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Vaginal Rugation Rejuvenation (Restoration): A New Surgical Technique for an Acquired Sensation of Wide/Smooth Vagina

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Key Words

Vaginal rejuvenation · Vaginal rugation rejuvenation · Vaginal rugation restoration · Vaginal columnar rugae · Acquired sensation of wide/smooth vagina

Abstract

Background: No paper on vaginal columnar rugation rejuvenation has been published so far. ***Objectives:*** To evaluate a new surgical technique of vaginal rugae restoration for the management of an acquired sensation of wide/smooth vagina (ASWSV). ***Methods:*** A prospective observational study was conducted. Ten women with ASWSV (group I) were compared to 10 healthy women (control group II). The vaginal rugation rejuvenation (VRR) technique was developed and appraised. The primary outcome measure was to assess VRR applicability. A secondary outcome measure was to evaluate the surgical resolution of symptoms and signs associated with ASWSV and the impact of VRR on female sexual function. ***Results:*** In group I, VRR was executed without complications and the surgical resolution of symptoms and signs associated with ASWSV was observed in all subjects. Improved feelings of penile strokes during coitus were also reported by all subjects of study group I. ***Conclusions:*** VRR (restoration) was accomplished without increasing the risks of complications. Surgical resolution of symptoms and signs was observed and sexual function improved by 18.75% following VRR in group I. This nonrandomized study precluded us from drawing the conclusion that VRR is a safe and effective operation.

Introduction

The author defines vaginal rejuvenation as a surgical intervention that transforms vaginal gross and functional anatomy to achieve more enjoyable sensation during coitus. He delineates a wide vagina as widened vaginal diameters which interfere with sexual function, and describes a smooth vagina as the absent or decreased vaginal rugation which can lead to lowering sensation of penile friction.

An MRI study established that vaginal rugae interact very tightly with the penile shaft during coitus [1]. A vanishing process of vaginal rugation independently correlates with advancing age and estrogen deficiency [2]. Vaginal subepithelial but intraepithelial innervations have been identified; the anterior vaginal wall has denser innervations than the posterior wall which was confirmed by electric vaginal stimulation; the upper (80%) and the lower (20%) vagina are of mesodermal and ectodermal origin, respectively [3–6]. So, neurosensory testing is similar to skin testing.

In the existing literature, only colpoperineoplasty, with or without paravaginal repair, was published as one-fit-all procedure for the treatment of wide vagina [7]. Yet, it appeared that an acquired sensation of a wide/smooth vagina (ASWSV) could result from multiple underlying causes, the repair of which would require diverse procedures.

Multiple electronic databases were used to search the multi-language literature on the vaginal rugation rejuve-

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nation (VRR) surgical technique using selected Medical Subject Headings. A manual search was also performed. Both searches revealed that VRR is a new surgical technique.

The objectives of this study were to develop a new VRR surgical technique and to assess the applicability, potential complications, surgical resolution of symptoms and signs associated with ASWSV, and the impact on female sexual function.

Subjects and Methods

The primary outcome measure was to determine the applicability of VRR. The secondary outcome measure was to establish the impact of VRR on symptoms, signs, and female sexual function.

In study group I, 10 consecutive women who demanded VRR for ASWSV were enrolled. All women were married, sexually active (median, 3 times weekly) Caucasians, aged between 19 and 59 (mean 39 ± 20 years). Parity ranged from 0 to 4 (median 2), 8 delivered vaginally (1 woman underwent an operative vacuum vaginal delivery complicated by 4th-degree perineal rupture), 1 woman an delivered by cesarean section, and 1 subject was nulliparous. Two women reported hysterectomy for benign indications, and all subjects but 1 had a history of colpoperineoplasty. There were 2 postmenopausal women with durations of 7 and 5 years, respectively; both were placed on Vagifem® for at least 6 weeks before VRR.

Control group II consisted of 10 consecutive, healthy, sexually active (median 3 times weekly) Caucasian women who requested a routine annual check-up. Their ages ranged from 22 to 62 (mean 42 ± 20) years. Eight women had delivered vaginally and 2 by cesarean section. Two subjects underwent hysterectomy for benign conditions. Seven women were married and 3 women were single living with their male partners.

At the initial visit, both groups of heterosexual women were asked specific questions related to medical history to verify the presence of ASWSV and were requested to complete the sexual function PISQ-12 questionnaire, and their answers were assessed on a 5-point Likert scale [8]. Re-evaluation of sexual function with PISQ-12 was conducted 6 months after VRR only in group I. In both groups, subjects were evaluated for wellbeing, depression, somatization, anxiety and hostility using the SQ questionnaire [9], and BMI was determined. Clinical neurosensory evaluation of the vagina was made by applying cold and warm cotton balls, and feelings of penile friction movement within the vaginal pool were recorded by the subjects using the Vaginal Functional Numeric Rating Scale (VFNRS) which was developed to appraise the wide/smooth vagina and standardized from 0 to 3, with 0 indicating no abnormality, 1 weak, 2 fair, and 3 extreme sensation of wide/smooth vagina. Pre- and postoperatively, subjects were asked to respond to the newly developed questionnaire to rate vaginal tightness during coitus. Identification of vaginal wall defects was established using the standard provided by ACOG [10]. Staging of vaginal prolapse was based on the POPQ profile [11]. Paravaginal defect(s) was verified by ultrasonographic imaging techniques described by Ostrzenski et al. [12, 13]. Preoperatively, all postmenopausal women used Vagifem® vaginal tablets of 25 μg estradiol for at least 6 weeks before VRR and Vagifem® was continued postoperatively. Postoperatively, subjects were evaluated in intervals of 1 week, and 1, 3 and 6 months.

Study Group Inclusion Criteria

Subjects were included if they: (1) understood the study's protocol and agreed to VRR; (2) tested negatively with the SQ instrument; (3) had the absence of vaginal rugation; (4) exhibited intact vaginal wall neurosensory faculty; (5) rated 3 or 4 on MBIS; (6) demonstrated VFNRS at the range of 3; (7) met category A (the absence of both columnar rugae and site-specific defects) and category B (the absence of columnar rugae and the presence of site-specific defects) of Ostrzenski's vaginal rejuvenation classification [14], and (8) completed vaginal/perineal reconstructive surgery, at least 6 months before VRR.

Exclusion Criteria

Subjects were excluded if they: (1) demonstrated lower genital tract or pelvic infections, were pregnant or had a neurologic condition; (2) had a BMI of ≥30; (3) did not want local anesthesia, and (4) suffered from dyspareunia or another form of sexual dysfunction.

Surgical Technique

Lidocaine and prilocaine topical cream (25%/25%; Fougera® & Co., Division of Atlanta Inc., Melville, N.Y.) was applied vaginally 1 h before surgery. Later, the vaginal walls were infiltrated with plain 1% lidocaine before tissue vaporization.

The depth of vaginal columnar rugae vaporization was between 2 and 5 mm, 5–8 mm width; the distance between grooves (crypts) varied between 5 and 10 mm, different length or shape. The vaginal muscular layer was very poorly delineated. Beneath the muscular layer is the pubocervical fascia which is easy to recognize by its white color. Vaporization should stop at the endopelvic fascia to avoid artificial creation of a site-specific defect.

The CO_2 laser was used on the continuous mode of 8–10 W with defocus. Columnar rugae restoration was carried out from the proximal to the distal vagina (fig. 1). The grooves were either created de novo or followed existing remnants of vaginal rugation.

Results

In group I, 2 subjects met the criteria for category A and 8 women met category B of the vaginal rejuvenation classification [14]. Severe wide/smooth vaginal sensations were documented in all women. VRR was completed successfully in each subject without any intraoperative, short- or long-term complications. VRR is a bloodless, simple, and easy to perform procedure, and was completed in 21–33 min (average 27 ± 6).

Preoperatively, subjects presented symptoms such as 'a sensation of wide vagina', 'feeling like an empty hole', 'a feeling of glassy smooth vagina', 'significant decreased

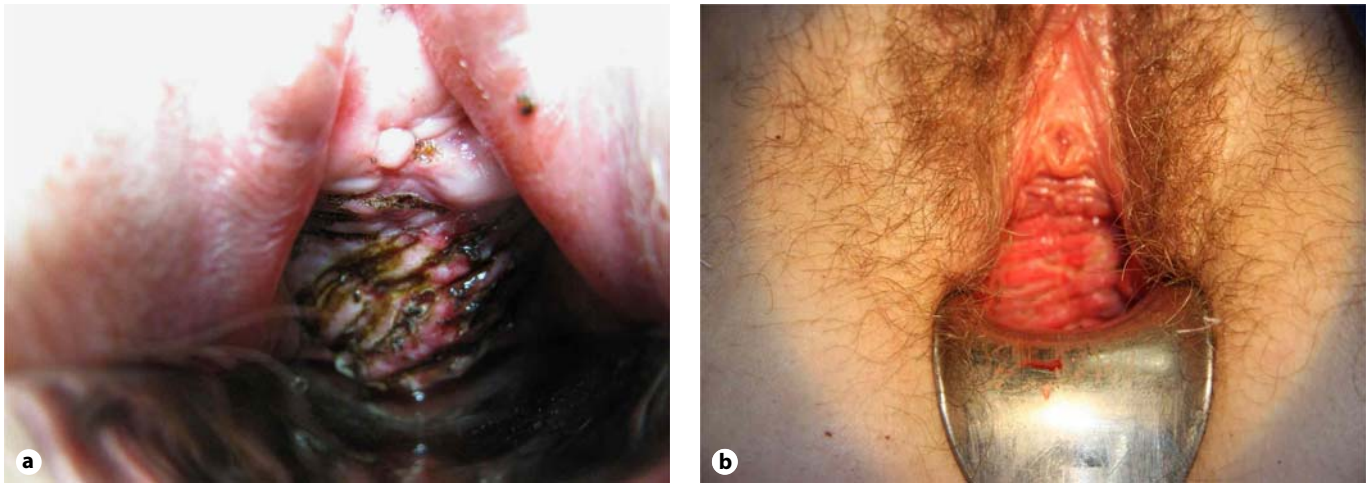

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Fig. 1. Vaginal rejuvenation. The anterior vaginal wall during restoration of columnar rugae with CO_2 laser (**a**) and 6 weeks later (**b**).

Table 1. Body image evaluation

Sensations of wide/smooth vagina		Not at all 1	A little 2	Quite a bit 3	Very much 4
1	Have you been feeling less self-confident?				
2	Have you felt less physically attractive?				
3	Have you been dissatisfied with your vagina?				
4	Have you been feeling less feminine?				
5	Have you found it difficult to touch your vagina?				
6	Have you been feeling less sexually attractive?				
7	Have you avoided having sexual intercourse?				
8	Have you felt dissatisfied with your body?				

Modified Body Image Scale, adopted from Jelovsek and Barber [26]. Degree of abnormality: 1 = normal, 2 = mild abnormality, 3 = moderate abnormality, 4 = severe abnormality.

feeling of penile stroke movements', 'not feeling penile penetration during coitus', and 'decreased enjoyment generated from feeling of penile frictional strokes during coitus'. In addition to the absence of vaginal columnar rugae, 8 women had a history of vaginal/perineal site-specific defect reconstruction. Before VRR, the VFNRS was reported at level 3. Postoperatively, VFNRS was reported at level 2 by 3 subjects and level 3 was reported by 7 women.

Preoperatively, the sexual function levels were recorded to be lower by 15.1 (64.3%) in group I when compared to group II. Postoperatively, the mean PISQ-12 increased from 27.2 to 32 (5.1 or 18.7%). Eight subjects (80%) reported improvement in vaginal tightness sensation during coitus as 'expected' (level 0), and 2 subjects (20%) reported a 'satisfactory' (level 1) improvement. Subjects reported an increased intensity of vaginal wall responsiveness to penile friction movements throughout the duration of the study. Testing with cold/warm cotton balls revealed intact neurosensory faculties of the vaginal walls. None of the subjects reported a negative change in vaginal sensation or de novo dyspareunia occurrence. Within 6 weeks following VRR, all subjects engaged in vaginal sexual intercourse and the sensation of smooth/wide vagina had vanished. Surgical resolution of symptoms of ASWSV was reported by all subjects. MBIS im-

proved from levels 3 and 4 preoperatively to level 1 postoperatively. There were newly developed vaginal groves (crypts), reestablished feeling of penile frictional stroke movements and reestablished sensation of tighter vagina during coitus in all subjects. No bleeding, infection, vaginal wall adhesions, scar formations, dyspareunia, or negative changes in vaginal sensation occurred during the length of the study. Vaginal estrogen application eradicated atrophy; however, it did not restore vaginal rugation.

Discussion

Anecdotal information about vanishing anterior vaginal rugation has been used to identify site-specific defects [15]. Vaginal rugae quantification could be objectively established [2], yet we did not apply this technique, since group I subjects had to demonstrate the absence of vaginal rugation.

Posterior colporrhaphy with levator ani muscle placation causes dyspareunia in 21–27% but without levator ani plication this does not occur. This procedure does not tighten the vagina [15–18]. Neither does perineoplasty tighten the vagina [16, 17]. Our study confirmed that site-specific vaginal/perineal reconstruction could not alleviate ASWSV. Therefore, it is not advised to apply a one-fit-all procedure to correct ASWSV indiscriminately due to the presence of several different causes of ASWSV.

It is important to stress that VRR is not vaginal resurfacing or making surgical incisions or linear scarifications with a laser. It is the deepening or creation of de novo crypts (grooves) of vaginal rugation with CO_2 laser tissue vaporizations.

Systemic estrogen intake does not alleviate vulvovaginal atrophy in 10–45% [19–21], but 25 μg vaginal estradiol tablets do [19]. For this reason, Vagifem®, vaginal estrogen tablets, was used for a postmenopausal vaginal atrophic condition.

Vaginal epithelium rugation is created by subepithelial papillae which cause an uneven surface with 2–5 mm thickness. The subepithelium consists of dense connective tissue (the lamina propria) which contains veins, elastic fibers, and nerves within a loose fibrovascular stroma. The vaginal smooth muscular layer (circular and longitudinal muscles) is located beneath the subepithelium and there is no fascia or a membrane to separate these two muscles. The vaginal adventitial layer arises from the pubocervical fascia and contains veins and nerves [22].

Electrocautery or cryotherapy creates postoperative fibrosis (adhesions), stenosis or fistulas and CO_2 laser application does not [23–25]. Histological examination determined that tissue destruction resulted from laser evaporation of the tissue and the tissue necrosis zone was significantly smaller when compared to electrocautery or cryotherapy [23]. The connective tissue from the knees, thighs and abdomen was evaluated and the results did not establish a correlation between using CO_2 laser and fibrosis, stenosis or fistula formation [25]. In our study, we have not observed fibrosis, stenosis, or fistula formation.

Conclusions

VRR (restoration) was accomplished without increasing the risks of complications. Surgical resolution of symptoms and signs was observed and sexual function improved by 18.75% following VRR. This nonrandomized study precluded us from drawing the conclusion that VRR is a safe and effective operation.

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