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An acquired sensation of wide/smooth vagina: a new classification☆

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ABSTRACT

Objective: To establish a new clinical classification for a wide/smooth vagina.
Study design: A prospective multiple time series clinical study without intervention. Vaginal rugation, and vaginal/perineal site-specific defects associated with wide/smooth vagina were used as basic clinical parameters to establish a new classification. One hundred symptomatic women associated with acquired sensations of wide/smooth vagina were enrolled. Main outcome measures were to establish the absence or presence of vaginal columnar rugae and/or site-specific vaginal/perineal/vaginal orifice defects.
Results: The absence of columnar rugation and the absence of vaginal/perineal site-specific defects were identified in 16 subjects; the absence of columnar rugae and the presence of vaginal/perineal site-specific defects were present in 76 women. The presence of columnar rugae and the presence of vaginal/perineal site-specific defects were demonstrated in 5 subjects; and the presence of columnar rugae and absence of vaginal/perineal site-specific defects were recognized in 3 subjects.
Conclusions: A wide vagina classification was developed as a "Category A, Category B, Category C or Category D".

1. Introduction

A wide/smooth vagina has never been defined and the classification of types of wide vagina has never been published. This author's understanding of an acquired sensation of a wide/smooth vagina is the initial absence of a sensation of a wide/smooth vagina during vaginal sexual intercourse and later on, development of the presence of a sensation of wide/smooth vagina during coitus. Also, the author characterizes a sensation of wide vagina as the overall increased size of the vagina causing decreased sexual function. The smooth vagina is identified as the absence of texture due to vanished vaginal rugation that interferes with sexual function. The traditional gynecologic procedure, colpoperineoplasty, for a sensation of wide vagina has been performed to manage a sensation of wide vagina [1]. Colpoperineoplasty was adapted from a traditional gynecologic surgery and renamed as "laser vaginal rejuvenation" in the practice of cosmetic gynecology [2,3]. The American College of Obstetricians and Gynecologists (ACOG) [4] does not sanction a vaginal rejuvenation procedure and recognized that "...vaginal rejuvenation, appear to be modifications of traditional vaginal procedures". There are other identifiable vaginal esthetic procedures in the literature [2,5,6], but detailed description of vaginal procedure for a sensation of a wide vagina was represented only by one article in a peer review journal [1].

Based upon very limited information on vaginal esthetic procedures, a question was born whether or not one-fit-all procedure such as colpoperineoplasty with or without paravaginal repair was an adequate clinical management for acquired sensations of a wide/smooth vagina or maybe there were clinical characteristics suggesting otherwise?

The objective of this study was to establish a cause(s) of wide/smooth vagina classification and based upon different and reproducible clinical vaginal anatomical characteristics, if present, associated with acquired sensations of a wide/smooth to establish adequate surgical interventions for managing vaginal rejuvenation.

2. Materials and methods

A search of the existing literature from 1900 to May 2010 was carried out utilizing Medical Subject Headings (MeSH), which were selected and used in a search on ISI Web of Science (including conferences proceedings); 1950 PubMed, ACOGNET, ProQuest, OVID, Cochrane Collection, the Lancet on Line Collection, MDConsultant, New England Journal of Medicine, American College of Physicians on Line Resources, Highwire Journals, and Citation Index Reference, and utilizing a manual search.

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Table 1
Modified Body Image Scale (M-BIS), associated with wide/smooth vagina.

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-confidence?				
2.	Have you felt less physically attractive?				
3.	Have you been dissatisfied of your vagina?				
4.	Have you been feeling less feminine?				
5.	Did you find difficult to touch your vagina?				
6.	Have you been feeling less sexually attractive?				
7.	Did you avoid having sexual intercourse?				
8	Have you felt dissatisfied with your body?				

Adapted from Jelovsek and Barber [7].
The degree of abnormality: 1 = normal, 2 = mild abnormality, 3 = moderate abnormality, 4 = severe abnormality.

This trial was designed as a prospective multiple time series without intervention (quality of evidence II-3). Upon applying a standardized medical history (developed by this author), 100 subjects out of 128 women with acquired sensations of wide/smooth vagina qualified for this study. The following questions were used as a standardized medical history: 1. Do you feel that your vagina is too wide? 2. When did you first notice a sensation of wide vagina? 3. Do you feel that your vagina is too smooth? 4. When did you first notice a sensation of smooth vagina? 5. Do you feel that your vagina is both too wide and too smooth? 6. When did you first notice sensations of both wide and smooth vagina? 7. Had you felt fullness and/or pressure in your vagina from penile penetration before identifying a sensation of wide/smooth vagina? 8. What part of your vagina (low, middle or high) is affected by a sensation of wide and/or smoothness? 9. Do you experience unhappy memory that your vagina is too wide or too smooth, or both, for having meaningful vaginal sexual intercourse?

Those subjects whose initial medical history indicated the presence of acquired sensations of wide/smooth vagina were further evaluated with a Modified Body Image Scale (M-BIS). MBIS was modified from Jelovsek and Barber [7] and validated by a sufficient reliability test (Cronbach's alpha = 0.9) and one factor variance test of 60%. All subjects filled out the M-BIS form (Table 1), and the results were analysed. When M-BIS screening documented a relationship between the presence of symptoms of an acquired sensation of a wide vagina and decreased quality of life, a subject was included into an initial evaluation. A direct visual inspection of the vaginal mucosa was conducted with a vaginal double-blade speculum to determine the presence or absence of vaginal rugation and/or site-specific defects of the vagina/vaginal orifice/perineum. A fundamental prerequisite of this clinical study was based on the presence or absence of: (1) vaginal columnar rugae, and (2) vaginal/vaginal orifice/perineal site-specific defect(s). The vaginal/perineal/vaginal orifice defect(s) were diagnosed by utilizing a standard provided by the ACOG [8]. Pelvic Organ Prolapse Quantification (POP-Q) Profile [9] was used to identify the stage of vaginal wall prolapse. A clinical suspicion of paravaginal defect(s) was verified by ultrasonography images [10,11]. These clinical findings were used to allocate subjects to Group I, Group II, Group III, or Group IV for the analysis. The main outcome measures were to determine the presence or absence of vaginal columnar rugae, and also the presence or absence of site-specific vaginal/perineal defect(s).

Women who presented with complaints of acquired sensations of wide and/or smooth vagina lasting for at least 2 year and who answered M-BIS questions (Table 1), as "Quite a bit" (3 = moderate) or "Very much" (4 = severe abnormality) were enrolled (Table 1).

Subjects excluded were those who underwent vaginal and/or perineal gynecologic or esthetic gynecologic surgical intervention(s) or whose standardized medical history did not indicate the presence of an acquired sensation of wide/smooth vagina. Women with sexual dysfunction disorders, mental or emotional impairment, and body dismorphic disorder were excluded. In addition, those subjects who answered M-BIS questions (Table 1) as either "Not at all" (normal) or "A little" (mild abnormality) were excluded from the study. Those subjects who were unable to position themselves in the dorsolithotomy position were excluded from the study. Subjects associated with cervical or vaginal neoplasia were also excluded.

3. Results

Reviewing the existing literature on the subject matter indicated that the wide vagina classification is a new concept. The study was conducted between January 2006 and January 2010 and the Institutional Review Board approval was obtained. The study included 100 out of 128 subjects. The age ranged between 19 and 66 years (mean age 41 years). There were 96 Caucasian, 2 Black, and 2 Latino women, 87 delivered vaginally (median: 2 deliveries), 11 delivered by cesarean section and 2 women were nulliparous. Fifty-two subjects had undergone hysterectomy; 78 were married and 22 women were single. All subjects were sexually active (median, 3 times weekly). Seventeen subjects were taking estrogen replacement or hormone replacement therapy. Responses to M-BIS documented worsening feelings of body image in 17 subjects (moderate levels) and in 83 women demonstrated severe levels.

Subjects described symptoms as, feeling sensation of wide vagina; feeling of empty hole; feeling glassy smooth vagina; feeling significant decreased penile stroke movements; decreased feeling of penile penetration during coitus; feeling lack of enjoyment generated from sensation of frictional strokes during coitus. The particular symptom related to vaginal rugation was a sensation of smooth vagina.

All subjects reported severely decreased self-confidence, body image and perceived overall quality of life. To determine the degree of satisfaction, absence of regret, social pressure, and cognitive dissonance were beyond the scope of this clinical study.

Based upon the presence of anatomical characteristics associated with acquired sensations of wide/smooth vagina, four groups were established: Group I: the absence of columnar rugae and the absence of vaginal site-specific defects (16 subjects), Group II: the absence of columnar rugae and the presence of vaginal site-specific defects (76 subjects), Group III: the presence of columnar rugae and the presence of vaginal site-specific defects (5 subjects), Group IV: the presence of columnar rugae and the absence of vaginal site-specific defects (3 subjects).

In Group I, four out of sixteen women were on hormone replacement therapy for estrogen deficiency. Estrogen therapy itself was not able to rebuild vaginal rugation. POP-Q Profile demonstrated no vaginal prolapse (Stage 0). Based on the absence of columnar rugae and the absence of vaginal site-specific defects,

Table 2
The wide/smooth vaginal classification and vaginal rejuvenation managements.

Wide/smooth vagina	Clinical characteristics	Clinical management (vaginal rejuvenation)
Category A	The absence of columnar rugae and the absence of site-specific defects	2-step therapy: Step I. Vaginal estrogen Step II. Vaginal columnar rugae restorations
Category B	The absence of columnar rugae and the presence of site-specific defects	Estrogen deficiency is present (3-step therapy): Step I. Vaginal estrogen Step II. Reconstruction of site-specific defects Step III. Vaginal rugation restorations Estrogenized woman (2-step): Step I. Reconstruction of site-specific defects Step II. Vaginal rugation restorations
Category C	The presence of columnar rugae and the presence of site-specific defects	Paravaginal defect(s) Reconstruction also other conditions can be included into this category such as isolated defects of: Dorsal perineal membrane Perineal body Vaginal orifice Management will require separate reconstruction of each entity.
Category D	The presence of columnar rugae and the absence of site-specific defects	*For hypermucorrhea:* Partial reduction of cervical glands with CO_2 laser *For wide middle vagina:* Size reduction of the middle part of the vagina with G-Spot surgical augmentation *For congenital vaginal prolapse into the fossa navicularis* Partial distal vaginal resection with vaginal hymeneal ring reconstruction

the wide/smooth vaginal classification and related vaginal rejuvenation management were qualified as Category A (Table 2).

In Group II, 69 women had multiple vaginal/perineal defects and 7 subjects had an isolated defect. In all 69 subjects, transverse defects of anterior vaginal wall were present. In addition, anterior vaginal central and paravaginal defects were identified. Distal anterior vaginal wall defect was not diagnosed. The posterior vaginal wall was also most commonly affected by transverse defects of Dennonvilliers fascia, followed by L-shaped, U-shaped and double transverse defects. Dorsal perineal membrane and perineal body defects were detected in 19 subjects. All subjects demonstrated vaginal prolapse in different degrees of prolapse ranging from Stage 1 to Stage 3 (POP-Q Profile). The absence of vaginal rugation and presence of vaginal/perineal site-specific defects met the criteria for Category B of the classification (Table 2).

In Group III, five subjects presented with isolated paravaginal defect (unilaterally or bilaterally) manifested by anterior vaginal wall prolapse (Stage 1, 2 or 3 by POP-Q Profile). Subjects demonstrated the presence of columnar rugae and of site-specific defects and were assigned to the Category C (Table 2).

In Group IV, three subjects displayed the presence of columnar rugae and the absence of site-specific defects. All women presented with Stage 0 according to POP-Q Profile. One woman revealed a congenital, isolated wide middle vagina. This condition led to an acquired sensation of wide and smooth vagina. The clinical evaluation documented balloon-shape vaginal appearance, occurring 4.5 cm from the hymeneal ring and extended up 3.0 cm in the vagina.

One subject in this group revealed congenital posterior vaginal wall insertion onto the fossa navicularis passing over the hymeneal ring. This congenital abnormality looked like a tongue-shape mass which was located outside of the hymeneal ring (prolapse) with preserved columnar rugae. Also, one subject in this group presented with extreme sensation of smooth vagina due to excessive mucus-like secretion during sexual stimulation (hypermucorrhea).

Subjects in the Group IV demonstrated the presence of vaginal rugation and the absence of site-specific vaginal wall defect and they were allocated to the Category D (Table 2).

4. Comments

This author defines vaginal rejuvenation as a surgical intervention that transforms the gross and functional vaginal anatomy to achieve more enjoyable sensation during coitus. The definition is general enough to encompass all clinical forms of vaginal rejuvenations and does not promise deceptively to be a form of treatment of sexual dysfunctions.

This study documented the presence of multiple anatomical underlying causes associated with an acquired sensation of wide and/or smooth vagina; therefore, these call for diversified types of vaginal rejuvenation managements. Consequently, a one-fit-all vaginal rejuvenation procedure [1–3] such as colpoperineoplasty is not adequate surgical intervention for clinical management of a variety causes of a wide/smooth vagina and a procedure(s) for vaginal rejuvenation should be crafted to rectify the presence of underlying specific clinical cause(s).

In general practice, a laser application for colpoperineoplasty is not indicated; therefore, the "laser vaginal rejuvenation" nomenclature and using laser for colpoperineoplasty should be abandoned, to avoid a deceptive form of cosmetic gynecologic practice (Table 2). The application of laser in vaginal rejuvenation is indicated in vaginal rugation restoration and hypermucorrhea, both of which cause an acquired sensation of smooth vagina [12] (Table 2).

In Category A of the wide/smooth vagina classification (absence of columnar rugae and absence of site-specific defects), two steps of managements are applicable: step I, vaginal estrogen treatment, followed by step II, in which vaginal rugation restoration (VRR) with CO_2 laser is performed [12] (Table 2).

In Category B, absence of columnar rugae and the presence site-specific defect(s) of vaginal/perinea/vaginal orifice could be present. When estrogen deficiency was identified in this group, a 3-step treatment was suggested: step I – vaginal estrogen therapy; step II – vaginal and/or perineal site-specific defects, dorsal perineal membrane with perineal body reconstruction, and the pubocervical fascia reconstruction; step III – VRR. When an estrogenized woman meets the criteria for Category B, 2-step therapy is offered: step I, site-specific reconstruction followed by step II, V RR. In this group, the step II therapy must be delayed to allow completion of the healing process of the step I procedure, since laser energy could melt sutures which were used during site-specific defect reconstruction (Table 2).

In Category C, women presented with isolated paravaginal defect (unilaterally or bilaterally). Those subjects characteristically demonstrate the presence of vaginal columnar rugae and a site-specific defect. A target treatment in this group is paravaginal repair through either a vaginal or abdominal approach (laparotomy or laparoscopy) (Table 2). In this study, we did not identify other conditions related to Category C, but this author observed cases of dorsal perineal membrane defects, perineal body defects, and vaginal orifice defects that would fit into Category C. Management of these conditions will require different surgical interventions for each condition.

In Category D, three separate causes of acquired sensations of wide/smooth vagina were recognized: (1) the presence of the isolated wide middle part of vagina (congenital abnormality), (2) congenital posterior vaginal wall prolapsed onto the fossa navicularis and over the hymeneal ring, and (3) hypermucorrhea associated with sexual stimulations and causing a sensation of a smooth vagina during coitus. An isolated, wide middle part of vagina would well respond to the surgical narrowing of the middle vagina with G-spot surgical augmentation [12]. Posterior vaginal wall congenital prolapse could be managed by distal vaginal partial resection with hymeneal ring reconstruction [12]. Copious secretion of cervical mucus during sexual stimulation would call for partial reduction of the number of cervical glands by means of CO_2 laser cervical glands vaporization [12]. In this study, hypermucorrhea was occurring with any sexual excitement and not in association with a cyclic pattern menstrual phases. The phenomenon of hypermucorrhea occurring cyclically is observed quite frequently in women of reproductive age with preserved ovarian function and it is considered a physiological event.

This study documented that there are multiple causes for a sensation of a wide vagina/smooth vagina; therefore, this classification will assist in managing of this entity. The classification presented here is simple and easy to apply, since it was based on two clinically straightforward and easily identifiable anatomical parameters: (1) the presence or absence of the vaginal columnar rugation, and (2) the presence or absence of vaginal and/or perineal site-specific defects. These two clinical parameters will not only lead practitioners to establish a diagnosis but also help selecting an adequate surgical intervention for management of an acquired sensation of a wide/smooth vagina.

Surgical procedures applicable for vaginal rejuvenation are summarized in Table 2. These cosmetic surgical interventions are not traditional gynecologic procedures or their modification; they are new cosmetic gynecologic procedures which were developed for vaginal rejuvenation. If needed, traditional vaginal procedures can and should be incorporated into the surgical armamentarium for vaginal rejuvenation with a specific informed consent that traditional vaginal procedures were part of the cosmetic vaginal rejuvenation.

It became obvious that new operations must be developed and published to meet the challenge of adequate selection of a surgical intervention(s) for vaginal rejuvenation. A selected procedure must fit the need of a particular case and should not fit a surgeon's skill in a one-fit-all procedure. Several new cosmetic gynecologic procedures for vaginal rejuvenation are summarized in Table 2. These surgical procedures were developed by this author [12] and they are related not only to the vagina itself but also to different anatomically adjacent vaginal structures. This study assisted us to develop the following new surgical interventions for vaginal rejuvenation: (1) vaginal rugation restoration (VRR). (2) Hymeneal ring reconstruction, (3) anterior vaginal introitoplasty, (4) lateral vaginal introitoplasty, (5) posterior vaginal introitoplasty, (6) perineal membrane reconstruction (ventral and dorsal), (7) pubocervical fascia reconstruction with posterior vaginal wall resection. In the near future, each surgical method will be detailed in separate articles.

The vaginal mucosa has rugae (pleats or ridges) and their presumptive function is to increase the vaginal surface and ability to expand. Histologically, vaginal rugae consist of nonkeratinized stratified squamous epithelium. Anterior and posterior midline ridges, also called columns, resulted from the impression of the urethra, bladder, and rectum on the inner vaginal wall [13,14]; however, this information does not have supportive scientific data of their existence. In addition, there are transverse vaginal pleats (vaginal columnar rugae) and their role was documented by a MRI study showing that vaginal columnar rugae assist a penis tightly engaged and rubbed against vaginal walls during coitus [15]. The location of vaginal free nerve endings is in the subepithelial layer of the vagina [16]. This author assumed that restoration of vaginal columnar rugae will create vaginal grooves which can decrease the distance between the vaginal epithelium and the nerve endings in subepithelial area. In this way, it can improve a sensation of tightness of the vagina during coitus. Based upon these data, this author hypothesized that recreating or restoring vaginal ridges and grooves can improve sensation of tightness, texture, and rubbing during vaginal coitus. There is, however, no scientific documentation to determine the role of the vaginal columnar rugae.

In conclusion, a new vaginal rejuvenation classification (''Category A, B, C or D'') was developed for medical and cosmetic management of acquired sensations of a wide and/or smooth vagina based on the presence of specific anatomical characteristics.

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