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EFFECT OF CONTROLLED VOLUMETRIC TISSUE HEATING WITH RADIOFREQUENCY ON CELLULITE AND THE SUBCUTANEOUS TISSUE OF THE BUTTOCKS AND THIGHS

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Abstract

Background: Regardless of diet and exercise, genetics plays an important part in creating puckering skin or dimples, which are difficult to hide at any age. The demand for a nonsurgical, noninvasive treatment of cellulite has inspired some manufacturers to invest in a new age of sophisticated devices and treatment therapies to repair the skin and improve contours. Although many of these new choices have demonstrated a smoothing effect (following a multitude of treatments), the objective documentation has in most cases been limited to biopsies, circumference measurements, and photographic evidence.

Hypothesis: We believe that the application of noninvasive high-energy radiofrequency (RF) to the skin of the thigh and buttocks heats the subcutaneous adipose tissue, causing collagen fibers to contract. The resulting impact to the subcutaneous tissue and collagen is expected to improve the skin's external architecture. Given that the subcutaneous tissue and adipose tissue are difficult to evaluate through histological methods, this investigation seeks to demonstrate the changes that occur when applying 2 treatments of high-energy RF on the subcutaneous tissue of thighs and buttocks utilizing real-time ultrasound image scanning.

Materials and Methods: Twenty-six healthy female patients (ages 18 to 50) with visible bilateral cellulite (grade 1 to 3) on either the buttocks and/or thighs received 2 treatment sessions (15 days apart) of unipolar RF using the Accent RF System (Alma Lasers Inc). The system utilizes a unipolar RF applicator that is electrically cooled to aid in patient comfort during the treatment. Appropriate energy was set and the treatment was delivered in 3 passes of 30 seconds each. Evaluation of the thickness of the subcutaneous tissue on buttocks and thighs took place before the first treatment, second treatment, and 15 days following the second treatment with a with real-time scanning image ultrasound (Philips Medical Systems). Clinical improvement was objectively evaluated through comparative pre- and post-treatment measurements of the distance between the stratum corneum to the Camper's fascia and from the stratum corneum to the muscle. The study also evaluated the structure and changes of the collagen (thickening and realignment of septae) resulting from 2 treatments of RF. Photography was used to document contour and superficial changes.

Results: From the measurements of the distance between the stratum corneum to the Camper's fascia and from the stratum corneum to the muscle we were able to demonstrate that 68% of the patients presented a contraction of the volume of approximately 20%.

Conclusions: Based on the demonstrated results with real-time ultrasound scanning, we have observed that 2 RF treatments on the subcutaneous tissue of the buttocks and thighs provide a volumetric contraction effect in the majority of patients. This validates the primary hypothesis of our protocol and establishes that the RF energy works on the connective tissue of the subcutaneous adipose tissue. This effect should be the same on any other body part.

Introduction

Through ultrasound we observed the subcutaneous tissue and fat positioned between the skin and the muscle. It is possible to observe in anatomical views the layer between the subcutaneous tissue and the adipose layer, as well as the integrity of the fibrous bands that divide them. As people age, the quality of the fibrous bands is lost and deformity appears that can be observed with an ultrasound.

Background

Radiofrequency

Electric currents have been used in medicine for more than a century. Low-frequency electric current causes spasms in muscle tissue, and in low intensity can be used for biostimulation, such as in cardioversion for atrial fibrillation.[1] High-frequency current in the 0.3 to 100 MHz range is defined as radiofrequency current (RF). RF only produces a thermal effect on living tissue depending on the electric properties of the tissue. High-frequency RF current has demonstrated its efficiency in heating tissue in electrosurgery and has recently become an attractive source of energy for different aesthetic and dermatological applications.[2,3]

Thermal energy has been proposed as a method for contracting loose, lax skin through the well-known mechanism of collagen denaturalization. Even though there are numerous *in vivo* and *in vitro* experimental studies that have provided evidence for the biology and biomechanics of thermally modified tissues, we recognize that there is not a unanimous