Review Article

Transcutaneous Temperature Controlled Radiofrequency: Groundbreaking Technology – Female Stress Urinary Incontinence and Overactive Bladder Can Be Treated Noninvasively and with Vulvovaginal Rejuvenation?

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Abstract

It has long been difficult to treat vulvovaginal laxity, genitourinary syndrome of menopause, stress urine incontinence, overactive bladder (OAB), and other indications of sexual dysfunction because women traditionally find it difficult to discuss these difficulties with clinicians and because society generally accepts these diseases. Originating in esthetic medicine, noninvasive feminine rejuvenation that targets vaginal tissue with energy-based methods has recently become more popular. A more youthful-looking vulva, the restoration of vaginal elasticity and "tightness," a significant improvement in stress urinary incontinence, a reduction in symptoms of OAB, and a decrease in sexual dysfunction are all benefits of transcutaneous temperature-controlled radiofrequency (TTCRF) therapy at the vulvovaginal region. It is also becoming more popular as a mild-to-moderate stress urinary incontinence and OAB noninvasive therapy option. Women will likely always be appreciative of their gynecologist for managing stress urinary incontinence with TTCRF therapy without making an incision, it would appear.

Keywords: *Overactive bladder, stress urine incontinence, transcutaneous temperature-controlled radiofrequency therapy, vaginal rejuvenation*

Introduction

Atrophic vaginitis, stress urine incontinence (SUI), overactive bladder (OAB), and other indications of sexual dysfunction are just a few of the problems that can develop as a result of the multiple changes that the vagina and surrounding tissues go through between childbirth and menopause. Due to women's traditional difficulties, sharing these issues with doctors and society's attitude of resignation regarding these disorders, as well as the fact that the arsenal has been extremely constrained until recently, treating these conditions is tough.

The development of feminine rejuvenation is due to the use of energy-based therapies on vaginal tissue, much like in esthetic medicine.[1] Transcutaneous temperature-controlled radiofrequency (TTCRF) therapy stimulates angiogenesis, which results in the fibroblasts to create new collagen and elastin. This same RF technology then increases the density of the small nerve fibers.[2] It makes sense that the ability to distribute more energy will have a greater impact.

It is possible to execute TTCRF at the vulvovaginal region using the ThermiVa (Thermi has been purchased by Celling BioScience). Along with lasers, RF technology has been utilized successfully in cosmetic medicine to tighten or rejuvenate skin on the chest,

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neck, and other body areas.[3] Recent investigations have demonstrated its value for both vulvar and vaginal usage.[1,4,5] Particularly when applied to naturally well-hydrated tissue, RF is secure, noninvasive, and efficient. The therapeutic damage required for skin renewal occurs as the RF electrode transmits current through the skin; this heat-induced resistance results in collagen denaturation and contraction, fibroblast activation, increased blood flow, and neocollagenesis.[3]

The instrument uses a thin, S-shaped therapy probe with a postage stamp-sized RF emitter on the ventral tip that was created expressly for the job.[1] Thermistors and thermocouples are feedback mechanisms on the probe that transmit information about tissue temperature to the device itself, which modifies power output to ensure that scientifically established temperature targets (40°C–45°C) are safely and quickly met but not exceeded, preventing overtreatment.

The entire procedure lasts <20–30 min. There is no need for anesthesia because TTCRF therapy is so comfortable. Users can concentrate on their treatments because it is activated by a footswitch. Because feedback mechanisms conduct all the work, including monitoring tissue temperature and adjusting RF energy emission, careful management of treatment parameters is not necessary. Therapeutics effects of RF are seen at temperatures from 40°C to 42°C. The instrument is able to reach 45°C–47°C in patients comfortably transvaginal and 40°C–45°C externally without need for any anesthesia. Temperatures of treated areas for 3–5 min have provided consistent results.

According to reports, RF has been shown to first increase neoangiogenesis. With the new vessels and increased blood flow comes the stimulation of the fibroblasts, then increase in elastin and collagen, and increase in the small nerve fiber density. There is both immediate tightening of the vulvovaginal tissues seen readily right after treatment then a steady tightening over the next 3 months to give a modest tightening of the vulva and vaginal tissues.[6] This causes the mucosa and fascia in the vaginal wall tissues, as well as the vulva, to tighten, giving the vulva a more youthful appearance [Figure 1]. Vanaman Wilson *et al*.[6] suggested TTCRF significantly enhanced atrophic vaginitis, vulvovaginal laxity, and sexual pleasure while having a less dramatic effect on orgasmic dysfunction and stress urinary incontinence. Neocollagenesis, neoelastogenesis, neoangiogenesis, and the first reported finding of TTCRF-related neurogenesis were all seen in posttreatment histology.[7] Better lubrication and transudate production, an improvement in SUI, a decrease in symptoms of OAB, and a reduction in sexual dysfunction are all reported along

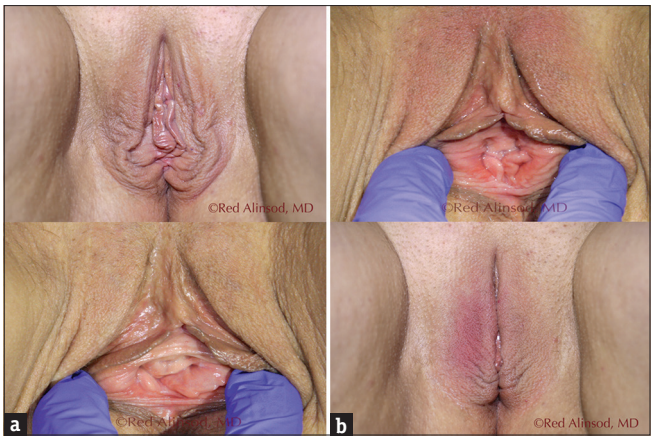

Figure 1: (a) Before and (b) after procedure images

with the restoration of vaginal elasticity and "tightness" in the newer, healthier tissue, which is stronger and more resistant to tearing. After TTCRF therapy, women with orgasmic dysfunction were able to experience orgasms more quickly. The average reduction in time to achieve orgasm ranges from 1/3 to 1/2 less time.[1] Results are frequently noticeable after the first session, even if a course of two or three treatments is preferred.[1] Results vary from 6 to 12 month and longer. Leibaschoff *et al*. suggested that RF therapy was linked to a substantial ($P < 0.01$) improvement in ICIQ-SF and UDI-6 scores in persons with SUI. Following the therapy regimen, a cough stress test was negative in seven out of ten patients (70%). Up to the 12th week of follow-up, improvements persisted. The favorable histologic alterations seen vaginally in women with postmenopausal vaginal atrophy confirmed the findings. RF was well tolerated, and trial participants reported no side effects. Visual labia majora tightening may last only 4–6 months until single treatment touch ups are needed.[2]

Laser-based technology is also becoming more common. Despite the fact that their safety and effectiveness have been scientifically proven, TTCRF therapy differs from them in a few key ways. Its treatment probe [Figure 2] resembles the well-known Hegar dilator in design and is small, narrow, and unthreatening cream in color. The generator box [Figure 2] is moveable from room to room and is lightweight. There is no smell, smoke, or requirement for special eyewear or a smoke evacuator. There is no need for protective mask to filter out smoke and viral particles. Feedback management ensures a high safety profile and eliminates the need for anesthesia during treatment. The skin barrier is not even slightly penetrated during the therapy, therefore there is no discharge or downtime, possibly the most significant benefit. Patients can immediately resume all daily activities, including intercourse, if they so choose, as

Figure 2: Generator box and vaginal probe

there is no waiting period for the surface tissue to heal. Wands are single-use, hygienic, and need no clean-up.

RF effects have also demonstrated promise for treating mild to moderate stress urinary incontinence. The initial results are highly encouraging, and the primary author is currently analyzing the short- and long-term effects on stress urinary incontinence in Indian women. This technique would revolutionize the care of stress urinary incontinence if it could establish itself as the noninvasive therapy option for mild to moderate stress urinary incontinence. The pursuit of better therapy choices with more effective outcomes and minimal patient morbidity is ongoing in the management of stress urinary incontinence, as it has been reported elsewhere.[8] The elimination of all incisions altogether might be the next development after the needleless, single minor vaginal incision procedure. While patients would be eternally grateful to avoid the knife, regardless of how small the wound has grown, this may be profanity to doctors. It appears that the day has come when women will always be appreciative of their gynecologist for treating SUI with TTCRF therapy without making an incision. In our experience, the value of TTCRF therapy may be even more important for the treatment of OAB and Nocturia. Alinsod *et al*.[1] suggested that 68/75 (90.6%) patients with OAB without incontinence reported a reduction of OAB symptoms by at least one-third, 33%. 43/75 (57%) patients with OAB without incontinence reported a 50%+ reduction in OAB symptoms. Of these patients, 24/75 (32%) completely resolved their OAB symptoms. Seven patients (9%) had more moderate symptoms reduction of 25% and less. All seven of these patients had OAB with incontinence. All patients noticed some reduction in OAB symptoms over baseline. Results for nocturia were similar. These findings were presented at IUGA 2016.

When this RF energy is combined with biologics such as platelet rich plasma, amniotic fluid, or exosomes, excellent control of symptoms is possible. This all assumes that there is no urinary tract infection (UTI) or other know causes. This is with and without the use of anticholinergics and mirabegron.

Radiofrequency Therapy Pros

Quick painless treatments in office with no IV or sedation or anesthesia needed. Increase in blood flow/collagen/elastin/nerve fiber density. Safe and reproducible. Wide safety margins of treatment parameters (treatment goes to about 42°C and burns occur at 55°C). Over 200,000 treatments worldwide with no serious adverse events which is shown according to favorable MAUDE Database reporting. Less than one percent UTI/vaginitis. Single use wands to eliminate contamination. Easily done procedure by gynecologist and esthetician.

Radiofrequency Therapy Cons

Duration of effects is 9–12 months. Tightening effects are modest and not to the level of surgical tightening. Disposable wands and grounding pad needed. Not covered by insurance, expensive RF generator. Constant movement of wand necessary. Can be embarrassing to patient and physician if experience lacking.

Authors' disclosures

Dr. Red Alinsod is the innovator of ThermiVa machine. Dr. Vineet Mishra is the Head of Urogynecology Department at Institute of Kidney Disease and Research Center. All other authors have no conflicts of interest to disclose.

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Conflicts of interest

There are no conflicts of interest.

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