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Comparison of Patient Impact and Clinical Characteristics Between Urgency and Passive Fecal Incontinence Phenotypes

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Abstract

Objective: To determine if categorizing fecal incontinence (FI) as urgency or passive FI is clinically meaningful, we compared clinical severity, quality of life, physical examination findings, and functional and anatomic deficits between women with urgency and passive FI.

Methods: This study is a prospective cross-sectional study of women with at least monthly FI. All women completed the St Mark's Vaizey and the Fecal Incontinence Quality of Life questionnaires and underwent anorectal manometry and endoanal ultrasound. We compared women with urgency FI to women with passive FI.

Results: Forty-six women were enrolled, 21 (46%) with urgency FI and 25 (54%) with passive FI. Clinical severity by Vaizey score did not differ between groups (urgency 11.7 ± 1.6 vs passive 11.0 ± 1.0 , $P = 0.51$). Women with urgency FI had worse median (range) lifestyle and coping scores than passive FI (Fecal Incontinence Quality of Life: lifestyle domain $2.5 [1, 4]$ vs $3.8 [1, 4]$, $P = 0.04$; coping domain $1.7 [1, 3]$ vs $2.4 [0.9, 4]$, $P < 0.01$). Women with urgency FI had higher anal resting and squeeze pressure than passive FI (60 ± 4 mm Hg vs 49 ± 3 mm Hg, $P = 0.03$; $78 [48, 150]$ mm Hg vs $60 [40, 103]$, $P = 0.05$). Internal anal sphincter defects were more common in women with passive FI (41.7% vs 30.0%, $P = 0.53$) and external anal sphincter defects more common in women with urgency FI (25% vs 16.7%, $P = 0.71$), but this did not reach statistical significance.

Conclusions: We identified functional and anatomic differences between women with urgency FI and passive FI. Phenotyping women with FI into these subtypes is clinically meaningful.

Keywords

fecal incontinence; phenotype; pelvic floor disorders

Fecal incontinence (FI), defined as the involuntary loss of liquid or solid stool, greatly affects quality of life and can negatively impact an individual's activity level, body image,

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and likelihood of institutionalization.¹ Prevalence rates of FI among women with pelvic floor disorders approach 41%, illustrating the large burden on this population.²

Several systems for classifying FI exist, including systems based on pathophysiology (bowel disturbances, anorectal dysfunctions), type of leakage (urge, passive, or combined), or symptom severity scales.³ None of these classifications have been standardized, and the utility of characterizing women by different classification systems has not been established. A recent state-of-the-science conference on FI highlighted the need for “an ideal system for classifying FI [that] would preferably be user friendly and preferably require less testing, provide discrete categories with minimal overlap among categories, be related to underlying mechanisms, and guide therapy and also predict the response to therapy.”³

Subtyping women with FI based on the type of leakage is attractive given it is based on patient-reported symptoms and thus easy to determine, yet it is unclear if this method of classification provides clinically meaningful information or helps to understand underlying mechanisms that lead to FI. Prior studies suggest that urgency FI is related to dysfunction of the external anal sphincter (EAS), whereas passive FI is attributed to dysfunction of the internal anal sphincter (IAS).⁴ However, the correlations between these subtypes and anorectal functional and anatomical defects have not been well studied in women with pelvic floor disorders. Thus, the purpose of this study was to compare the clinical severity, quality of life, physical examination findings, and functional and anatomic deficits in women with urgency and passive FI in women with pelvic floor disorders.

MATERIALS AND METHODS

Our study protocol was reviewed and approved by the Institutional Review Board of the University of Pennsylvania and registered with Clinical Trials registry ([NCT02772874](#)). We conducted a prospective cross-sectional study of adult women with FI presenting to our Urogynecology practices between August 2014 and March 2016 for pelvic floor disorders including urinary incontinence, pelvic organ prolapse, and FI. Inclusion criteria were at least monthly FI over the last 3 months. Women with colorectal or gastrointestinal malignancy, fistula, rectal prolapse, prior colorectal surgery, radiation, fecal impaction, sole flatal incontinence, or neurologic disorders were excluded.

After informed consent, participants completed questionnaires on severity of their FI symptoms and its impact on quality of life. Demographic information including age, race, ethnicity, body mass index (BMI), and parity was collected. Presence of other GI conditions was assessed using subsections of the ROME III questionnaire, a self-administered survey of gastrointestinal clinical symptoms, to diagnose irritable bowel syndrome, functional constipation, and functional diarrhea.⁵ All participants underwent pelvic and rectal examination, anorectal manometry, and endoanal ultrasound to evaluate functional and anatomic pathology. The examiner performing the physical examination, anorectal manometry, and endoanal ultrasound was blinded regarding the FI classification status (urgency or passive) of the subject.

Symptom Severity

Fecal incontinence clinical severity was measured using the St Mark's Vaizey scale, a validated patient-reported instrument extensively used in the literature to measure severity of FI.^{6,7} The Vaizey scale has been shown to correlate with provider assessment of severity and, importantly, includes an assessment of fecal urgency.⁸ The scale consists of 3 items that address the type of incontinence (gas, liquid, solid), frequency of incontinence (scored 0 to 4), alteration in lifestyle (scored 0 to 4), need to use pads or plugs (scored 0 to 2), use of constipating medications (scored 0 to 2), and fecal urgency, that is, the ability to defer defecation for 15 minutes (scored 0 to 4). Possible scores range from 0, perfect continence, to 24, complete incontinence.⁷

Quality of Life

The impact of FI on quality of life was measured by the Fecal Incontinence Quality of Life scale (FIQL), a patient-reported, condition-specific questionnaire.⁹ This instrument specifically addresses lifestyle impositions that can result from FI. The 29-item questionnaire is divided into 4 domains that assess general health/lifestyle (10 items), coping behaviors (9 items), self-perception/depression (7 items), and embarrassment (3 items).¹⁰ Possible scores for each domain range from 1 to 5, with higher scores indicating better quality of life.¹⁰

Physical Examination

Pelvic and rectal examination assessment included pelvic organ prolapse quantification staging (stage 0 to 4), Brink's vaginal squeeze pressure, duration, and displacement to measure strength of pelvic floor contraction (all scored 1 to 4), and digital rectal examination anal resting tone and squeeze tone (scored 1 to 6).^{11,12}

Anorectal Manometry

Anorectal manometry testing was performed using the Medspira Mcompass Anorectal Manometry device.³ Anorectal testing was conducted in the left lateral position. Mean and maximum anal resting and squeeze pressures and anal squeeze duration were recorded. Rectal air volumes were recorded for first sensation, normal urge, strong urge, and maximum tolerated capacity.

Endoanal Ultrasound

Endoanal ultrasound assessment was performed using the BK Flex Focus 500 ultrasound with an endoanal probe containing a rotating 10-MHz transducer producing a 360-degree view in the axial plane. The EAS and IAS were measured for thickness and presence of defects at 12, 3, 6, and 9 o'clock. The puborectalis muscle thickness was measured at 6 o'clock at the high anal canal.

Analysis

Participants were categorized into 2 groups, urgency FI and passive FI, based on responses to 2 questions from the Fecal Incontinence and Constipation Assessment¹³: (1) "When 'accidents' with leakage of stool occurred, were you aware when the leakage was actually

happening?” and (2) “Do you leak stool because you have great urgency and cannot make it to the toilet in time to open your bowels?” Answer choices included “never,” “sometimes, less than 25% of the time,” “often, more than 25% of the time,” or “usually, more than 75% of the time.” Subjects answering “often” or “usually” to the urge question were categorized as having urgency predominant FI, whereas those answering “often” or “usually” to the passive question were categorized as having passive predominant FI. Women who answered affirmatively to both were placed in the group with which experienced symptoms more frequently, that is, in the group that happened “often” rather than “usually.” We compared demographic characteristics, FI severity, physical examination findings, anorectal manometry measurements, and endoanal findings between the 2 groups using unpaired Student t test or Mann-Whitney-Wilcoxon test for continuous variables and Fisher exact or χ^2 test for categorical variables as appropriate.

Sample size was based on our primary outcome, clinical severity of FI via Vaizey scale (range, 0 to 24). Prior studies report a minimally important change in Vaizey score of 5.⁹ With an alpha at 0.05 and power of 80%, we estimated a sample size of 23 participants in each group to detect a clinically meaningful difference in FI severity between the 2 groups. From prior studies,⁷ we expected an equal distribution between women with urge and passive FI and thus we planned to recruit 46 consecutive women with FI. All analyses were performed in STATA version 13 (StataCorp LP 2013, College Station, TX). Statistical tests were 2-sided, and $P < 0.05$ was considered statistically significant.

RESULTS

Forty-six women were eligible for study participation and successfully enrolled after informed consent, 18 (39%) with sole urgency FI, 22 (49%) with sole passive FI, and 6 (13%) with both urgency and passive FI. After adjustment of subtype group based on predominant symptoms, 21 (46%) of women were categorized as urgency FI and 25 (54%) as passive FI. Mean age of the cohort was 62.8 (± 11.4) years. There were no significant differences in age, race, ethnicity, BMI, parity, or concurrent gastrointestinal conditions between the 2 groups (Table 1).

Symptom Severity and Quality of Life

Most women (30, 65.2%) reported at least weekly FI of solid or liquid stool. Mean Vaizey score on severity of FI did not differ between groups (Table 2). Women with urgency FI had worse median lifestyle and coping scores compared with women with passive FI (Table 2).

Physical Examination Findings

Most women had minimal prolapse that was not significantly different between groups (urgency FI stage 0 [0–3] vs passive FI stage 1 [0–3]). Median Brinks scores on strength of pelvic floor contraction, including pressure, duration, and displacement, did not significantly differ between the urgency FI and passive FI groups (pressure score 2 [1, 4] vs 3 [1, 4]; duration score 3 [1, 4] vs 3 [1, 4]; displacement score 2 [1, 4] vs 3 [1, 4]). Digital rectal examination mean resting tone was lower in the passive FI group than the urgency FI group but did not reach statistical significance (2.64 ± 0.20 vs 3.12 ± 0.25 , $P = 0.15$). Women with

urgency FI had weaker digital rectal examination squeeze tone than women with passive FI (2.79 ± 0.26 vs 3.17 ± 0.29) although this also did not reach statistical significance ($P = 0.33$).

Anorectal Manometry Findings

Functional comparisons using anorectal manometry showed higher mean anal resting pressure and higher mean squeeze pressure in the urgency FI group than the passive FI group, whereas maximum anal squeeze pressures did not differ between groups (Table 3). The urgency FI group was able to maintain a longer anal squeeze duration compared with the passive FI group (Table 3). Rectal sensations did not differ significantly between the 2 groups (Table 3).

Endoanal Ultrasound Findings

Anatomic assessment with endoanal ultrasound showed no significant difference in the IAS and EAS thickness between the 2 groups (Table 4). Internal anal sphincter defects were more common in women with passive FI (10, 41.7%) than women with urgency FI (6, 30.0%). External anal sphincter defects were more common in women with urgency FI (5, 25.0%) than women with passive FI (4, 16.7%). However, these differences did not reach statistical significance ($P =$ not significant).

DISCUSSION

Our study shows that women with urgency FI report significantly worse quality of life than women with passive FI. There are also important functional differences between women with urgency and passive FI. Women with urgency FI had weaker squeeze pressure on digital rectal examination, earlier rectal sensation on anorectal manometry, and a trend toward more EAS defects. Conversely, women with passive FI had lower resting tone on digital rectal examination, significantly lower mean anal resting pressures on anorectal manometry, and a trend toward more IAS defects. These findings suggest that there are clinically meaningful differences when women with FI are subtyped as having urgency versus passive FI. Given that certain treatments for FI such as percutaneous tibial nerve stimulation and biofeedback are more effective in women with fecal urgency incontinence than passive FI, our findings could allow clinicians to direct women with specific types of FI to specific treatments.^{14–16}

Among women with pelvic floor disorders, women with FI generally have lower general health and quality of life scores compared with those without FI.² Few studies have explored what aspects of FI negatively impacts quality of life. Despite an assumption that passive FI, given its insidious nature, may have a more distressing impact on women than urgency FI, our study demonstrates that women with pelvic floor disorders with urgency FI have worse lifestyle and coping scores compared with women with passive FI. Although FI severity was similar between groups, women with urgency FI reported worse lifestyle and coping measures than the passive FI group. This interesting finding suggests that a woman's awareness of impending incontinence and her inability to stop it are especially distressing for women. Women with urgency predominant FI may benefit from additional counseling

on coping mechanisms for dealing with their FI symptoms such as avoiding specific food triggers or using antidiarrheal agents when outside the home and avoiding brisk physical activities after meals.¹⁷

Our findings on examination and anorectal testing supports our hypothesis that subtyping women as having passive or urgency FI can provide meaningful information that helps explain the underlying pathophysiology. Decreased anorectal manometry mean anal resting pressures in the passive FI group compared with the urgency group is consistent with known mechanisms of anal continence. Anal continence necessitates a pressure gradient whereby anal canal pressure is greater than rectal pressure.¹⁸ In passive FI, pressure within the anal canal is decreased, and thus the pressure gradient between the rectum and anal canal allows escape of fecal content without awareness. The IAS is responsible for 70% to 85% of resting sphincter tone.¹⁹ In our study, IAS defects were similar in the passive FI group compared with the urgency FI group. Although we did not find a significant difference in IAS thickness between the 2 groups, likely due to small sample size, other studies have noted that the thickness of the IAS is reduced in women with passive FI.¹⁹ The functional significance of these IAS defects is demonstrated by the associated loss of resting pressure on anorectal manometry and weaker digital rectal examination resting tone that we observed in the passive FI group. Taken together, these findings suggest that IAS defects are a significant contributor to passive FI.

Increased anorectal manometry anal squeeze pressure and squeeze duration in the urgency FI group compared with the passive FI group likely reflects the compensatory mechanisms used by women with urgency FI. In response to an urge to defecate due to increase in rectal pressure, the rectoanal contractile reflex response leads to contraction of the EAS via the pelvic splanchnic and pudendal nerves in an attempt to increase anal pressure and prevent escape of fecal content.¹⁷ Women with urgency FI likely use this reflex during episodes of urgency, and perhaps over time, gain the ability to generate and sustain a contraction; however, this contraction may not be strong enough or long enough to actually maintain continence. Our finding of increased EAS defects in the urgency group seemingly contradicts the finding of increased squeeze pressure noted in this group as the EAS is traditionally assumed to be responsible for squeeze strength.¹⁷ Other studies too have reported that a high proportion of women with fecal urgency incontinence have EAS defects.^{20,21} In a Cochrane Review on biofeedback in FI, pelvic floor muscle contractions do not necessarily isolate the EAS, but recruit surrounding muscles including the puborectalis and remaining levator ani.²² It is likely that the squeeze pressures of anorectal manometry do not represent contraction of the EAS alone but also included the pressure generated from surrounding pelvic floor muscles. This suggests that even in the absence of intact sphincter muscles, pelvic floor exercises with biofeedback can still be beneficial. An interrupted sphincter may not necessarily be nonfunctional, and an intact sphincter may not necessarily provide optimal function.

Although some authors have found an association between the presence of fecal urgency and lower rectal distention volume,^{1,23} we did not find statistically significant differences in the sensory volumes between the groups. Deutekom et al²⁰ also did not find a significant association between type of FI and rectal sensation. These differences in findings between

studies may reflect differences in equipment or technique of measuring anorectal sensation, which vary considerably and have not been standardized.²⁴ Alternatively, our lack of differences in anorectal sensation between groups may reflect inconsistencies with rectal sensation measurements, which have been reported to be less reproducible compared with pressure measurements using anorectal manometry.²⁵ Limitation of the anorectal testing modalities further underscores the importance of using a classification system that can be assessed using self-reported findings to distinguish women with FI.

Our study has several strengths. Although some other authors have investigated functional and anatomical differences and correlations with FI symptom characteristics,^{4,20,21} few have aimed to comprehensively compare urgency and passive FI. Ours is the first to attempt a global assessment of clinical severity, quality of life, functional, and anatomic evaluation of women with pelvic floor disorders to assess the implications of FI subtyping of urgency FI and passive FI. Such subtyping may allow us to better approach the management and treatment of this condition in women. Weaknesses of our study include our small sample size and our binary approach to clinical distinction of types of FI. In addition, our study did not examine the impact of certain comorbidities such as diabetes and the impact of treatment on FI subtype. Future studies should consider additional classifications of clinical grouping, such as mixed FI, urgency-predominant FI, and passive-predominant FI. A larger sample size would allow further stratification by age and other demographics that may reveal differences between groups.

In conclusion, we demonstrated that in women with FI, categorizing them as having urgency FI and passive FI is clinically meaningful. These findings may allow us to better approach the treatment of women with pelvic floor disorders and FI.

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TABLE 1.
Demographics of Urgency Fecal Incontinence Group Compared With Passive Fecal Incontinence Group

Characteristic	Urgency FI Group, n = 21	Passive FI Group, n = 25	P
Age, y	62.2 ± 2.5	63.4 ± 2.2	0.74
Race			0.51
White	11 (68.8)	12 (54.6)	
Black	5 (31.3)	10 (45.5)	
Other	5 (23.8)	3 (12.0)	
Ethnicity			1.00
Hispanic	1 (4.8)	1 (4.0)	
Non-Hispanic	20 (95.2)	24 (96.0)	
Parity	2 (0–7)	2 (0–5)	0.67
Prolapse POP-Q stage	0 (0–3)	1 (0–3)	0.15
BMI, kg/m ²	30.0 (20.8–48.0)	26.2 (20.3–46.1)	0.14
Concurrent gastrointestinal pathology			
IBS	6 (28.6)	5 (20.0)	0.73
Functional constipation	3 (14.3)	6 (24.0)	0.47
Functional diarrhea	3 (14.3)	1 (4.0)	0.33

Data are mean ± standard deviation, median (range), or n (%).

P values refer to comparison of measures between groups using Student *t* test or Mann-Whitney-Wilcoxon test for continuous variables and Fisher exact test for categorical variables as appropriate.

POP-Q, pelvic organ prolapse quantification; IBS, irritable bowel syndrome.

TABLE 2.
Clinical Severity and Quality of Life Measures of Urgency Fecal Incontinence Group Compared With Passive Fecal Incontinence Group

Clinical Severity and Quality of Life Measures	Urgency FI Group, n = 21	Passive FI Group, n = 25	P
Vaizey score	11.7 (1.6)	11.0 (1.0)	0.51 [*]
FIQL			
Lifestyle	2.5 (1.0–4.0)	3.8 (1.0–4.0)	0.04 [†]
Coping	1.7 (1.0–3.0)	2.4 (0.9–4.0)	<0.01 [†]
Depression	2.4 (1.0–3.8)	2.8 (1.3–3.9)	0.06
Embarrassment	2.0 (0.7–3.7)	2.3 (1.0–3.7)	0.66

Data are mean (standard deviation) or median (range).

P values refer to comparison of measures between groups using Student *t* test or Mann-Whitney-Wilcoxon test for continuous variables as appropriate.

^{*} Primary outcome.

[†] Significant difference in questionnaire scores between groups by Student *t* test or Mann-Whitney-Wilcoxon test ($P < 0.05$).
SD, standard deviation.

TABLE 3.
Functional Measures Via Anorectal Manometry of Urgency Fecal Incontinence Group Compared With Passive FI Group

Functional Measures of Anorectal Manometry	Urgency FI Group, n = 21	Passive FI Group, n = 25	P
Anal mean resting pressure, mm Hg	60 (4)	49 (3)	0.03*
Anal median squeeze pressure, mm Hg	78 (46–150)	60 (40–103)	0.05
Anal maximum squeeze pressure, mm Hg	103 (51–210)	90 (47–194)	0.28
Anal mean squeeze duration, s	5 (2–19)	3 (1–18)	0.05
Rectal first sensation capacity, mL	30 (10–60)	30 (10–120)	0.41
Rectal normal urge capacity, mL	55 (20–120)	60 (30–140)	0.41
Rectal strong urge capacity, mL	90 (40–150)	90 (40–180)	0.20
Rectal maximum tolerated volume, mL	130 (50–180)	120 (50–180)	0.85

Data are mean (standard deviation) or median (range).

P values refer to comparison of measures between groups using Student *t* test or Mann-Whitney-Wilcoxon test for continuous variables as appropriate.

* Significant difference in questionnaires scores between groups by Student *t* test or Mann-Whitney-Wilcoxon test ($P < 0.05$).

TABLE 4.
Anatomic Measures Via Endoanal Ultrasound of Urgency Fecal Incontinence Group Compared With Passive Fecal Incontinence Group

Anatomic Measures of Endoanal Ultrasound	Urgency FI, n = 21	Passive FI, n = 25	P
Puborectalis thickness, mm	5.4 ± 0.4	5.3 ± 0.2	0.90
IAS thickness at 12 o'clock, mm	1.4 (0.0–2.3)	1.4 (0.0–2.4)	0.77
IAS thickness at 3 o'clock, mm	1.0 ± 0.1	1.8 ± 0.1	0.61
IAS thickness at 6 o'clock, mm	1.2 ± 0.1	1.3 ± 0.1	0.34
IAS thickness at 9 o'clock, mm	1.7 (0.0–2.8)	1.8 (0.0–3.1)	0.44
EAS thickness at 12 o'clock, mm	1.9 (0.0–3.3)	2.6 (0.0–3.8)	0.27
EAS thickness at 3 o'clock, mm	2.4 (1.7–4.8)	2.6 (1.2–4.9)	0.88
EAS thickness at 6 o'clock, mm	2.9 (1.6–5.4)	2.7 (1.7–5.0)	0.46
EAS thickness at 9 o'clock, mm	1.6 ± 0.2	1.7 ± 0.2	0.59
IAS defects	6 (30.0)	10 (41.7)	0.53
EAS defects	5 (25.0)	4 (16.7)	0.71

Data are mean (standard deviation), median (range), or n (%).

P values refer to comparison of measures between groups using Student *t* test or Mann-Whitney-Wilcoxon test for continuous variables as appropriate.