

# Regenerative Approach for Lichen Sclerosus: A Case Series Combining Monopolar and Fractional RF Therapy with Biologics

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## ABSTRACT

**Background:** Lichen sclerosus (LS) is a chronic inflammatory dermatosis affecting anogenital skin, often associated with vulvar pain, sexual dysfunction, and increased risk of malignancy. Despite its significant impact on quality of life, there is no definitive cure. This case series explores a multimodal regenerative approach with promising potential to improve symptoms and patient well-being.

**Objective:** To evaluate the clinical benefits of combining energy-based modalities with either exosomes or platelet-rich plasma (PRP) in the treatment of LS, aiming to achieve synergistic regenerative effects.

**Methods:** In this prospective, single-center case series, ten patients (n=10, 9 women, 1 man, 39-88 years) were enrolled. Each patient received an individualized treatment protocol consisting of monopolar radiofrequency (RF), fractional RF, and either exosomes or PRP. Up to three treatment sessions were administered per patient, spaced 14 days apart.

**Results:** Patients reported significant symptomatic improvement following treatment. Distress related to inability to orgasm dropped by 100%. Relief from itching and burning was reported by 88% of patients, 80% were able to discontinue steroid use, and 75% experienced improvement in vaginal dryness.

**Conclusion:** This case series demonstrates notable clinical improvements across a range of patient-reported outcomes following combination regenerative therapy for LS. Observed outcomes show reductions or complete resolution of symptoms such as vaginal dryness, atrophy, itching, burning, and interference with daily activities. Additionally, several patients reported improvements in sexual health, contributing to an overall enhancement in quality of life.

## Abbreviations

FRF	: Fractional Radiofrequency
FSQ	: Female Sexual Questionnaire
LS	: Lichen Sclerosus
LSQ	: Lichen Sclerosus Questionnaire
PRP	: Platelet-rich plasma
RF	: Radiofrequency
SUI	: Stress Urinary Incontinence

## Introduction

Lichen Sclerosus (LS) is a chronic inflammatory skin disorder primarily affecting the anogenital area and presenting with a wide range of genitourinary symptoms [1]. While various treatment options exist, they primarily focus on symptom management and remission. There is a growing demand for advanced,

energy-based regenerative therapies, which are being studied for their potential to provide superior outcomes compared to conventional treatments [2]. Emerging approaches, such as radiofrequency (RF) therapy, are currently being explored as promising alternatives to traditional management strategies [3,4].

Radiofrequency therapy, in particular, represents a novel, minimally invasive treatment for LS. This case series utilized a combination of RF therapy, integrating 360° monopolar RF and fractional RF (FRF) microneedling to enhance tissue repair and functional restoration. Monopolar RF energy generates controlled heating, stimulating fibroblasts to produce collagen and elastin, which help restore the structural integrity, elasticity, and moisture of the vaginal mucosa [5]. FRF energy induces controlled mechanical and thermal micro-injuries. This dual

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approach activates a wound healing cascade resulting in tissue remodeling and increased dermal thickness, density, firmness, and elasticity, ultimately improving both function and comfort for LS patients [6,7].

Beyond RF therapy, biologically active regenerative treatments such as exosome therapy and platelet-rich plasma (PRP) have emerged as permissive options for enhancing tissue repair and functional restoration. Exosomes, extracellular vesicles derived from stem cells, have gained significant attention recently for their regenerative and anti-inflammatory properties. When applied to affected areas, they help reduce inflammation, improve skin elasticity, and alleviate symptoms such as itching and dryness [8].

Similarly, PRP, derived from the patient's own blood, is rich in growth factors that support the healing process by stimulating vascularization and collagen renewal. Emerging evidence also indicates that PRP may enhance female sexual function [9]. Such biologically active therapies represent a novel approach for patients who do not respond well to conventional treatments, offering a regenerative alternative that targets both symptom relief and long-term tissue restoration.

We hypothesize that the integration of energy-based modalities with exosome or PRP therapy may produce a synergistic regenerative effect, leading to improved sexual health and reduced symptom severity.

## Methods

This case series included ten subjects (n=10, 9 women, 1 man, 39-88 years). The objective was to describe the clinical outcomes of using EMFEMME 360 (BTL Industries Inc., Boston, MA) in combination with EXION Fractional RF (BTL Industries Inc., Boston, MA) and exosomes for patients with Lichen Sclerosus. This case series was conducted in accordance with the Declaration of Helsinki and all patients provided written informed consent prior to participation. Adverse events were monitored throughout the course of treatment and follow-up.

## Treatment Protocol

Patients received individualized treatment combinations consisting of FRF microneedling (needle depth 0.5–1.0 mm, RF intensity 60%), 360° monopolar RF, and exosomes within a single session. Up to three treatments were conducted per patient, spaced 14 days apart.

The decision to include 360° monopolar RF therapy, applied intravaginally for improved lubrication and elasticity or to the vulva for symptom relief, was based on each patient's clinical presentation and treatment goals. In patients who expressed a desire to maintain or resume penetrative intercourse, a combined treatment approach using 360° monopolar RF and FRF microneedling was implemented. In all other cases, FRF microneedling alone was utilized, as it is likely to remain the cornerstone treatment for LS.

Male participants were not treated with 360° monopolar RF, and several female patients, either not sexually active or exhibiting significant vaginal atrophy, prioritized improvements in skin quality over sexual function, making intravaginal RF unnecessary. Ethical considerations also led some patients

to decline treatment with exosomes, in which case PRP was administered as an alternative. Although not designed as a controlled comparison, this exploratory approach allowed for the preliminary identification of potentially more effective protocols. Treatment details, including the number of sessions and specific modalities applied, are summarized in Table 1.

**Table 1: Patient-Specific Treatment Details**

Subject	Number of treatments	Treatment protocol
01	3	360° monopolar RF (intravaginal application) + FRF microneedling + exosomes
02	2	360° monopolar RF (intravaginal application) + FRF microneedling + exosomes and PRP
03	3	360° monopolar RF (vulvar application) + FRF microneedling
04	3	360° monopolar RF (intravaginal application) + FRF microneedling + exosomes
05	3	FRF microneedling + exosomes and PRP
06	3	FRF microneedling + exosomes
07	3	360° monopolar RF (intravaginal application) + FRF microneedling + exosomes
08	3	360° monopolar RF (intravaginal application) + FRF microneedling + exosomes
09	3	FRF microneedling + exosomes
10	3	360° monopolar RF (intravaginal application) + FRF microneedling + exosomes

## Evaluation

The medical history of all subjects was recorded prior to treatment to assess relevant health conditions, previous therapies, and any potential contraindications. Patient-reported outcomes were gathered using two customized tools: the Female Sexual Questionnaire (FSQ) and the Lichen Sclerosus Questionnaire (LSQ). Both tools were adapted from existing validated questionnaires to more accurately reflect the symptoms and concerns specific to women with LS. Assessments were administered at baseline and at follow-up visits to evaluate changes in symptoms, sexual function, and overall treatment response. The FSQ is 15-item scale measuring aspects of sexual health on a 6-point scale, where "0" indicates the lowest function or greatest difficulty and "6" indicates the highest function or least difficulty. This questionnaire was not applicable to male participants or to individuals who were no longer sexually active. The LSQ includes 16 primarily YES/NO items designed to assess the severity of symptoms and the broader impact of the disease.

## Results

Ten subjects (n=10) were enrolled in this case series and attended the baseline visit. Of these, nine subjects (n=9) completed all three treatment sessions and at least one follow-up visit. One

participant received two treatment sessions, and all completed at least one follow-up. No adverse events were reported throughout the course of treatment.

### Female Sexual Questionnaire

Not all participants completed every questionnaire, as some were male or not sexually active and had no intention of resuming penetrative intercourse. Four participants completed the FSQ, all of whom demonstrated notable improvements at follow-up. All participants (100%) reported no longer experiencing distress related to their inability to achieve orgasm. Pain during sexual intercourse decreased by 49%, lubrication improved by 44%, and sexual arousal increased by 41%. Additionally, the severity of stress urinary incontinence (SUI) improved by 58%. The ease of reaching orgasm improved by 21% during intercourse and by 17% during masturbation. Libido increased by 27%.

### Lichen Sclerosus Questionnaire

Nine (n=9) out of ten patients completed the LSQ, and all of them reported improvement after treatment. Every patient indicated that LS no longer interfered with their daily activities. Among those who have been using steroids, 80% discontinued their use. Furthermore, 88% of patients no longer experienced itching or burning in the vaginal area. Other improvements included a 75% resolution of vaginal dryness, 60% resolution of active tearing, and 33% improvement in vaginal atrophy.

### Individual Case Observations

Patient 2, who received a single treatment session with 360° monopolar RF, FRF microneedling, and exosomes with PRP, reported notable improvement at the 1-month follow-up visit. Vaginal dryness was resolved, and lubrication during intercourse improved. The patient also noted that LS no longer interfered with their daily activities. Clinical photographs illustrating the improvement are presented in Figure 1.



**Figure 1:** An 88-year-old patient before and after treatment. In the baseline photograph (1A - left), there is marked atrophy, with inflamed skin characterized by erythema and visible fissures. Following treatment (1B - right), the tissue appears smoother, less inflamed, and more hydrated. The fissures have resolved, and the overall color and texture are notably improved.

**Patient 3**, who received 360° monopolar RF therapy administered exclusively via vulvar application, in combination with FRF microneedling therapy, reported a fivefold increase in sexual arousal during intercourse, with scores rising from 1 to 6. A threefold increase was also observed in the level of lubrication during sex. At the 9-month follow-up visit, the patient also

reported resolution of vaginal atrophy, narrowing of the introitus, and itching or burning in the vaginal area. Additionally, LS no longer interfered with their normal daily activities.

**Patient 5**, a female patient treated with FRF microneedling in combination with exosomes and PRP, reported modest improvements that were less pronounced than those observed in patients who also received 360° monopolar RF therapy. At the 1-month follow-up, she continued to indicate symptoms such as vaginal dryness, narrowing of the introitus, atrophy, and itching; however, clinical notes referenced some perceived improvement in these areas. While quantitative scores on the sexual function questionnaire remained unchanged across most domains, the patient did report a 33% reduction in pain during sexual intercourse, suggesting partial symptomatic relief. These outcomes may reflect the added therapeutic value of 360° monopolar RF treatment when included as part of a multimodal approach.

**Patient 6**, a male patient treated with FRF microneedling and exosomes, reported significant improvement at the 4-month follow-up. He was able to discontinue corticosteroid therapy, with resolution of penile atrophy, active tears or sores, as well as itching and burning sensations.

Four patients (**Patients 1, 4, 7, 8, and 10**) who received treatment with 360° monopolar RF, FRF microneedling, and exosomes reported substantial improvement in the management of LS. Vaginal dryness resolved in four out of five patients, and notable improvement in tissue appearance, such as enhanced color and elasticity, was observed. Symptoms such as itching and burning resolved in patients 4, 7, 8, and 10, while Patient 1 reported no such symptoms at any time point. Two patients discontinued steroid use post-treatment, two patients had not used steroids at any time, and one patient continued steroid therapy.

### Discussion

This case series examined the clinical outcomes of a novel multimodal regenerative approach for treating LS. Traditional management relies heavily on topical corticosteroids, such as clobetasol, which, while effective in reducing inflammation, do not reverse tissue damage, scarring, or sexual dysfunction [10,11]. In contrast, the combination of 360° monopolar RF, FRF, and either exosomes or PRP used in this case series was associated with notable clinical improvements across a broad range of patient-reported outcomes, including symptom severity, tissue quality, and sexual health.

Patients reported substantial symptom relief following treatment. Distress related to inability to orgasm dropped by 100%, pain during intercourse decreased by 49%, and lubrication improved by 44%. Furthermore, 88% of patients experienced relief from itching and burning, 80% were able to discontinue steroid use, and vaginal dryness improved in 75% of participants. Importantly, no participants experienced treatment-related adverse events.

Notably, patients who received the full multimodal protocol tended to report more pronounced improvements compared to those receiving partial protocols. These observations support the hypothesis that combining energy-based therapies with biologically active treatments may produce synergistic effects

through complementary mechanisms of action. Energy-based regenerative therapies, by stimulating collagen neogenesis and enhancing epithelial turnover, may provide long-term tissue restoration and reverse scarring. This represents a shift from symptom control to true regenerative care.

Monopolar RF energy stimulates collagen and elastin production while also enhancing blood flow, which contributes to improved tissue elasticity, mucosal hydration, and sexual function [12,13]. FRF microneedling complements this by creating controlled micro-injuries that trigger a regenerative healing cascade [14]. The addition of exosomes or PRP introduces biologically active molecules that further promote cellular repair, vascularization, and anti-inflammatory effects. Together, these modalities offer a comprehensive therapeutic effect that goes beyond inflammation suppression, addressing the underlying tissue degeneration characteristic of LS.

One participant treated with FRF microneedling combined with exosomes and PRP, but without monopolar RF therapy, had less pronounced outcomes, reinforcing the importance of combining technologies for broader tissue impact. While she did report some symptom relief, most notably a 33% reduction in pain during intercourse, there were no significant improvements across other patient-reported domains, such as lubrication, elasticity, or visual appearance. This contrast suggests that monopolar RF may play a critical role in achieving more comprehensive therapeutic effects. It delivers deeper, more diffuse heating than FRF microneedling across a broader tissue volume, potentially enhancing deeper regenerative effects. These observations underscore the potential value of multimodal therapy in addressing tissue degeneration.

This case series presents initial clinical observations from a small cohort and was not designed to assess efficacy in a controlled manner. The absence of a control group, variability in treatment combinations, and differences in follow-up attendance introduce heterogeneity that may affect the consistency and generalizability of results. Nonetheless, this case series highlights a well-tolerated multimodal approach, with outcomes assessed using validated patient-reported questionnaires.

### Conclusions

This case series describes the clinical outcomes of a novel multimodal regenerative approach in the management of LS. Observed outcomes included reductions or complete resolution of symptoms such as vaginal dryness, atrophy, itching, burning, and interference with daily activities. Additionally, several patients reported improvements in sexual health, contributing to an overall enhancement in quality of life. These findings suggest potential benefits of this approach and warrant further investigation in controlled studies.

### Conflict of Interest

Dr. Caplan serves as a speaker for BTL Industries and acts as a clinical investigator. However, no funding or financial support was received for the research, authorship, or publication of this article.

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