



TREATMENT OF VULVOVAGINAL ATROPHY SYMPTOMS AND VAGINAL REJUVENATION BY FRACTIONAL CO₂ LASER

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Article Received date: 14 February 2024

Article Revised date: 05 March 2024

Article Accepted date: 25 March 2024



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ABSTRACT

Background: Menopausal women might have vulvovaginal atrophy, which is caused by hormonal changes. Women of various ages might develop vulvovaginal laxity and mucosal atrophy. This condition lowers life quality. Vulvovaginal atrophy symptoms in women are now treated using fractional CO₂ laser (10600nm). **Objectives:** The study examined fractional CO₂ laser (10600nm) effectiveness for vulvovaginal atrophy and vaginal rejuvenation. **Method:** From July 2019 until the end of September 2019, this research was conducted at the Institute of Laser's postgraduate research clinics for laser medicine. Twelve females, ranging in age from 42 to 56 years, were enlisted in this study with symptoms of vulvovaginal atrophy. Point 28 at a distance of 1.0 mm, CO₂ laser wavelength 10600 nm, 30 watts of power, 1.7 milliseconds of duration, scan mode normal, scan times fourth, and scan rows five were the laser parameters utilized. **Results:** Seventy-five percent (n.9) of the twelve women who participated in the study were content with their treatment following two CO₂ laser sessions separated by four weeks. **Conclusion:** Fractional CO₂ laser therapy is a successful technique that produces fewer adverse effects.

KEYWORDS: Vulvovaginal, atrophy, fractional, CO₂, laser, vaginal, rejuvenation.

INTRODUCTION

Vulvovaginal atrophy (VVA) is a condition predominantly affecting women during menopause, though it can also impact those at different life stages, such as post-pregnancy or cancer patients undergoing chemotherapy or endocrine therapy. This condition stems from a decrease in estrogen levels, leading to symptoms that adversely affect quality of life, sexual desire, and self-confidence. In 2014, the International Society for the Study of Women's Sexual Health and the North American Menopause Society proposed the term "genitourinary syndrome of menopause" (GSM) to more accurately describe the array of genital, urological, and sexual problems caused by hypoestrogenism during menopause.^[1] The primary cause of VVA or GSM is the hypoestrogenic state associated with aging, which leads to significant changes in genital/vaginal tissues, including loss of collagen, elastin, and smooth muscle. These changes result in the thinning of the vaginal epithelium, reduced blood flow and elasticity, and decreased vaginal folds, causing symptoms like

irritation, itching, burning, dyspareunia, and contact bleeding.^[2,3] Traditional treatments for VVA include topical therapies and hormone replacement, which require long-term, consistent use to be effective. However, these methods often have poor patient compliance and effectiveness. Surgical interventions are another option but may not be suitable for all due to potential post-operative complications. Consequently, treatment choice depends on symptom severity, safety, and patient preference.^[4] Recent advancements have highlighted the effectiveness of fractional carbon dioxide (CO₂) laser therapy as a promising treatment for VVA. The CO₂ laser's appeal lies in its non-invasive nature, minimal downtime, painlessness, and improved outcomes. The treatment works by using a wavelength highly absorbed by water (10,600 nm) to precisely ablate and coagulate vulvar and vaginal tissues, initiating a wound response that leads to tissue remodeling. This process includes the neoformation of collagen and elastic fibers in atrophic skin, thereby improving the muscle tone and tightness of the vulvovaginal complex.^[5-7] The

fractional delivery of CO₂ energy creates controlled damage while preserving surrounding healthy tissue, enabling rapid epithelial repair. This method ensures effective tissue remodeling and safety by generating controlled ablation zones within the lamina propria at various energy levels. The heat from the CO₂ laser also induces a transient heat shock response, resulting in the over-expression of heat shock proteins (HSP), particularly HSP 70. This protein plays a crucial role in producing transforming growth factor- β (TGF- β), a key element in the inflammatory response and fibrogenic process, thus aiding in collagenization and the production of the extracellular matrix.^[6,8] Moreover, thermal remodeling with new collagen deposition improves vaginal tissue quality, alleviating symptoms like dryness, itching, dysuria, and recurrent infections. This improvement is partly due to an increase in glycogen, which rebalances lactobacilli levels, thereby inhibiting the growth and virulence of pathogenic bacteria.^[9]

METHOD

This study, conducted from July to September 2019 at the laser medicine research clinics of the Institute of Laser for Postgraduate Studies, involved 12 women suffering from vulvovaginal atrophy and vaginal laxity. These patients were treated with fractional CO₂ laser therapy, receiving two sessions four weeks apart. The inclusion criteria targeted women with symptomatic vulvovaginal atrophy who sought to improve vaginal tightness due to vaginal relaxation syndrome or a self-perceived "loose vagina" affecting sexual gratification. Exclusion criteria ruled out those pregnant, menstruating, with previous vaginal surgeries or treatments for tightening in the past year, acute or recurrent urinary infections, active genital infections, undiagnosed vaginal bleeding, severe diseases or conditions impacting study compliance, and severe prolapse. The participants, aged between 42 and 59 years with a mean age of 46.5, comprised 75% (n=9) perimenopausal and 25% (n=3) postmenopausal women. Before the procedure, each patient received a thorough explanation of the process, including potential benefits, risks, and complications,

followed by signing an informed consent. The gynecological examination included inspection of the external genitalia and vagina for any abnormalities, assessment of vaginal diameter, and a stress test in both supine and standing positions to check for stress urinary incontinence. Additionally, a complete blood count and viral screening were conducted as part of the investigations. The laser treatment parameters were set to a fractional CO₂ laser with a wavelength of 10600 nm, power of 30 watts, duration of 1.7ms, point number 28, distance between points at 1.0 mm, normal scan mode, 4 scan times, and 5 scan rows. Preparation for the procedure involved scheduling sessions two days post-menstruation for menstruating patients, emptying the bladder before starting, and applying topical anesthesia (Amla cream 5%) at the introitus. Proper eye protection was mandatory for the patient, physician, and anyone else in the room. A specially designed laser speculum guided the laser beam delivery system into the vagina, with the laser handpiece applied at each 1 cm marking along the vaginal wall in a step-by-step withdrawal manner, repeating the insertion twice. Safety and tolerability were monitored by noting any adverse effects during and after the procedure, which typically took about 15±5 minutes to complete. Postoperative care involved adhering to follow-up appointments and abstaining from sexual activity for 7 days following each treatment session.

RESULTS

Age, parity, history of vaginal deliveries, and any history of obstructed deliveries history of delivering big babies, menstrual cycle and its regularity, time of menopause, contraceptive method, symptoms (pain, backache and abnormal vaginal discharge, feeling of bulging or swelling at the vaginal opening), any history of urine leakage, history of incomplete bladder emptying, sexual life history (frequency of sex, dyspareunia, feeling of loose vagina or dryness with sexual intercourse), previous vaginal construction surgery and previous vulvar surgery (including episiotomy). As shown in table 1.

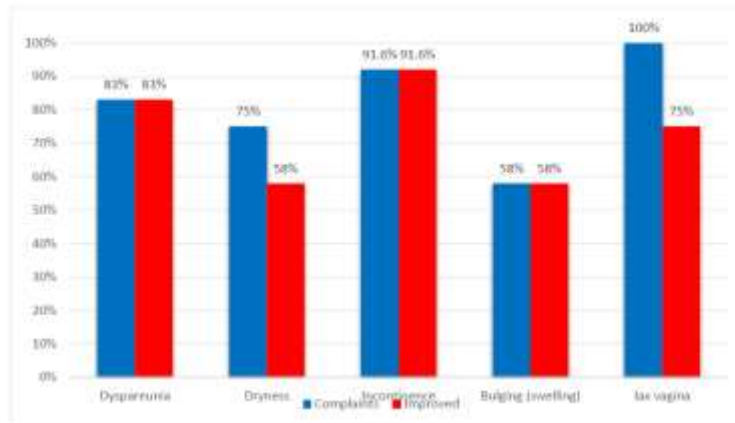
Table 1: Patient's Complaints.

Dyspareunia	Y	83.3% (n.10)
	N	16.6% (n.2)
Dryness with sex	Y	75% (n.9)
	N	25% (n.3)
Lax vagina		100% (n.12)
Swelling or bulging inside the vagina	Y	58% (n.7)
	N	41.6% (n.5)
Sexual desire	Y	50% (n.6)
	N	50% (n.6)
Dripping urine during stress	Y	11 (91.6%)
	N	1 (8.33)

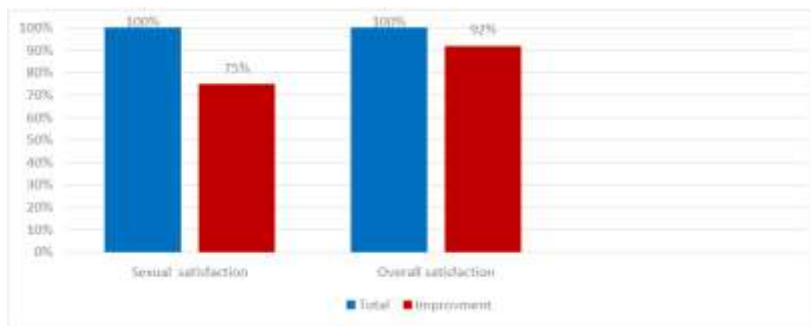
Y =yes, N=no

The result of this study depends mainly on the patient’s symptoms and follow-up All patients were discharged home immediately after treatment.83% of the patients (n.10) showed improvement in dyspareunia, only two patients from 9 did not show dryness improvement,

91.6% (n.11) reported improvement in stress urine incontinence, no more feel mass or bulging in the vagina. 75% (n.9) reported an improvement or increased vaginal tightening. As shown in figure (1)



Most of the patient 75 % (n.9) reported sexual satisfaction, all subjects except one (92 %) reported satisfaction with treatment figure (2).



Adverse reaction

The majority of patients (97%) indicated that their treatment was accompanied by minimal to no discomfort. Among the mild and transient treatment responses that resolved within three to five days were the following symptoms: two cases of swelling (16.6%), one case of paralysis (8.3%), one case of twinging sensation (8.3%), two cases of mild hemorrhage (16.6%), and two cases of watery discharge (16.6%). These events were reported at the one-week follow-up following the initial treatment. They exclusively transpired after the initial treatment. There were no further adverse symptoms reported by the patient subsequent to the supplementary treatment. All individuals experienced a single adverse event, which was of a benign, transient nature, and resolved itself within a few days.

DISCUSSION

The core principle of CO2 laser treatment involves photo thermal interaction with tissue, where the emitted light is absorbed by the tissue and converted into heat, altering the tissue's structure. This concept falls under the broader category of thermal interactions, characterized by significant changes in local temperature. Such thermal effects can be achieved through continuous wave (CW)

or pulsed laser emissions. Our research showed that perimenopauses and postmenopausal women experienced notable improvements in symptoms of vulvovaginal atrophy after undergoing two sessions of fractional CO2 laser treatment for vaginal tightening. The majority of participants reported enhanced sexual satisfaction and noticeable tightening effects, indicative of vaginal rejuvenation. The application of fractional CO2 laser in this context not only shortened the duration of the procedure, with a maximum time of 20 minutes, making it significantly quicker and simpler compared to traditional surgical methods, but also proved to be highly effective in ameliorating symptoms associated with vulvovaginal atrophy. A similar study by Gaspar A, Addamo G, et al. (2011) on the use of CO2 lasers for Vaginal Relaxation Syndrome (VRS) in a cohort of 51 women (10), also documented improvements in sexual experiences post-laser treatment, albeit within a short-term follow-up period. Importantly, none of the participants in our study experienced any adverse effects from the CO2 laser treatment, underscoring its safety. This finding aligns with the conclusions drawn by Sokol ER, Karram MM (2017), further validating the CO2 laser as a safe and effective tool for managing vulvovaginal atrophy and vaginal laxity.^[11]

CONCLUSION

This study found that fractional CO₂ laser treatment significantly improved symptoms of vulvovaginal atrophy (VVA), enhancing sexual satisfaction for women. The procedure is quick, minimally invasive, and involves minimal discomfort, offering benefits like reduced vaginal dryness, improved vaginal tightness, diminished urinary stress incontinence, and restored sexual function.

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