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

The objectives of this study were to develop a new VRR
surgical technique and to assess the applicability, poten-
tial 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 appli-
cability of VRR. The secondary outcome measure was to establish
the impact of VRR on symptoms, signs, and female sexual func-
tion.

In study group I, 10 consecutive women who demanded VRR
for ASWSV were enrolled. All women were married, sexually ac-
tive (median, 3 times weekly) Caucasians, aged between 19 and 59
(mean 39 ± 20 years). Parity ranged from 0 to 4 (median 2), 8 de-
ivered vaginally (1 woman underwent an operative vacuum vagi-
inal delivery complicated by 4th-degree perineal rupture), 1 wom-
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, respect-
ively; both were placed on Vagifem® for at least 6 weeks before
VRR.

Control group II consisted of 10 consecutive, healthy, sexually ac-
tive (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 ben-
ign 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, depres-
sion, somatization, anxiety and hostility using the SQ question-
naire [9], and BMI was determined. Clinical neurosensory evalu-
ation 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 in-
dicating 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 de-
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

Study Group Inclusion Criteria

Subjects were included if they: (1) understood the study’s pro-

tocol and agreed to VRR; (2) tested negatively with the SQ instru-


tment; (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 cat-

egory 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 sur-

gery, 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 con-

dition; (2) had a BMI of ≥ 30; (3) did not want local anesthesia,

and (4) suffered from dyspareunia or another form of sexual dys-

function.

Surgical Technique

Lidocaine and prilocaine topical cream (25%/25%; Fougera®
& Co., Division of Atlanta Inc., Melville, N.Y.) was applied vagi-
nally for at least 6 weeks before surgery. Later, the vaginal walls were infiltrated
with plain 1% lidocaine before tissue vaporization.

The depth of vaginal columnar rugae vaporization was be-

tween 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 rec-
ognize by its white color. Vaporization should stop at the endopel-
vic fascia to avoid artificial creation of a site-specific defect.

The CO₂ laser was used on the continuous mode of 8–10 W
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 suc-
sessfully in each subject without any intraoperative,
short- or long-term complications. VRR is a bloodless,
simple, and easy to perform procedure, and was complet-
ed 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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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-

Table 1. Body image evaluation

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

Modified Body Image Scale, adopted from Jelovsek and Barber [26]. Degree of abnormality: 1 = normal, 2 = mild abnormality, 3 = moderate abnormality, 4 = severe abnormality.
proved from levels 3 and 4 preoperatively to level 1 postoperatively. There were newly developed vaginal grooves (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 placa-
tion 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 allevi-
ate 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 resur-
facing or making surgical incisions or linear scarifica-
tions with a laser. It is the deepening or creation of de
 novo crypts (grooves) of vaginal rugation with CO2 laser
tissue vaporizations.

Systemic estrogen intake does not alleviate vulvovagi-
nal 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 subepithe-
lial papillae which cause an uneven surface with 2–5 mm thickness. The subepithelium consists of dense connec-
tive 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 CO2 laser application does not [23–25]. Histological examination determined that tissue destruction resulted from laser evap-
oration of the tissue and the tissue necrosis zone was sig-
ificantly 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 CO2 laser and fibrosis, stenosis or fistula formation [25]. In our study, we have not observed fibrosis, stenosis, or fistula forma-
tion.

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 nonrandom-
ized study precluded us from drawing the conclusion that VRR is a safe and effective operation.

References

3 Hilliges M, Falconer C, Ekman-Ordeberg G, Johansson O: Innervation of the human vaginal mucosa as revealed by PGP9.5 immuno-

6 Weijmar Scholts WCM, Van de Wiel HBM, Klatter JA, et al: Vaginal sensitivity to elec-
tric stimuli, theoretical and practical impli-
7 Pardo DS, Solda VD, Ricci PA, et al: Colpo-

perineoplasty in women with a sensation of a wide vagina. Acta Obstet Gynecol 2006;85:
1125–1127.
8 Rogers RG, Goats KW, Kammerer-Doak, Khalsa S, Qualls C: A short form of the Pelvic Organ Prolapse/Urinary Incontinence/Sex-


