX),⁷ which, in the presence of oxygen, is converted to cytotoxic singlet oxygen.^{8,9} PpIX has absorption peaks at 410, 505, 540, 580, and 630 nm.¹⁰ Among these, the 410-nm wavelength (blue) light is the most strongly absorbed by PpIX. Blue light, however, does not penetrate as deeply as the longer, less strongly absorbed wavelengths.^{11,12} In addition, a 2006 study of keratinocyte cell lines¹³ suggests that narrowband blue light may also have anti-inflammatory effects, further enhancing the therapeutic potential of blue light for acne vulgaris.

Photodynamic therapy (PDT) is an effective modality for acne vulgaris, but PDT is complicated by variable responses to the topical aminolevulinic acid and post-treatment erythema and peeling that may persist for up to 5 days.¹⁰

In the author's experience, the combination of Accent and blue light is 1) rapid; 2) causes no downtime, pain, erythema, or peeling; 3) can be used safely on all skin types; 4) rarely causes pigmentary abnormalities; 5) tightens skin, (in adult women with acne) especially along the mandible and forehead, correcting brow ptosis; 6) requires no expensive disposables, as with the ThermaCool device; 7) is not associated bacterial resistance; and 8) can be done at a favorable price point, which appeals to patients who would normally choose medical treatments as their acne is an insurable condition. In addition, blue light therapy does not require the presence of a staff member during treatment. With the Accent's unipolar head, the practitioner can increase the RF energy or RF treatment time to achieve jowl and fat reduction if desired.

Conclusion

Combining Accent RF energy and 410-nm blue light appears to be an effective modality to treat cystic acne without downtime, pain, or any side effects. Further study is necessary to determine if fewer treatments with Accent RF energy and blue light can produce similar results over a long period of time in a large number of patients.

Disclosure

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