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RESEARCH ARTICLE

VAGINAL PLATELET-RICH PLASMA ADMINISTRATION TO IMPROVE FEMALE SEXUAL SATISFACTION

Mostafa Abdulla Elsayed Mahmoud

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Abstract

Objective: To investigate the effect of platelet-rich plasma (PRP) injection to the lower one-third of the anterior vaginal wall on sexual function, orgasm, in women with sexual dysfunction by scoring with FSFI.

Materials and Methods:Three sessions of PRP (platelet rich human autologous plasma) were administered to the anterior vaginal wall of fiftyfemale patients with sexual dysfunctiondiagnosed by FSFI scoring card obtained in JAM clinic in Benha city Egypt and orgasmic disorder. Female Sexual Function Index (FSFI) total score ≤26 orgasmic subdomain score ≤3.75 were considered having sexual dysfunction and recruited in the study.

Results: Following the application of the PRP, the total FSFI score was observed as 27.7±4.5 and the total score was 26 and above in patients having sexual dysfunction ($p<0.001$).

Orgasm subdomain scores were found as 2.2±1.2 before the PRP treatment and 4.4±1.06 at the third dose after ($p<0.001$).

Conclusion:PRP administration to the distal anterior vaginal wall improved female sexuality with high satisfaction by using multiple sessions (three month).

Introduction:-

Platelet-rich plasma (PRP) increases the healing ability through increasing neo vessels and collagen formation through the effect of platelet derived growth factors (1).

PRP injections improve angiogenesis and wound healing and can restore functions and also increase the thickness of submucosa aiding vaginal tightening in patients with pelvic and vaginal relaxation after repeated normal vaginal deliveries

Woman'ssexual dysfunction disorders can be categorized into arousal disorder, with hormonal, physical, psychological and relational changes to be mainly accused.

Other causal factors include decreased estrogenlevels as in postmenopausal subjects, vaginal dryness, and chronic physical and mental stress. The vaginal PRP rejuvenation is designed to treat the mentioned disorders particularly vaginal dryness and lubrication during sexual acts. It can, vaginal PRP be combined with uterine and ovarian PRP rejuvenation treatment for a more extensive treatment.

Corresponding Author:- Mostafa Abdulla Elsayed Mahmoud

The most important advantages are it being autologous and reliable (2, 3).

Blood platelets are filed with growth factors and essential nutrients that offer a base for epithelialization and neovessel formation aiding in wound healing and epithelial integrity.

In order to harvest the platelets, blood taken from the subjects and placed in a centrifuge that will separate the platelets from the other components. At the end of process, the final product will be a form of plasma with a highly concentrated amount of platelets.

PRP has been used in atrophic diseases such as lichen sclerosis in the vagina, stress urinary incontinence, episiotomy scars, and lubrication disorders in the vagina (2).

The vaginal PRP comprises the injection of Platelet Rich Plasma (PRP) into the distal anterior wall of the vagina and clitoris, stimulating stem cells for multiplication of younger epithelial cells that aid in tissue growth.

Growth Factors released from the activated PRP, promote collagen and elastin production inside the vagina and clitoris, leading to tissue thickening easier for sexual prompt stimulation, and improved vaginal hydration and lubrication that alleviate dyspareunia.

The first use for sexual dysfunction in women was performed by Charles Runels under the name of O-Shot (3).

Improvement of sexual functions was reported with PRP administration to the G-spot AKA Gräfenberg spot, described firstly by Dr. Beverly Whipple .

According to the criteria of the Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM-5), desire/arousal and orgasmic disorders are the most common causes of female sexual dysfunctions(4,5).

The lower one-third of the anterior region has been proved to have more nerves immunohistochemically(7,8,9) and this consequently affects the response of the distal anterior vaginal wall to contact and to pressure (6,10).

Materials and Methods:-

PRP application performed on 100 patients who fulfilled the criteria for inclusion and exclusion and who were admitted to a private clinic because of sexual dysfunction between December 2019 and April 2020 and administered vaginal PRP.

The inclusion criteria

age from 18 years to 55 years, sexually active for the last 12 months and had sexual intercourse every 7 days, dyspareunia, difficulty in reaching orgasm or taking too long duration to obtain orgasm, dryness and penetrative pain in the last six months, lackof desire and interest , difficult or absent arousal (lubrication and genital congestion), and patients with a total score FSFI below 26.5 whose orgasm subdomain is below 3.75 in the Female Sexual Function Index (FSFI) questionnaire in the first admission included in the study.

Exclusion criteria

Patients who were sexually inactive, who had organic pathology , pregnancy, aged under 18 or over 55 years, antidepressant-psychotropic drugs use , cases dependent on sildenafil, local estrogen use in the past year, contraceptive pill use as it is associated with decreased appetite for sex, alcohol and illicit drug abuse , t genital oncological surgery, chemotherapy or radiotherapy exposure in the last two yars, FSFI questionnaire scores above 26.5, and those with orgasm subdomains above 3.75 were excluded from the study.

The Female Sexual Function Index Questionnaire (FSFI-Q)

The FSFI-Q is a multidimensional self-report tool for assessing key dimensions of female sexual functioning overthe preceding 4weeks. This standardized questionnaire described by Rosen and colleagues consists of 19-items thatassess six domains of female sexual functioning [10,11].

The domains include sexual desire (items 1 and 2), arousal(items 3-6), lubrication (items 7010), orgasm (items 11-13), satisfaction (items 14-16), and sexual pain (items 17-19).

The full scale or total FSFI score ranges from 2 to 36 and is the sum of all the scores in the six domains. Scores morethan 26.55 considered satisfactory and those below this figure considered having sexual dysfunction [10,11]

The following questionnaires were administered before the PRP administration in the 1st, 2nd, 3rd month follow up by female sexual function index FSFI .

Female sexual function index questions are as follow

1. Over the past 4 weeks, how often did you feel sexual desire or interest?
Almost always or always =5
Most times (more than half the time) =4
Sometimes (about half the time) =3
A few times (less than half the time) =2
Almost never or never =1
2. Over the past 4 weeks, how would you rate your level (degree) of sexual desireor interest?
Very high =5
High =4
Moderate =3
Low =2
Very low or none at all =1
Sexual arousal is a feeling that includes both physical and mental aspects of sexual excitement. It may include feelings of warmth or tingling in the genitals, lubrication (wetness), or muscle contractions.
3. Over the past 4 weeks, how often did you feel sexually aroused ("turned on") during sexual activity or intercourse?
No sexual activity =0
Almost always or always =5
Most times (more than half the time) =4
Sometimes (about half the time) =3
A few times (less than half the time) =2
Almost never or never =1
4. Over the past 4 weeks, how would you rate your level of sexual arousal ("turn on") during sexual activity or intercourse?
No sexual activity =0
Very high =5
High =4
Moderate =3
Low =2
Very low or none at all =1
5. Over the past 4 weeks, how confident were you about becoming sexually aroused during sexual activity or intercourse?
No sexual activity =0
Very high confidence =5
High confidence =4
Moderate confidence =3
Low confidence =2
Very low or no confidence =1
6. Over the past 4 weeks, how often have you been satisfied with your arousal (excitement) during sexual activity or intercourse?
No sexual activity =0
Almost always or always =5
Most times (more than half the time) =4
Sometimes (about half the time) =3
A few times (less than half the time) =2
Almost never or never =1
7. Over the past 4 weeks, how often did you become lubricated ("wet") during sexual activity or intercourse?
No sexual activity =0

Almost always or always =5
Most times (more than half the time) =4
Sometimes (about half the time) =3
A few times (less than half the time) =2
Almost never or never =1

8. Over the past 4 weeks, how difficult was it to become lubricated ("wet") during sexual activity or intercourse?

No sexual activity =0
Extremely difficult or impossible =5
Very difficult =4
Difficult =3
Slightly difficult =2
Not difficult =1

9. Over the past 4 weeks, how often did you maintain your lubrication ("wetness") until completion of sexual activity or intercourse?

No sexual activity =0
Almost always or always =5
Most times (more than half the time) =4
Sometimes (about half the time) =3
A few times (less than half the time) =2
Almost never or never =1

10. Over the past 4 weeks, how difficult was it to maintain your lubrication ("wetness") until completion of sexual activity or intercourse?

No sexual activity =0
Extremely difficult or impossible =5
Very difficult =4
Difficult =3
Slightly difficult =2
Not difficult =1

11. Over the past 4 weeks, when you had sexual stimulation or intercourse, how often did you reach orgasm (climax)?

No sexual activity =0
Almost always or always =5
Most times (more than half the time) =4
Sometimes (about half the time) =3
A few times (less than half the time) =2
Almost never or never =1

12. Over the past 4 weeks, when you had sexual stimulation or intercourse, how difficult was it for you to reach orgasm (climax)?

No sexual activity=0
Extremely difficult or impossible=5
Very difficult =4
Difficult =3
Slightly difficult =2
Not difficult =1

13. Over the past 4 weeks, how satisfied were you with your ability to reach orgasm(climax) during sexual activity or intercourse?

No sexual activity =0
Very satisfied=5
Moderately satisfied =4
About equally satisfied and dissatisfied =3
Moderately dissatisfied =2
Very dissatisfied =1

14. Over the past 4 weeks, how satisfied have you been with the amount ofemotional closeness during sexual activity between you and your partner?

No sexual activity =0

Very satisfied =5
Moderately satisfied =4
About equally satisfied and dissatisfied =3
Moderately dissatisfied =2
Very dissatisfied =1

15. Over the past 4 weeks, how satisfied have you been with your sexualrelationship with your partner?
Very satisfied =5
Moderately satisfied =4
About equally satisfied and dissatisfied =3
Moderately dissatisfied =2
Very dissatisfied =1

16. Over the past 4 weeks, how satisfied have you been with your overall sexual life?
Very satisfied =5
Moderately satisfied =4
About equally satisfied and dissatisfied =3
Moderately dissatisfied =2
Very dissatisfied =1

17. Over the past 4 weeks, how often did you experience discomfort or pain duringvaginal penetration?
Did not attempt intercourse =0
Almost always or always =5
Most times (more than half the time) =4
Sometimes (about half the time) =3
A few times (less than half the time) =2
Almost never or never =1

18. Over the past 4 weeks, how often did you experience discomfort or pain followingvaginal penetration?
Did not attempt intercourse =0
Almost always or always =5
Most times (more than half the time) =4
Sometimes (about half the time) =3
A few times (less than half the time) =2
Almost never or never =1

19. Over the past 4 weeks, how would you rate your level (degree) of discomfort orpain during or following vaginal penetration?
Did not attempt intercourse =0
Very high =5
High =4
Moderate =3
Low =2
Very low or none at all =1

The FSFI is a brief instrument for the assessment of sexual function that consists of 19 questions about desire, arousal, orgasmic dysfunction and penetrative pain disorders

Each section of libido, arousal, lubrication, orgasm, satisfaction, and pain were tested by questions and the observations recorded in the score card (15).

The cut-off scores were 3.16 for desire, 3.97 for arousal, 4.31 for lubrication, 3.75 for orgasm, 3.85 for sexual satisfaction, and 4.22 for pain.

An FSFI total score of 26.55 is considered satisfactory sexual response, out of a maximum possible score of 36, the cut off level of 26.55 differentiate women with and without sexual dysfunction (16).

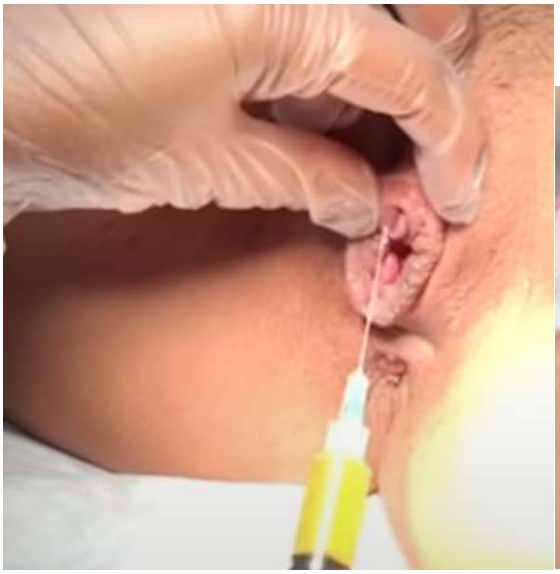
Application

Written consent was obtained from subjects after perfect counseling and detailed information about the procedure.

The patients were placed on the operating table in the lithotomy position, after emptying the urinary bladder, before the procedure a local anesthesia which contained lidocaine 2.5% cream applied to prevent the pain and patient discomfort and also lidocaine spray used in some cases according to the patient's preference

The local anesthetic was administered around the clitoris and the vaginal lower third and a period of half an hour is waited to achieve a maximum anesthetic response

The PRP kit consists of 2 PRP tubes, re-suspension tube, 2 injectors, and 2 needles in a single sterile mold. Each PRP tube has a volume of 10 mL and contains 1 mL of citrate.
The PRP preparation steps were as follows:
1-18 mL of venous blood from the antecubital vein was taken to two special certified PRP tubes.
2-then the sampled blood centrifuged at 3200 rpm for 10 minutes.
3-After centrifugation, the plasma (upper layer), platelets and leukocytes (middle layer called "Buffy coat") and erythrocytes (lowest layer) were divided into three layers.
4-2 mL of PRP and 2-3 mL PPP from each tube was transferred to the re-suspension tube, for a more homogeneous spread of platelets in the re-suspension tube, the tube shaken gently for 30 sec.
5. 5 mL of PRPisolated from the re-suspension tube, calcium chloride (0.5 mL) was added, leading to activation of thrombin , followed by of platelets activation with release of growth factors and .
6- 10 mL PRP mixture was the final volume from both tubes using a 21 gauge needle.
PRP was administered around the clitoris in the direction of clock positions of 12, 3, 6, and 9, each with 1 cc, 2 cc subcutaneously at the distal vaginal wall each with 1 cc, 3 cc and mid-urethral midline 1 cc. The PRP applications administered using 31-G needles.



This administration was continued once every four weeks, for three months. The patients were evaluated by repeating the questionnaires in each administration.

Results:-

The mean age of the patients was 36±8.5 (mean ± SD; 22-55 minimum-maximum) years.

The mean body mass index was 26.54±5.10 (mean ± SD; 18.29-40.00 minimum-maximum) kg/m2, 100% wer sexually active;the results of the PRP before, during, and after the administration for 3 months are seen in Table 1

The pre-treatment FSFI total score was 13.2±2.1 (mean ± SD), and the total score of all patients was below 26.

The subdomains of FSFI of desire, arousal, lubrication, orgasm, satisfaction and pain mean scores (mean ± SD) were found as 3.2±2.1, 2.2±1.36, 2.1±1.1, 2.2±1.20, 1.5±1.2, and 1.5±1.1, respectively. As shown in table one .

Table one:- FSFI scoring of cases before PRP and after.

fsfi	Before PRP	First application	Second application	Third application	P value
Total score	13.2±2.1	19.1±	22.8±	27.7±4.5	<0.001
desire	3.3±1.3	4.2±0.8	4.5±0.7	4.9 ±0.38	<0.001
arousal	2.2±1.36	3.2±1.1	3.5±1.2	4.6±1.02	<0.001
lubrication	2.1±1.1	3.3±0.9	3.4±1	4.5±1.08	<0.001
orgasm	2.2±1.2	3.4±1.08	3.9±1.3	4,48±1.4	<0.001
Satisfaction	1.5±1.2	3.5±1.1	4.07±0.7	4.7±0.8	<0.001
pain	1.5±1.1	2.4±0.7	3.1±0.8	4.5±1.06	<0.001

After application of the PRP, the total score of FSFI was 27.7±4.5 (mean ± SD) .

The increase in the total score was found statistically significant after the 1st month ($p<0.001$, from 13.2 to19.1).

After PRP, the subdomains of FSFI of desire, arousal, lubrication, orgasm, satisfaction, and pain mean scores were found as (mean ± SD); 4.9±0.3, 4.6±1.02, 4.5±1.08, 4.48±1.4, 4.71±0.8, and 4.5±1.06, respectively.

A significant initial change in all sub-domains was observed after the first administration ($p<0.001$).

As a result, it was seen that there was a significant improvement in scale scores after four PRP administrations. There was a significant improvement in all subdomains specially lubrication and total FSFI score

Discussion:-

This study investigated the effect of PRP injection to the lower anterior vaginal wall on sexual function, orgasm, and total sexual gratification of patients in cases who known to have sexual dysfunction.

The study found an increase in the satisfaction of the patients after the procedure in arousal orgasm and other item related to sexual satisfaction as evident by increase in FSFI score.

PRP is based on the separation of a small amount of blood taken from the patient into a special tube, centrifugation is performed and the obtained "PRP" is returned to the same patient by injection.

PRP has been used in many areas such as cosmetic use, wound healing, and urologic and orthopedic applications (1, 2, 3).

It is known that PRP increases collagen formation and neovascularization with growth factors (platelet-derived growth factor, transforming growth factor-b, and epidermal growth factor) by 10 times more than normal blood.

PRP use in gynecology has been used in atrophic conditions like vaginal lichen sclerosis, stress urinary incontinence, episiotomy scars, and lubrication disorders and also in vaginal tightening after pelvic relaxation form normal vaginal deliveries (2, 19).

PRP injection is effective in mesh erosion through better wound healing, increased synthesis of collagen 3, and neovascularization that enhance re-epithelialization and augment the integrity of the submucosa to be in batter state (7-11).

The treatment of female sexual dysfunction is limited to psychotherapy and hormonal support but these lead to a less satisfactory results (5).

From this point of view, laser, filler injections, and PRP are gaining popularity nowadays as Less invasive and low risk interventions (3,5) to be added to psychotherapy for increasing sexual gratification in women with sexual dysfunction and a change in mindset and thoughts lead to improvement in self-acknowledgment and new perception of pleasure from sexual acts .

Minimally invasive methods like PRP injection at the anterior distal vaginal wall have a positive effect in enhancing sensation in the vagina during sexual intercourse through increase in local thickness, nerve endings and submucosal vessel congestion aiding in lubrication so facilitates in vaginal penetration without pain.

The first use for sexual dysfunction in women was performed by CharlesRunels under the name of O-Shot (3).

In a human studies, PRP injection significantly increased density of nerves and microvessels in the distal one-third of the anterior vaginal wall (9). the distal part of the anterior vaginal wall particularly in the lower 4 cm, has been shown to have more nerves immunohistochemically(7). It was found that the second one-fifth partition of the distal anterior wall had significantly richer innervation than the surrounding areas (8)

The distal anterior vaginal wall possesses G-spot;known also as anterior wall erogenous complex, this spot in distal anterior vaginal wall, is known to be more sensitive to penile touch during sexual intercourse.

The response of the distal anterior vagina, which is more sensitive, to penile vagina penetration is higher (6-10). This study administered injectionsin the distal anterior one-third vagina region and followed for sexual gratification by scoring with female sexual function index.

We administered five injections in the vaginal wallaftercentrifugation; by using the plasma part of the poor platelet in order to benefit from the growth factors within it.

It is known that increased blood flow through the clitoris is correlated with improved sexual function in women (11). Accordingly, we administered four injections to the clitoris and its surroundings.

In the presented work after application of the PRP, the total score of FSFI was 27.88±4.80 (mean ± SD).

The increase in the total score was found statistically significant after the 1st month ($p<0.001$,).

Runels et al. made one single application for sexual dysfunction and this was different from the present work as I apply 5 injections and they expressed positive results after only one injection to the distal vaginal wall at the G spot (12)

In the presented work increasing the number of application at three month a total satisfaction as evident by positive change in FSFUI was observed so patients can be benefited from multiple applications instead of one only. Increasing the number of application also resulted in increase in the total FSFI score and consequently sexual gratification this may be due to the cumulative effect on epithelial integrity, nerve endings and neovessles that aid in arousal

In multiple studies there were no adverse effect reported in vaginal applications. This is explained by the fact that the contents of PRP are from the patient's own blood (autologous). In our study, no adverse effects of the administration were observed in any patients. (13)

Conclusion:-

PRP is a minimally invasive method, easy, fast, and has almost no adverse effects. Administration to the lower anterior vaginal wall may improve female sexuality with high satisfaction

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