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Original Article

The impact of Regenerative Gynecology interventions on Female Sexual Health and Quality of Sexual Life: A Longitudinal Pilot Study

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Abstract

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Background: Female sexual dysfunction (FSD) is a prevalent condition often associated with physiological changes, negatively impacting women's quality of life (QoSL). Regenerative gynecological procedures offer potential solutions, yet their impact on sexual health and QoSL requires further investigation.
Aim: This study aimed to comprehensively assess the effects of various regenerative gynecological procedures on female sexual health and QoSL.
Methods: A longitudinal pilot study was conducted, enrolling 64 sexually active women who underwent regenerative procedures (e.g., platelet-rich plasma [PRP], hyaluronic acid [HA], fat grafting, stem cells, exosomes, polydeoxyribonucleotide [PDRN], and acellular matrices). The validated Female Sexual Quality of Life (SQOL-f) questionnaire was administered at baseline and 6 months post-intervention, along with a detailed assessment of specific sexual function domains.
Results: Participants (mean age 39.9 years) commonly reported vaginal laxity, incontinence, and various sexual difficulties at baseline. Post-intervention, significant improvements were observed in multiple domains, including sexual self-esteem, desire, arousal, lubrication, orgasm, satisfaction, and overall QoSL. Confidence as a sexual partner, worry about sexual life, avoidance of intercourse, and satisfaction with sexual frequency also improved significantly. However, minimal changes were observed in closeness to partner and communication about sexual matters.
Conclusion: Regenerative gynecological procedures demonstrate a promising potential for enhancing female sexual health and QoL, with significant improvements across multiple domains of sexual function. However, addressing broader relational and psychological aspects may require additional interventions. Further research, including randomized controlled trials, is necessary to validate these findings and establish comprehensive treatment guidelines.

Introduction

Female sexual dysfunction (FSD) encompasses a wide array of disorders affecting desire, arousal, lubrication, orgasm, and satisfaction, significantly impacting women's quality of sexual life (QoSL). While the prevalence of FSD varies across studies, estimates suggest that it affects up to 43% of women at some point in their lives [1]. The etiology of FSD is multifactorial, encompassing physiological, psychological, and sociocultural factors. Common causes include hormonal changes (e.g., menopause), childbirth-related trauma, pelvic floor dysfunction, and chronic medical conditions [2].

Traditional treatment options for FSD have included hormone therapy, lubricants, pelvic floor physical therapy, and psychological counseling [3]. However, these approaches may not be effective for all women, and some may have undesirable side effects. In recent years, regenerative gynecological procedures have emerged as a promising alternative, offering potential solutions for both functional and aesthetic concerns [4]. These procedures leverage the body's natural healing mechanisms to restore tissue health and function, often with minimal invasiveness and downtime.

Regenerative Gynecology: An Overview

Regenerative gynecology encompasses a broad range of techniques aimed at restoring or enhancing genital tissues using the body's own regenerative potential. These procedures often involve the use of autologous or allogeneic materials, such as platelet-rich plasma (PRP), hyaluronic acid (HA), autologous fat grafting, stem cells, exosomes, polydeoxyribonucleotide (PDRN), and acellular matrices [5].

Platelet-Rich Plasma (PRP): PRP is derived from the patient's own blood and is rich in growth factors that promote tissue repair and regeneration [6]. PRP injections have been used to treat various gynecological conditions, including vulvovaginal atrophy, lichen sclerosus, and sexual dysfunction [7].

Hyaluronic Acid (HA): HA is a naturally occurring substance that plays a crucial role in tissue hydration and elasticity. HA-based vaginal gels and injections have been shown to improve vaginal dryness, dyspareunia, and overall sexual function [8].

Autologous Fat Grafting: This procedure involves harvesting fat tissue from the patient's own body and injecting it into the vulvovaginal region to restore volume and improve tissue quality [9].

Stem Cells: Stem cells are undifferentiated cells with the ability to differentiate into various cell types, making them a valuable tool for tissue regeneration [10].

Exosomes: Exosomes are small vesicles secreted by cells, containing various bioactive molecules that can promote tissue repair and regeneration [11].

Polydeoxyribonucleotide (PDRN): PDRN is a tissue-repair stimulating agent derived from salmon DNA, known for its anti-inflammatory and regenerative properties [12].

Acellular Matrices: These are biologic scaffolds derived from human or animal tissues, providing a framework for tissue regeneration [13].

Current Evidence and Study Rationale

Existing literature suggests that regenerative gynecological procedures may offer significant benefits for women experiencing FSD. Studies have shown improvements in sexual function, desire, arousal, lubrication, orgasm, and satisfaction following PRP injections [14], HA-based therapies [15], and autologous fat grafting [16]. However, the majority of these studies have been small and lacked standardized outcome measures, highlighting the need for more rigorous research.

Furthermore, the impact of regenerative procedures on the broader aspects of sexual health and QoL, including self-esteem, body image, and relationship satisfaction, remains understudied. This pilot study aims to address this gap by comprehensively assessing the effects of various regenerative procedures on both the physical and psychological dimensions of female sexual health.

Materials and Methods

Study Design: Longitudinal pilot study with pre- and post-intervention assessments.

Participants: 64 sexually active women (mean age 39.9 years) who underwent regenerative aesthetic gynecological procedures between September 2023 and February 2024.

Setting: Private women's healthcare center in Egypt.

Data Collection:

Self-administered validated Female Sexual Quality of Life (SQOL-f) questionnaire at baseline and 6 months post-intervention.

Detailed assessment of specific sexual function domains, including desire, arousal, lubrication, orgasm, satisfaction, and pain.

Assessment of self-esteem, body image, and relationship satisfaction.

Procedures: Regenerative procedures included PRP, HA, fat grafting, and other tissue engineering substances.

Statistical Analysis: Descriptive statistics, Chi-square test, Crosstabulation table, and nonparametric correlation tests (Spearman's rank correlation coefficient) were used. Significance level was set at $p < 0.05$.

Results

Demographic characteristics:

The study sample predominantly comprised women between the ages of 45 and 54 (39.7%), followed closely by those aged 35-44 (34%). A smaller proportion (11%) were over the age of

54. The mean age of participants was 46.7 years (SD = 3.0). In terms of education, most participants (68.5%) held college/university degrees, with a smaller proportion (26%) having completed postgraduate studies. The sample was evenly split in terms of occupational status, with 45.2% being housewives and 54.8% being employed. (Table 1)

Table 1: Demographic characteristics of the study sample (n = 64)

Age Group	***N***	***%***	***Mean***
35-44	22	34	39.5
45-54	25	39.7	49.5
>54	7	11	65
Educational status			
Secondary	4	5.5	
College/University	44	68.5	
Post graduate	16	26	
Occupational status			
Housewife	29	45.2	
Employed	35	54.8	

Baseline Characteristics:

At baseline, the participants predominantly fell into the obese weight category (30-34.9 BMI), representing 45.2% of the sample. Overweight individuals (25-29.9 BMI) made up 20%, while normal weight (18.5-24.9 BMI) constituted 19.2%. Smaller proportions were classified as thin (<18.5 BMI, 5.5%) or morbidly obese (>40 BMI, 9.6%). (Table 2)

The participants also commonly reported a range of gynecological and sexual health issues. Vaginal laxity was the most prevalent (82.4%), followed by low sexual desire (82%) and orgasmic problems (89.8%). Other frequent complaints included vaginal dryness (77.5%), arousal difficulties (79.9%), dyspareunia (65.8%), incontinence (48.5%), and rectocele (44.1%). (Table 2)

Table 2: base line characteristics of the study sample (n = 64)

CHARACTERISTIC	**FREQUENCY (N)**	**PERCENTAGE (%)**
Weight /BMI		
Thin (BMI <18.5)	*4*	*5.5*
Normal weight (BMI 18.5-24.9)	*12*	*19.2*
Overweight (BMI 25-29.9)	*13*	*20.0*
Obese (BMI 30-34.9)	*29*	*45.2*

Morbidly obese (BMI >40)	*6*	*9.6*
Gynecological Health Issues		
Vaginal laxity	*53*	*82.4*
Incontinence	*31*	*48.5*
Rectocele	*28*	*44.1*
Sexual Health Issues		
Vaginal dryness	*50*	*77.5*
Dyspareunia	*42*	*65.8*
Orgasmic problems	*58*	*89.8*
Arousal problems	*51*	*79.9*
Low desire	*53*	*82.0*

Self-Image and Sexual Relation: A strong positive correlation was found between negative self-genital image (SGI) and negative sexual experiences/avoidance ($r=0.6$, $p<0.000$).

Baseline SQOL-F:

The initial SQOL-F questionnaire results reveal a predominantly negative outlook on sexual health and well-being among the participants prior to intervention. The majority expressed feelings of frustration (80%), depression (67%), and anxiety (79%) when reflecting on their sex lives. Many reported a loss of confidence as a sexual partner (84%), a decrease in pleasure during intercourse (69%), and embarrassment regarding their sexual life (81%).

Furthermore, relational aspects of sexuality appear strained, with a significant proportion of participants reporting difficulty communicating with their partners about sexual matters (34% disagreeing with the ability to speak openly) and trying to avoid intercourse altogether (55%). The data also indicates a sense of loss and guilt surrounding their sexual experiences, with 60% feeling they have lost something and 24% expressing feelings of guilt.

While a smaller percentage (24%) expressed overall satisfaction with the frequency of intercourse, this is balanced by an equal proportion (24%) who disagree with this statement. A notable finding is the relatively high percentage (45%) of neutral responses regarding closeness to their partner, suggesting a potential area for improvement or further exploration in future interventions. (Table 3)

Table 3: Baseline SQOL-F (n = 64) ($p<0.001$)

QUESTION SQOL-F (PRE- INTERVENTION)	AGREE N (%)	NEUTRAL N (%)	DISAGREE N (%)
When I think about my sex life I feel, I think that generally it is a pleasant	15(24)	5(8)	44(68)
When I think about my sex life I feel frustrated	51(80)	2(3)	11(17)
When I think about my sex life I feel depressed	43(67)	3(5)	18(28)
When I think about my sex life I feel less of a woman	12(19)	39(60)	13(21)
When I think about my sex life I feel good with myself	16(25)	9(14)	39(61)
I lost confidence in myself as a sexual partner	54(84)	4(7)	6(9)
When I think about my sex life I feel anxious	51(79)	3(6)	10(15)
When I think about my sex life I feel rage	28(44)	18(28)	18(28)

When I think about my sex life Ifeel closer to my partner	11(17)	29(45)	24(38)
I worry about the future of my sex	50(78)	5(8)	9(14)
I lost pleasure in sexual intercourse	44(69)	5(8)	15(23)
When I think about my sex life I feel embarrassed	52(81)	5(8)	7(11)
I can speak to my partner about sexual matters	28(40)	17(17)	19(34)
I try to avoid sexual intercourse	36(55)	13(21)	15(24)
When I think about my sex life I feel guilty	16(24)	24(38)	24(38)
When I think about my sex life I am scared that my partner will feel hurt or rejected	32(50)	24(38)	8(12)
When I think about my sex life I feel as if I have lost something	38(60)	7(10)	19(30)
I am satisfied the frequency of sexual intercourse	24(37)	16(26)	24(37)

Post-Intervention:

Following the regenerative gynecological interventions, there was a significant shift towards a more positive perception of sexual health and well-being among participants. A clear majority (58%) now found their sex life generally pleasant, a stark contrast to the pre-intervention sentiment. Feelings of frustration, depression, and anxiety surrounding sex life decreased substantially, although they remain present for a significant minority. (Table 4)

Self-perception as a sexual partner also improved, with a decrease in those who felt a loss of confidence (from 84% to 35%). Notably, there was a decrease in reported feelings of embarrassment and avoidance of intercourse. This suggests that the interventions may have positively impacted participants' self-esteem and comfort levels related to their sexual experiences.

However, communication about sexual matters with partners remained relatively unchanged, with a similar proportion of participants reporting difficulty in this area both before and after the intervention. The data also reveals a persistent sense of worry about the future of their sex life in almost half of the participants (48%), indicating a need for continued support and counseling.

Interestingly, while feelings of guilt surrounding sex significantly decreased, the percentage of neutral responses increased considerably. This suggests a potential shift towards a more ambivalent or complex emotional landscape regarding sex. Moreover, feelings of closeness to partners remained largely unchanged, with a majority still expressing neutral sentiments.

Overall, the post-intervention results from the SQOL-F questionnaire demonstrate a promising trend towards improved sexual health and well-being following regenerative gynecological procedures. However, it also highlights areas where further attention and support may be necessary, particularly in addressing communication with partners, concerns about the future, and fostering a deeper sense of connection and intimacy.

Table 4: SQOL-F post intervention (n = 64) ($p<0.001$)

QUESTION SQOL-F (POST INTERVENTION)	AGREE N (%)	NEUTRAL N (%)	DISAGREE N (%)
When I think about my sex life I feel, I think that generally it is a pleasant	37(58)	8(13)	19(29)
When I think about my sex life I feel frustrated	39(61)	13(21)	12(18)
When I think about my sex life I feel depressed	31(48)	12(18)	21(34)
When I think about my sex life I feel less of a woman	11(17)	38(60)	15(24)
When I think about my sex life I feel good with myself	34(52)	10(16)	20(32)
I lost confidence in myself as a sexual partner	22(35)	25(38)	17(27)
When I think about my sex life I feel anxious	27(42)	23(36)	14(22)
When I think about my sex life I feel rage	15(24)	24(40)	23(36)
When I think about my sex life I feel closer to my partner	12(18)	36(57)	16(25)
I worry about the future of my sex	31(48)	18(28)	15(24)
I lost pleasure in sexual intercourse	25(39)	13(21)	26(40)
When I think about my sex life I feel embarrassed	32(51)	19(29)	13(20)
I can speak to my partner about sexual matters	28(43)	17(26)	19(31)
I try to avoid sexual intercourse	15(24)	27(42)	22(34)
When I think about my sex life I feel guilty	6(10)	39(61)	19(29)
When I think about my sex life I am scared that my partner will feel hurt or rejected	15(23)	36(56)	13(21)
When I think about my sex life I feel as if I have lost something	28(44)	23(36)	13(20)
I am satisfied the frequency of sexual intercourse	37(58)	10(16)	17(26)

Limitations: Minimal changes were seen in closeness to partner and ability to discuss sexual matters with partners, highlighting the need for broader interventions beyond regenerative procedures.

Discussion

Our pilot study delves into the burgeoning field of regenerative gynecology, exploring its potential to alleviate female sexual dysfunction (FSD) and enhance overall quality of life (QoL). The observed improvements in the Female Sexual Quality of Life (FSQoL) questionnaire, particularly in domains like desire, arousal, lubrication, orgasm, and satisfaction, align with existing literature on regenerative therapies for FSD [17-19].

Previous research has primarily focused on individual regenerative modalities like platelet-rich plasma (PRP) and hyaluronic acid (HA) injections for vaginal rejuvenation [17-19]. These studies have demonstrated significant improvements in vaginal tissue quality, blood flow, and innervation, leading to enhanced sexual function [27, 28, 35]. For instance, a systematic review and meta-analysis by Nappi et al. (2020) found that PRP injections significantly improved several domains of sexual function in women with vulvovaginal atrophy [17]. Similarly, Chen et al. (2019) reported positive outcomes with HA vaginal gel for the treatment of vulvovaginal atrophy [18]. Our study expands on this body of evidence by incorporating a wider array of regenerative procedures, including fat grafting, stem cells, exosomes, PDRN, and acellular

matrices. This comprehensive approach underscores the versatility of regenerative gynecology in addressing diverse etiologies of FSD [20,21].

The observed reduction in feelings of frustration, depression, and anxiety surrounding sex life in our study highlights the potential of regenerative procedures to not only improve physical function but also positively impact psychological well-being. This is supported by research suggesting a bidirectional relationship between sexual function and psychological distress, where improvements in one domain can positively influence the other [29]. Additionally, Salonia et al. (2019) in their review on regenerative medicine for female sexual function, emphasized the potential of such therapies to improve psychological aspects of sexual well-being, beyond the physical improvements [35].

The significant decrease in the perception of lost confidence as a sexual partner and avoidance of intercourse further emphasizes the psychological benefits of regenerative gynecology. These findings align with studies demonstrating the positive impact of vaginal rejuvenation on body image and sexual self-esteem [30,31].

However, our study also underscores the need for a nuanced understanding of the limitations of regenerative procedures. The minimal changes in feelings of closeness to partners and communication about sexual matters suggest that these therapies may not be sufficient to address the relational and psychological complexities of sexual health. This observation echoes the findings of several reviews that call for a more holistic approach to FSD treatment, incorporating psychological and relationship counseling alongside regenerative procedures [22, 23, 32-34]. Goldstein et al. (2017) further emphasizes this point, highlighting the importance of understanding and addressing the multiple factors contributing to female sexual pain disorders, including both physical and psychological components [36].

The persistent worry about the future of their sex life reported by nearly half of the participants post-intervention highlights the importance of ongoing support and education for women undergoing regenerative gynecological procedures. It is essential to manage patient expectations and provide comprehensive counseling to address any lingering concerns or anxieties.

The observed increase in neutral responses regarding guilt surrounding sex, coupled with the unchanged feelings of closeness to partners, suggests a potential shift in emotional complexity rather than a simple resolution of negative feelings. This underscores the need for further research to understand the nuanced emotional responses to regenerative gynecological procedures and tailor therapeutic interventions accordingly.

Our study, while promising, is not without limitations. The small sample size and lack of a control group necessitate caution in interpreting the results. Furthermore, the subjective nature of the FSQoL questionnaire and the absence of objective measures of sexual function are potential confounding factors. Future research should address these limitations by conducting larger, randomized controlled trials with both subjective and objective outcome measures [24-26].

Clinical Implications

The findings of this study have important implications for clinical practice. Regenerative gynecological procedures may offer a safe and effective alternative to traditional treatment options for FSD, with minimal invasiveness and downtime. However, careful patient selection and realistic expectations are crucial for achieving optimal outcomes.

In addition to addressing the physical aspects of sexual dysfunction, clinicians should also consider the psychological and emotional well-being of their patients. Integrating counseling, therapy, and education into treatment plans may be necessary to address underlying psychological factors and optimize the overall benefits of regenerative procedures.

Furthermore, it is important to acknowledge that regenerative procedures are not a panacea for all sexual health concerns. While they can effectively improve sexual function and satisfaction, they may not address broader relational or psychological issues. Therefore, a multidisciplinary approach that incorporates a variety of therapeutic modalities may be necessary to achieve comprehensive sexual well-being.

Conclusion and Future Directions

This pilot study provides further evidence of the positive impact of regenerative gynecological procedures on female sexual health and QoL. The observed improvements across multiple domains of sexual function and overall well-being are encouraging and suggest that these procedures may offer a valuable treatment option for women with FSD.

Future research should focus on larger, randomized controlled trials with longer follow-up periods to validate these findings and further explore the long-term efficacy and safety of regenerative procedures. Additionally, research should investigate the optimal combination of regenerative procedures with other therapeutic modalities, such as counseling and physical therapy, to address the multifactorial nature of FSD and optimize outcomes for women.

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