Using a Radiofrequency Energy Device to Treat the Lower Face: A Treatment Paradigm for a Nonsurgical Facelift

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With current nonablative laser modalities for rejuvenation, a modest reduction in facial rhytides and texture often requires multiple treatment sessions. The radiofrequency (RF) energy device is a new technology that seems to induce tissue tightening after only a few treatment sessions. In this article, we describe use of an RF energy device, the ThermaCool TC™ System (Thermage, Hayward, Calif), in treating the lower face; present a simple treatment protocol; and suggest that RF energy technology shows promise in tightening tissue in the lower face and anterior neck and has few potential complications when performed with the proper technique.

With its origins in ablative carbon dioxide and Er:YAG resurfacing, laser treatment of photoaged skin is continually evolving. Although highly effective in eliminating superficial actinic damage and effacing rhytides, ablative resurfacing requires meticulous and prolonged postoperative care. Furthermore, ablative resurfacing techniques may be associated with potential complications such as scarring, infection, and dyschromia.[1,2] In recent years, the search for less invasive procedures has led to the emergence of nonablative resurfacing modalities for minimizing postoperative healing and potential complications. Several lasers and light sources—including 585- and 595-nm pulsed dye lasers, 1320-nm Nd:YAG lasers, 1450-nm diode lasers, and intense pulsed light sources—have been effective in reversing photodamage and softening rhytides.[3-8] However, multiple treatment sessions and several months are usually required to achieve results that fall far short of what is possible with ablative resurfacing techniques. As a result, the search for an optimal rejuvenation treatment—a highly effective and minimally invasive nonablative procedure requiring few treatment sessions and little postoperative recovery—continues. Particularly useful would be a nonablative procedure that protects the epidermis while tightening tissue through a combination of thermally induced collagen contraction and tissue remodeling/wound contracture.[9]

Radiofrequency (RF) energy has been used to deliver heat in a safe and controlled manner in medical applications such as ablation of cardiac conductive pathways in arrhythmia treatment,[10] endovenous closure of incompetent saphenous veins,[11] tightening of the joint capsule of the shoulder,[12] and ablation of prostate cancer.[13]

The ThermaCool TC™ System (Thermage, Hayward, Calif), a new device that uses RF energy technology, has the potential to tighten tissue significantly after only 1 to 4 treatments and with no postoperative "downtime." The ThermaCool system delivers RF energy, in a controlled volumetric manner, to the deep dermis and subcutaneous layers (as deep as 5–6 mm). A contact cooling handpiece protects the epidermis from ablation and injury. The ThermaCool system has been reported to significantly reduce facial rhytides and to effect nonsurgical lifting of the forehead and lower face.[14-17] This article describes using this RF energy device to treat the cheeks, jowls, and neck—to perform a nonsurgical facelift of the lower face and anterior neck—in a series of 40 patients.

Materials and Methods

This article covers 40 patients treated with the RF energy device. Patients ranged in age from 35 to 70 years, and all had Fitzpatrick skin type I to V. Indications for treatment included excess or redundant skin and rhytides (31/40), photodamage (4/40), and acne scarring (5/40). Treated areas were the lower two thirds of the face and cheeks (26), the full face (7), the jowls (6), and the anterior neck (2).

After makeup and jewelry were removed, a topical 5% lidocaine preparation (ELA-Max® 5; Ferndale Laboratories, Ferndale, Mich) was applied to the treatment area for 30 to 60 minutes. After the topical anesthetic was

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removed, a conductive fluid was spread on the treatment area, and the contact cooling handpiece was applied to the skin immediately after that.

Patients underwent 1 to 4 treatment sessions at 6- to 8-week intervals. Twenty-eight patients, 5 patients, 6 patients, and 1 patient were treated 1, 2, 3, and 4 times, respectively. Treatment was started at a setting of 12 to 13, which was raised to 15.5 as tolerated (12.5–15.5 in our patients). Target energy was approximately 100 J. The contact cooling handpiece was used to provide precooling, postcooling, and simultaneous cooling during the delivery of RF energy. Total number of treatment cycles ranged from 22 to 100, and cycle length ranged from 6 to 6.5 seconds. The typical treatment area on the cheeks began at the nasolabial fold crossed the malar region to the preauricular area and down to the jawline; in addition, 2 rows of impacts were placed under the submandibular ridge from the midchin to the mastoid process (Figure 1). These treatment points were aligned by looking at the skin for the contact impression caused by the treatment tip and sequentially placing the tip in adjoining sites across the cheek. The same amount of RF energy was used at all sites.

Results

Treatment was moderately painful but tolerable. Mean treatment setting was 14.5. The average patient received about 70 pulses per treatment session. Patients described the feeling as "heat in the skin." Immediately postoperatively, the treatment site developed only mild erythema, which lasted up to a few hours. Response to treatment was gradual, and degree of improvement increased with time—with improvement becoming visible 4 to 6 weeks after treatment for most patients. Approximately 30%, 50%, and 70% of patients noticed significant improvement in skin laxity and texture 1, 2, and 3 months, respectively, after the first treatment (Figures 2–4). Patients treated more than once noticed further improvement after successive treatments. Repeat treatment sessions were performed at 6- to 8-week intervals.

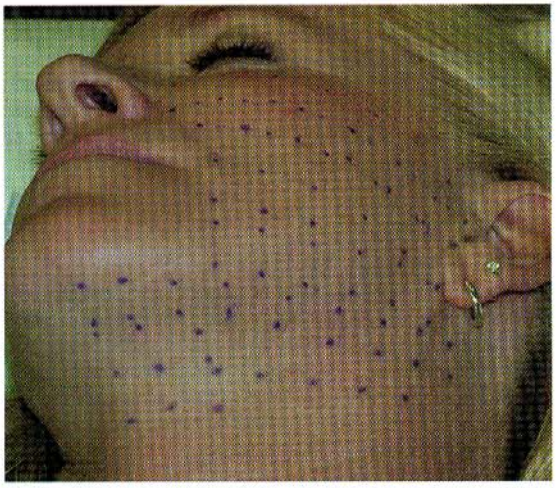

Figure 1. Typical treatment area on the cheeks begins at the nasolabial fold crosses the malar region to the preauricular area and down to the jawline, including the submandibular ridge from the midchin to the mastoid process.

The only side effect encountered was superficial blisters in 3 patients. These blisters healed without scarring. The incidence of blister formation was approximately 1 in every 500 pulses delivered. Excessive tissue contracture and ectropion did not occur in any patients.

Discussion

This promising new RF energy technology seems to tighten tissue significantly after only a few treatment sessions. When RF energy is used to induce thermal injury, the target zone is the deep dermis and subcutaneous tissues. Heat produced in these planes presumably induces microscopic wounds and possibly immediate collagen contraction (which can become clinically visible within a few days) as well as long-term collagen deposition and tissue contraction (which occur during wound healing).[14,18] As hypothesized regarding nonablative lasers, subclinical wounds are likely to be created, leading to activation of fibroblasts, endothelial cells, and blood vessels mediated by cytokine and growth factor release.

Applying the ThermaCool contact cooling handpiece to the skin results in volumetric heating of the dermal and subdermal layers. *Depth* of thermal injury is directly related to the size and geometry of the handpiece and can be varied by changing the treatment tip. *Degree* of thermal injury depends on the conductive properties of the tissue being treated. Applying RF energy to target tissue generates a current of ions that produce the desired thermal effect, which is proportional to the impedance of the target tissue, as dictated by the formula: energy (J) = I^2xRxt, where I is current, R is impedance of the tissue, and t is time of application. Tissues with higher impedance (eg, subcutaneous fat) generate more heat, which accounts in part for the deep thermal effects of RF.[14,15] The ThermaCool system delivers RF energy to the dermis and subcutaneous tissues while its contact cooling handpiece is cooling the epidermis. The epidermis is cooled before, during, and after delivery of RF energy and is thereby protected from thermal injury. As a result, the risk for superficial burns, ablation, and dyschromia can be mitigated. Three of our patients had a few superficial blisters that healed without scarring. Possible

causes of blistering include high treatment settings and inadequate amounts of coupling fluid on treatment areas. Care must be taken to apply adequate amounts of coupling fluid to minimize the risk for blistering and potential scarring.

Several groups have reported that RF energy devices are effective in tightening deep tissues in the forehead and cheeks and thus in effecting nonsurgical lift of the brows and diminution of the nasolabial folds.[15-18] Overcorrection, excess tissue contracture, and ectropion have not been reported. In theory, as with ablative resurfacing, excessive tissue tightening may be a potential complication associated with overaggressive or poor treatment technique.

Clinical experience in using an RF energy device to tighten tissue and minimize acne scarring in the face, jowls, and neck was presented in this article. Many of the patients described in this article had early tissue laxity of the lower cheeks, jawline, and anterior neck and wanted to avoid the downtime and risks associated with traditional face-lift surgery. These patients were very pleased with their treatment results—softer nasolabial folds, less visible "jowls," sharper and tighter jawline and submental tissue, and less loose tissue and deep lines on the anterior neck. Although degree of improvement was less than that achieved with face-lift surgery, the advantages of decreased risk and no downtime are significant enough to increase the value of the RF energy procedure. Several of our patients had previous liposculpture of the anterior neck, and the RF energy procedure tightened tissue further and cosmetically improved the lower face and neck. Besides being used to treat acne scarring and skin laxity secondary to intrinsic and extrinsic aging, the RF energy procedure potentially may be used to tighten loose skin after liposuction, to lift the breast after breast reduction, to tighten loose skin in areas where surgery is often too difficult because of visible scarring (eg, buttocks, elbows, knees), and so forth.

Conclusion

In summary, our preliminary clinical findings suggest that RF energy technology shows promise in tightening tissue in the lower face and anterior neck and has few potential complications when performed with the proper technique. To optimize the efficacy of RF energy devices, investigators need to study treatment parameters and techniques and conduct histologic evaluations of the planes of maximal contraction.

The authors have an ongoing relationship with Thermage as research participants. Thermage product is mentioned in this article.

Figure 2. Left, before and right, 2 months after the third treatment. Note the less visible platysmal bandings in the anterior area of the neck.

Figure 3. Left, before and right, 2 months after the second treatment. The redundant skinfold of the cheeks and jaws has tightened significantly.

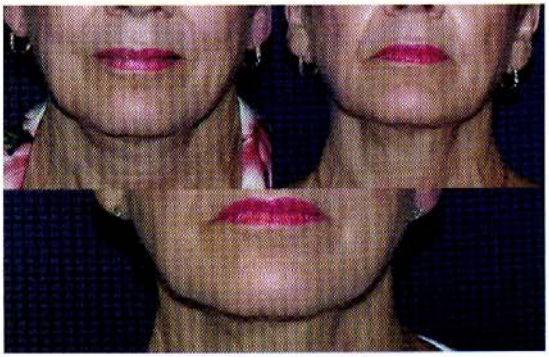

Figure 4. Left, before. Right, after 3 treatments, the redundant skin on the lower face and the horizontal lines on the neck have progressively improved. Bottom, after.

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