Value of Quantitative Sensory Testing in the Evaluation of Genital Sensation: Its Application to Female Sexual Dysfunction

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ABSTRACT

Introduction: Female sexual dysfunction (FSD) is multifactorial, with psychological and organic elements. Genital sensation, an important component of sexual response, has until recently not been subjected to adequate clinical appraisal. During the past 15 years we have performed Quantitative Sensory Testing (QST) to assess genital sensation in healthy women and women with FSD.

Aim: To review available evidence of QST in the investigation of genital sensation in women with FSD.

Methods: We examined data obtained from assessment of genital sensation in normal women and those with different conditions, including multiple sclerosis, pelvic floor disorders, effect of hysterectomy, and vulvar vestibulitis.

Main Outcome Measure: Use of QST for assessment of FSD.

Results: Normograms for healthy women were used to measure parameters during arousal, orgasm, and the refractory phase. Using QST, genital sensation was found to be impaired in women with multiple sclerosis. Clitoral vibratory sensation most significantly correlated with FSD parameters. Women with greater deficit in vibratory sensation encountered more sexual dysfunction. Women with urinary incontinence had a significant decrease in sensitivity to warm, cold, and vibratory thresholds in the anterior vaginal wall and clitoral area. A study comparing women with and without pelvic organ prolapse showed mean thresholds for vibratory and warm stimuli to be significantly higher and mean thresholds for cold stimuli to be significantly lower in the group with prolapse. QST of women undergoing hysterectomy showed a significant decrease in sensation to cold, warm, and vibratory stimuli at the anterior and posterior vaginal wall; clitoral thermal and vibratory sensation thresholds remained unchanged after surgery. In a study of vulvar vestibulitis, patients reported significantly lower heat pain thresholds compared with controls.

Conclusion: QST appears useful for evaluating various gynecologic disorders associated with disturbed sexual function and with multiple sclerosis, which might be accompanied by disturbed genital sensation.

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Key Words: Female Sexual Dysfunction; Genital Sensation; Quantitative Sensory Testing; Vibratory Stimulus; Thermal Stimulus

INTRODUCTION

Female sexual dysfunction (FSD) is an enigmatic, complex, yet quite common disorder, with multiple causes, including psychological and organic components.[1,2] The prevalence varies in different parts of the world, usually from 20% to 50%[1] and even as high as 70% in some countries.[3] Conditions associated with FSD include aging, high blood pressure, hypercholesterolemia, diabetes, smoking, hormonal imbalance, pregnancy and the immediate postpartum period, neurologic disorders, and pelvic surgery.[1,2,4–6]

In the past, evaluation of patients with FSD was restricted to an analysis of psychological elements, which, although important, failed to determine important physical factors involved in the disorder. Although physiologic assessment of the sexual response is fundamental, often it is not enough. Anatomic and physiologic changes need to be investigated to perceive a wide clinical perspective. Genital sensation is an important component of the sexual response and, until recently, has not been subjected to adequate clinical appraisal. Over the past 15 years, we have been applying Quantitative Sensory Testing (QST) to assess genital sensation in healthy women and in women with FSD.

AIMS

The aim of this review was to share our experience with a new physiologically based method, QST, in the investigation of genital sensation in women with FSD. Our quantitative

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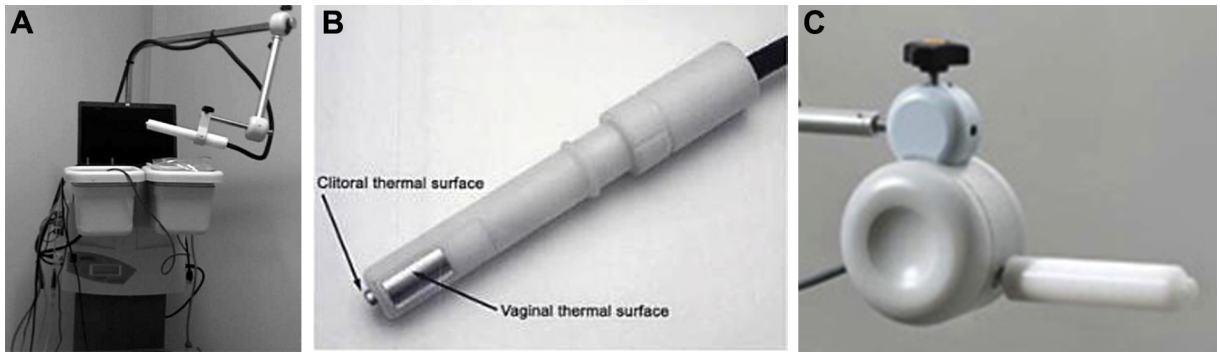

Figure 1. (A) Genital sensation analyzer. (B) Vibratory probe for genital sensation. (C) Thermal probe for genital sensation. Figure 1 is available in color online at www.smr.jsexmed.org.

assessment data should lead to a greater understanding of the mechanisms involved with various causes of FSD. These data might promote a wider use of QST in the overall evaluation of FSD with disturbed genital sensation.

METHODS

QST is based on the administration of quantified stimuli, namely vibratory and thermal, in a controlled manner to the vagina and the clitoris.[7] The method is reproducible and can be considered a reliable descriptor of genital sensation. The instrument used is a Genito-Sensory Analyzer (Figure 1A–C), which generates and records the various stimuli—hot, cold, and vibratory. The vaginal probe is inserted to its full length without pressure on the vaginal walls, and when the patient reports that she is comfortable with the probe in situ, the adjustable holder is locked to hold it in position. Stimulation and measurement are carried out at this stage. Positioning of the clitoral probe requires some experience. The subject defines the sensory threshold by indicating the onset of perceived sensation. The thermal probe has a working range of 10°C to 50°C. The vibration frequency is maintained at 100 Hz, with an amplitude range of 0 to 130 μm. Thresholds of cold sensation are obtained for the sampling of small-caliber A-δ fibers, those of warm sensation for C-fibers, and those of vibratory sensation for large-caliber A-β fibers. As for other tests of sensory assessment, QST is not completely objective. Nevertheless, the test results are consistent and reliable.[7]

APPLICATION OF QST TO HEALTHY WOMEN AND IN WOMEN WITH FSD

Using QST, Vardi et al,[8] in 2000, studied 89 healthy volunteers by exposing them to vibratory and thermal stimuli to the clitoris and vagina. They determined normative values in these healthy women and constructed age-correlated normograms from this healthy group. Their rationale was to gain a better understanding of FSD and its relation to neurologic disorders, such as multiple sclerosis, peripheral neuropathy, and lumbar radiculopathy.

Subsequently, the testing of genital sensation was applied to women with multiple sclerosis by Gruenwald et al[9] who introduced QST as a measure to assess genital neural function of women with this disease. In addition, they carried out an extensive neurologic assessment. This was conducted for sensory deficit in the cutaneous and proprioceptive systems, upper and lower motor function in the extremities, cerebellar function (as demonstrated by coordination skills), autonomic state (as evidenced in situations of fecal or urinary incontinence), and cognitive, psychological, and memory disorders (visual disturbances, depression, anxiety, and memory loss). It is well known that the process leading to orgasm involves the autonomic system (ie, clitoral engorgement, vaginal secretions, tachycardia, and tachypnea) and the somatic system (ie, pelvic floor muscle contractions). It is likely that the cerebellum plays a role in such coordinative effort of the central nervous system; accordingly, cerebellar dysfunction can disorganize the process by delaying or precluding the climax. The investigators found impaired genital sensation in women with multiple sclerosis. The most significant correlation was between clitoral vibratory sensation and FSD parameters ($r = 0.423$, $P = .006$); thus, women with a greater deficit in vibratory sensation had a higher level of sexual dysfunction. Another association was found between cerebellar deficit and orgasmic dysfunction ($P = .0012$).[9]

To better explore the relation between sexual function and genital sensation, the latter was evaluated in relation to sexual stimulation in 11 healthy volunteer women.[10] Participants were invited to attend three separate visits, and during each session only one anatomic site—the clitoris or the vagina—was tested for vibratory or thermal stimuli. A psychophysical method of limits was used for threshold determination of warm or vibratory stimuli. In each session, all women were tested at baseline, immediately after arousal, after orgasm, and at 5, 10, and 20 minutes during the recovery state. A significant decrease in clitoral vibratory sensation threshold was found between the baseline and the arousal phases (1.66 vs. 2.31 vibratory units, $P < .003$). Further, a significant difference was shown for the clitoral and vaginal regions in the comparison of vibratory sensation between baseline and subsequent orgasm (1.66 vs 3.27 and 1.82 vs 2.69 vibratory units, respectively, $P < .001$). However, such changes for thermal threshold sensation at the clitoral region were not significant.

Several studies have described disturbances of sexual function in women with pelvic floor disorders,[11–14] but such findings have