Prevalence and characterization of dyspareunia in a general urology clinic population

Clinton Yeaman, MD,[1] Jacqueline Zillioux, MD,[1] Kimberly Boatman,[2] Sarah Krzastek, MD,[3] David E. Rapp, MD[1]

[1]Department of Urology, University of Virginia Medical Center, Charlottesville, Virginia, USA
[2]University of Virginia School of Medicine, Charlottesville, Virginia, USA
[3]Division of Urology, Virginia Commonwealth University, Richmond, Virginia, USA

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Introduction: *To assess the character and prevalence of dyspareunia in a general urology population presenting for evaluation of unrelated non-painful complaints.*

Materials and methods: *This is an IRB-approved, prospective, cross-sectional survey-based assessment of dyspareunia in a general cohort of female patients presenting to a urology clinic over a 10-month period (7/2018-5/2019). Patients presenting specifically for acute painful complaints were excluded. Participating patients completed an original 23-item survey with questions pertaining to dyspareunia. Specific focus was placed on pain characteristics, including location, quality, frequency, severity, and quality of life. Descriptive analysis, pain mapping, and plotting analyses were performed to assess pain patterns.*

Results: *A total of 181 women completed the survey, with a mean age of 56 years. Overall, 53 (29%) women reported dyspareunia. However, among currently sexually active women the prevalence of dyspareunia was 46% (38/83). Patients reported a significant variety of pain locations and qualities. Women most commonly reported multiple pain locations (median 2 (IQR 1,4)), with 33 distinct combinations identified. The majority (70%) of women endorsed only one pain quality, although eight unique combinations were nonetheless seen. A significant proportion (34%) reported high or very high pain severity, with 45% having pain most or all times of sexual activity. A majority (53%) of patients indicated moderate to severe dissatisfaction with their sexual activity. Despite this finding, a significant proportion (33%) of patients with dyspareunia reported having at least weekly sexual activity.*

Conclusions: *A significant percentage of women presenting to a general urology clinic experience dyspareunia. Notably, patient-reported pain characteristics, including location and quality, varied significantly across women assessed. Further study is needed to understand how these characteristics may relate to different and specific etiologies of sexual pain and directed treatment options.*

Key Words: dyspareunia, character, prevalence, pain mapping

Introduction

Dyspareunia is estimated to affect up to 61% of women.[1-3] Dyspareunia is associated with psychosocial distress as well as significant impact on quality of life.[4,5] Predictors for sexual dysfunction include younger age, poor health, and stress.[6] Despite the significant impact of dyspareunia, many women report fear seeking help or not receiving effective treatments.[7]

The differential diagnosis for dyspareunia is broad and includes endometriosis, mucosal (post-menopausal), vulvodynia, pelvic floor dysfunction, central pain sensitization, and urethral diverticula.[1] Further, given the complexity of diagnosis, it is often difficult for providers to identify a definitive underlying etiology for sexual pain. Given this challenge, evaluation is often performed using a systems-based approach that includes dermatologic

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Address correspondence to Dr. David E. Rapp, Department of Urology, UVA Medical Center, Fontaine Research Park, 500 Ray C. Hunt Drive, Charlottesville, VA 22908 USA

(e.g. atrophic vaginitis, lichen sclerosis), neurologic (e.g. central pain disorders), surgical (e.g. pelvic floor surgery), or musculoskeletal (e.g. levator spasm).[1] Alternatively, other diagnostic models focus on the differentiation between superficial and deep dyspareunia and individualized approaches to these different patient populations.[8] Despite these approaches, definitive diagnosis and related targeted therapy is difficult to achieve.

A second obstacle to the effective treatment of sexual pain lies in the high association of dyspareunia with other challenging medical disorders. An association between dyspareunia and depression or anxiety is well established.[9] Further, a significant portion of patients with dyspareunia or pelvic pain also suffer from other unexplained medical conditions or somatic syndromes, including fibromyalgia or temporomandibular joint and muscle disorders.[10] This combined presentation often makes treatment more difficult and underscores the need for promoting a better understanding of the relationship between these painful conditions and a potential common pathophysiology.

To date, available literature primarily focuses on the prevalence of dyspareunia, related predictors, and generalized evaluations.[1,2,11] Despite pelvic pain being a common reason for urologic evaluation, the prevalence of dyspareunia in patients seeking urologic care is not well known. More importantly, little research has been focused on pain characteristics in patients with dyspareunia. Such research is important as prior study of other painful disorders has analyzed pain characteristics for the purpose of pain mapping and potentially directing targeted therapies based on cohorts with differing pain characteristics.[12] Indeed, pain characteristics have previously been used to develop pain phenotypes in both patients with vulvodynia and endometriosis.[8,13]

Based on this background, we sought to assess specific characteristics in urologic patients with dyspareunia. Secondary study objectives included to assess the prevalence of dyspareunia and related comorbid conditions in a general urology population presenting for evaluation of unrelated non-painful urologic complaints.

Materials and methods

We conducted a prospective, survey-based assessment of female patients presenting to a general urology clinic at a single institution over a 10-month period (7/2018-5/2019). This study was performed in conjunction with a similar questionnaire-based study protocol in which we assessed pelvic pain symptomatology among the same patient population. Participants were recruited by a study coordinator during clinic registration prior to seeing one of 10 urologic health care providers. In an effort to assess prevalence of dyspareunia in a general urology cohort, patients presenting specifically for a painful complaint (e.g. flank pain, interstitial cystitis) were excluded from study consideration. This study was approved by the University of Virginia Institutional Review Board (protocol #20503). Written informed consent was obtained prior to study participation.

Each patient completed an original 23-item survey with questions regarding demographics, relevant past medical history, and dyspareunia symptoms. A variety of questionnaire items were used to assess pain characteristics. Pain location was assessed using a detailed questionnaire item asked patients to identify pain locations via a multiple-choice question listing ten anatomic locations (e.g. labia, clitoris, vagina). Additional multiple-choice and Likert-scale questions specifically focused on dyspareunia pain quality, severity, and the pain's impact on quality of life.

Statistical analysis

Data analysis was performed using R programming language (Version 3.6.1). Data are presented as median (interquartile range (IQR)) or mean (standard deviation (SD)), as appropriate. Comparisons across numerous demographic and medical characteristics between patients with and without dyspareunia were performed using Chi-squared, Fisher's exact, t-test or Wilcoxon rank sum tests, as appropriate. For the purpose of this comparison, prior pelvic surgery included patients with a history of surgery for correction of incontinence or prolapse, hysterectomy, or cesarean section. A Bonferroni correction was applied to correct for multiple comparisons of the various chief complaints between those with and without dyspareunia. All tests were performed with $\alpha = 0.05$.

Descriptive analysis was performed with specific focus on location, quality, and severity of patient-reported dyspareunia. Analysis of pain locations was performed both using four broad locations (clitoris, labia, introitus, vagina) and also given more specific differentiation of intra-vaginal location. To summarize patient-reported pain locations and qualities, UpSet plots were created using the UpSetR package in R.[14] Briefly, an UpSet plot is a quantitative visualization technique designed as an alternative to Venn or Euler diagrams, which are limited to a few sets and interactions. To further summarize patient-reported pain locations, heat-map figures were created using color scale conditional formatting in Excel and Adobe Photoshop Suite.

Results

A total of 187 women completed the survey, with a mean age of 56 (15) years. Six patients were excluded from analysis due to chief complaint of interstitial cystitis or pelvic pain despite screening at registration. Of the 181 included patients, 53 (29%) endorsed a history of dyspareunia. The majority (60%) of these patients reported onset of pain prior to age 50.

A total of 83 (45.8%) reported being currently sexually active and, of these, 38 (45.7%) endorsed dyspareunia. Of 98 patients in the overall cohort reporting being sexually inactive, 12 (12%) reported abstaining from sexual activity due to fear of pain. Cohort demographics and characteristics are

TABLE 1. **Patient cohort characteristics**

	No dyspareunia (n = 128)	**Dyspareunia (n = 53)**	**p value**
Age (y)	62 (50, 70)	53 (35, 59)	< 0.001
BMI (kg/m^2)	31 (7.5)	33 (8.4)	0.07
Race (n) (%)			0.17
White	97 (76)	39 (74)	
Black	24 (19)	8 (15)	
Other	7 (5)	6 (11)	
Sexually active (n) (%)	45 (35)	36 (72)	< 0.001
Chief complaint (n) (%)			
Hematuria	9 (7)	4 (8)	1.00
Stones	24 (19)	11 (20)	1.00
Retention	5 (4)	0 (0)	1.00
UI	20 (16)	20 (38)	0.02
rUTI	14 (11)	6 (11)	1.00
POP	3 (2)	1 (2)	1.00
UCC	10 (8)	4 (8)	1.00
RCC	18 (14)	2 (4)	0.23
Other	25 (19)	5 (9)	1.00
Comorbidities (n) (%)			
HTN	67 (52)	21 (40)	0.16
Cancer	36 (28)	13 (25)	0.75
Diabetes	38 (30)	12 (23)	0.42
Depression	33 (26)	25 (47)	0.009
Fibromyalgia	5 (4)	13 (25)	< 0.001
OAB	46 (36)	25 (47)	0.22
Endometriosis	8 (6)	5 (9)	0.53
IBS	17 (13)	12 (23)	0.18
Pelvic pain	40 (31)	35 (66)	< 0.001
Smoker (n) (%)	17 (13)	11 (20)	0.30
Surgical history (n) (%)			
Pelvic	83 (65)	38 (72)	0.47
Abdominal	84 (66)	34 (64)	0.99
Gravida (n) (± SD)	0.81 (1.5)	1.5 (2.4)	0.02
Any OB complication	62 (48)	30 (57)	0.40

BMI = body mass index; UI = urinary incontinence; rUTI = recurrent urinary tract infections; POP = pelvic organ prolapse; UC = urothelial cell carcinoma; RCC = renal cell carcinoma; HTN = hypertension; OAB = overactive bladder; IBS = irritable bowel syndrome; OB = obstetric

detailed in Table 1. Patients with dyspareunia were more likely to present for urinary incontinence as a chief complaint (38% versus 16%, p = 0.015). These patients were also younger (53 versus 62 years, p < 0.001), more likely to be sexually active (72% versus 35%, p < 0.001), and more likely to have diagnoses of depression (p = 0.009), fibromyalgia (p < 0.001), and pelvic pain (p < 0.001). Patients with dyspareunia also had higher gravidity (1.5 versus 0.8, p = 0.02). Similar differences were seen on sub-analysis of sexually active patients, although sexually active patients with dyspareunia were more likely to have had prior pelvic surgery (73% versus 49%, p = 0.04) compared to sexually active women without dyspareunia. No additional differences were seen based on race, socioeconomic factors, or past medical history.

Pain location

Patients described a variety of pain locations. Figure 1a illustrates a heat-map of the various pain sites marked by patients. Figure 1b illustrates an UpSet plot of the four broad unique patient-reported pain site combinations. When specific "inside vagina" locations (e.g. "middle third", "anterior", "right side") were included in an UpSet analysis, 33 unique combinations were identified. Patients identified a median of 2 [1,4] pain sites. Of note, all 53 (100%) patients who endorsed dyspareunia reported pain inside the vagina. Few patients reported labial (11%) or clitoral (7.5%) pain.

Pain quality and severity

Pain quality and severity are demonstrated in Table 2. "Sharp/stabbing" was the most commonly endorsed pain quality (62%). Although most patients (70%) reported only one quality, some reported more than one quality of their dyspareunia. The frequencies of eight unique pain quality combinations are demonstrated in the Figure 2 UpSet plot. A significant

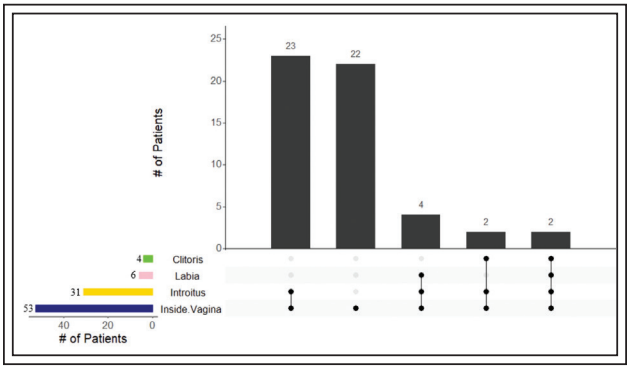

Figure 1a. Heatmap, pain location.

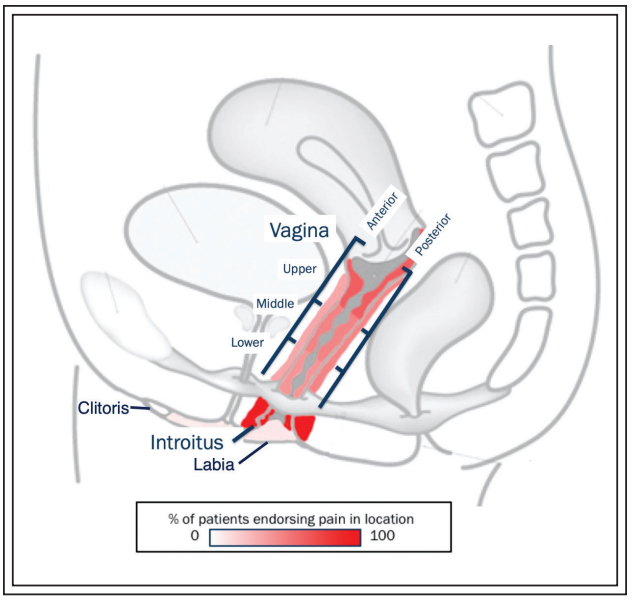

Figure 1b. UpSet plot, pain location.

TABLE 2. **Pain characteristics**

	n (%)
Pain severity	
Very high	7 (13.2)
High	11 (20.7)
Moderate	18 (33.9)
Low	10 (18.9)
None	3 (5.6)
Pain quality	
Sharp or stabbing	33 (62.3)
Dull	18 (33.9)
Numbness/tingling	1 (1.8)
Occurs with touch	15 (28.3)

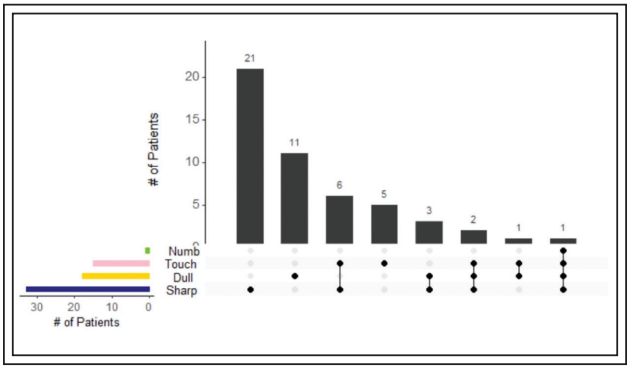

Figure 2. UpSet plot, pain quality.

proportion (34%) of patients reported high or very high pain severity, with 45% having pain most or all times of sexual activity.

Sexual activity impact and satisfaction

A majority (53%) of patients with dyspareunia indicated moderate to severe dissatisfaction with their sexual activity. Despite this finding, a significant proportion (33%) of patients with dyspareunia reported having at least weekly sexual activity. Fourteen patients (26%) reported that they are no longer sexually active because of their dyspareunia.

There were no differences in reported pain locations, qualities, severity, or sexual satisfaction between sexually active and inactive patients with dyspareunia.

Discussion

Our study demonstrates several important findings. First, there is a high prevalence of dyspareunia in women presenting for outpatient evaluation of unrelated non-painful complaints. Available literature providing prevalence and incidence estimates is often reported in the setting of primary care or gynecology cohorts.[2,15] The high rate of dyspareunia seen in our cohort underscores the importance of screening for dyspareunia within the context of urologic evaluation. Further, our findings are important as there is limited updated data to understand the scope of dyspareunia in women. A notable systematic review of worldwide literature identified significant variability in the rates of dyspareunia across countries and notes the importance of updated study, as changes to social practices like smoking or sexual behavior may influence rates given their known relationship with pelvic pain.[16,17] These findings also highlight the need for updated prevalence data specific to populations of interest, such as that provided through our study.

Second, a significant heterogeneity of specific pain sites and qualities was seen. This finding underscores the complexity of dyspareunia and the challenge that clinicians encounter when tasked with both diagnosis and delivery of targeted therapies. The differential diagnosis for dyspareunia is broad and includes endometriosis, vulvodynia, pelvic floor dysfunction, central pain sensitization, and urethral diverticula.[1] At present, there is a lack of diagnostic tools to aid in the evaluation of this complex differential diagnosis, with subjective history and comprehensive exam serving as primary evaluation methods.

Pain mapping is an established tool that has been used to evaluate complex painful symptomotologies.[12] Most commonly, pain mapping focuses on detailed organization of pain locations in an effort to define pain patterns and facilitate diagnosis. Limited investigation is available to understand the utility of pain mapping specific to urologic and gynecologic disorders. More recently investigation reports the use of pain mapping for chronic pelvic pain.[18-21] Torstensson et al reported the use of pain mapping to identify pain patterns provoked by intravaginal palpation of pelvic landmarks.[18] Ultrasound and laparoscopy have also been used in conjunction with pain mapping to gain additional insight.[19-21]

We are aware of no formal study assessing the use of pain mapping for the evaluation of dyspareunia. There is limited prior study that has reported more generally on locations of sexual pain as part of a more global assessment of sexual experiences reported by women.[22] The present study provides an important initial step by mapping not only pain locations, but also pain characteristics. These mapping techniques and the use of UpSet plots allow for a quantitative visualization of pain presentations. Indeed, our study demonstrated five unique combinations of broad pain locations, with 33 distinct combinations when accounting for various specific intra-vaginal locations. Pain quality demonstrated variability as well with eight unique combinations. Future study is needed to understand whether these combinations can be organized in a way to facilitate diagnosis of dyspareunia subtypes.

Third, our study demonstrated an association between dyspareunia and fibromyalgia, depression, and pelvic pain. Prior study has also identified a concordant relationship between dyspareunia and depression.[9] Moreover, an emerging body of investigation has recently focused on better understanding associations with unexplained medical conditions such as fibromyalgia. These conditions are characterized by the absence of clear physical or biologic etiology and include fibromyalgia, irritable bowel syndrome (IBS), chronic pelvic pain, and vulvodynia.[10,23] A notable systematic review by Bullones Rodriguez and colleagues demonstrated that a significant portion of patients with unexplained urological conditions also suffer from unexplained non-urological conditions (e.g. fibromyalgia and IBS).[10] Proposed mechanisms underlying this overlap include physiologic (neuroendocrine or immunologic), psychiatric, and trauma.[24]

Despite this, Bullones Rodriguez and colleagues highlight that such proposed mechanisms are inconsistent with the clinical presentations of many urologic patients with concurrent unexplained conditions and, similarly, emphasize the limitations of organ-based diagnostic approaches.[10] As a result,

these authors suggest a multi-disciplinary model to guide research and diagnosis that includes assessment of predisposing, perpetuating, and precipitating factors. The heterogeneity of pain characteristics in our cohort, as well as the association with comorbid conditions, further underscores that challenge of understanding dyspareunia and its relationship with other painful conditions. Accordingly, we emphasize the benefit of a multi-disciplinary approach to dyspareunia that not only aids in assessment of a broad differential diagnosis across specialties (e.g. dermatologic, urologic, neurologic) but also may be beneficial to research collaborations that forward our understanding of pathophysiology.

We also found that women presenting with a chief complaint of UI were more likely to have dyspareunia. The specific etiology of this association is unclear. Prior investigation by Su et al found that urge UI is associated with increased pain during sexual activity.[25] Moreover, UI has been demonstrated to deleteriously impact sexual function given the negative impact of UI during sexual activity on self-esteem and anxiety.[26,27] Notably, specific therapies may provide benefit in the treatment of both UI and also dyspareunia/sexual function. Accordingly, an IUGA committee paper on post-menopausal pelvic floor dysfunction concludes that local estrogen demonstrates benefits in the treatment of both dyspareunia and UI.[28] In addition, several studies have shown that treatments of OAB-wet, including mirabegron and botulinum toxin, yield significant improvements in not only urinary but also sexual function outcomes including sexual pain.[29] Finally, we have previously reported that TVTO placement is associated with significant improvements in sexual function at 1-year minimum follow up.[30] Combined, these data demonstrate the importance of considering strategies that concurrently treat UI and sexual dysfunction.

Our study provides insight regarding specific pain characteristics of dyspareunia. Further study is needed to explore these patterns and how they may relate to underlying etiology of dyspareunia. Specific to vulvodynia, Lo et al report the use of exam criteria to group patients into distinct and clinically relevant phenotypes that may differentiate between peripheral and central pathologies.[13] Similarly, Orr and colleagues report the use of phenotyping in endometriosis patients with sexual pain and hypothesize that certain phenotypes may be associated moreso with a central component to the pain.[8] Future study will be helpful to assess whether certain phenotypes of pain characteristics seen in our cohort are associated with specific etiologies of dyspareunia.

Study imitations

Study limitations include those inherent to a non-validated questionnaire study and the specific patient population of our analysis. An original questionnaire was created given the primary study focus to map pain characteristics and locations and the lack of related questionnaire items to comprehensively address all of these items in available validated questionnaires. In addition, given our study focus on urologic patients, it is possible that our findings are not representative of a more general population. Furthermore, the study includes patients who reported both dyspareunia and sexual inactivity. This could bias results, as we did not capture time since last sexual activity and patient recall regarding symptom characteristics could be imperfect; however, sub-analysis of only sexually active patients with dyspareunia showed similar results and there were no differences in reported dyspareunia characteristics based on sexual activity. Nonetheless, our data helps advance our understanding of the heterogeneity of dyspareunia as well as the significant rate of dyspareunia seen in patients presenting for urologic evaluation.

Conclusions

A significant percentage of women presenting to a general urology clinic experience dyspareunia. Notably, patient-reported pain characteristics, including location and quality, varied significantly across women assessed. Further study is needed to understand how these characteristics may relate to different and specific etiologies of sexual pain and directed treatment options. □

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