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Depression, anxiety and pelvic floor symptoms before and after surgery for pelvic floor dysfunction

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Abstract

Objectives: We aimed to explore the correlation between perioperative symptoms of depression and anxiety with pelvic floor symptoms after urogynecologic surgery. Postoperative pain, goal attainment, quality of life, and satisfaction were assessed.

Methods: Prospective cohort study of women undergoing inpatient urogynecologic surgery. Preoperative questionnaires included Beck Depression and Beck Anxiety Inventories (BDI-II, BAI), Pain Catastrophizing Scale, Pelvic Floor Distress Inventory (PFDI-20), Pelvic Floor Impact Questionnaire (PFIQ-7), and a detailed goals and perioperative supports questionnaire. Postoperative pain was assessed via the Short-Form McGill Pain Questionnaire. Questionnaires were re-administered 6 weeks postoperatively. Descriptive statistics were obtained. Spearman correlation determined the relationship between pre- and postoperative questionnaire scores. Quantile regression assessed the potential moderating effect of patient characteristics on these relationships.

Results: Sixty women (mean age 58.5) were recruited. Fifty-seven (95%) completed follow-up. Most common surgical indication was pelvic organ prolapse (59/60; 98%). Depression and anxiety symptoms were minimal in most women. There was significant median change in pre- to postoperative scores for BAI (-2.0, $p=0.011$), PFDI-20 (-69.4, $p<0.001$) and PFIQ-7 (-23.8, $p=0.001$). Baseline depression and anxiety symptoms were correlated with higher immediate postoperative pain, but not other outcomes. The most common goal, achieved by 47/51(92%), was to reduce condition-specific symptoms.

Postoperative depression and anxiety symptoms, and pelvic floor distress and impact, were significantly correlated.

Conclusions: Baseline depression and anxiety symptoms were not significantly associated with postoperative pelvic floor symptom burden, or surgical satisfaction. Bothersome postoperative pelvic floor symptoms were associated with postoperative depressive symptoms.

Abstract word count: 242

Keywords: Pelvic floor disorders, pelvic organ prolapse/surgery*, patient-centered outcomes, depression, anxiety

Summary: Preoperative depression and anxiety were not found to affect pelvic floor surgical satisfaction.

Abbreviations:

- BAI: Beck Anxiety Inventory
- BDI-II: Beck Depression Inventory-II
- IQR: Interquartile range
- PFD: Pelvic floor dysfunction
- PFDI-20: Pelvic Floor Distress Inventory
- PFIQ-7: Pelvic Floor Impact Questionnaire

- SF-MPQ-2: Short-form McGill Pain Questionnaire

Text

Introduction

Optimization of physical health prior to surgery is a well-known strategy to improve postsurgical outcomes [1,2]. On the other hand, preoperative mental health is often overlooked and may play an important role in optimal postsurgical recovery [1,3,4].

Depression and anxiety have a lifetime prevalence of 17% and 29%, respectively, and women are 50% more likely than men to experience depression and anxiety [5]. Anxiety is one of four most significant predictive factors for the intensity of postoperative pain [3]. In the orthopedic literature, depression was associated with increased medical complications [4] and depression or anxiety with less satisfaction with postoperative results [6,7].

The prevalence of mental health symptoms and their relationship with women's recovery from pelvic floor dysfunction (PFD) surgery is currently not completely understood. The prevalence of depressive symptoms in women with PFD varies widely from 20 to 71% between studies[8-10]. Women with PFDs and depressive symptoms report more bother and a higher impact of PFD on quality of life, compared to women without depressive symptoms [9,11,12]. In addition, a case-control study found that women with prolapse had a higher incidence of depressive symptoms than those without prolapse [11]. Moreover, women with PFD and depressive or anxiety symptoms can have improved mental health symptoms after surgery [11,13]. Conversely, anxiety or depression symptoms may affect PFD treatment satisfaction[12]. Many studies to date have used questionnaires screening for

mental health disorders rather than detailed symptom questionnaires [9,14,15], and many have focused on depression alone [9,15]. In addition, most studies have not looked specifically at patients' surgical goals, which can enrich the assessment of patient-centered outcomes after PFD surgery [16,17]. The association between depression and anxiety with pain severity has not been completely assessed in women undergoing surgery for PFD. In addition, although pain catastrophizing is known to be associated with symptoms of depression and anxiety[18], it has not been fully studied in the setting of women with PFDs.

This was a cohort study aiming to describe the relationship between perioperative psychological symptoms, as well as related social and personal factors, on short-term patient-centered outcomes after pelvic reconstructive surgery. Our main hypothesis was that more preoperative symptoms of depression and anxiety would be correlated with more postoperative pelvic floor symptoms and impact on quality of life. Secondarily, we hypothesized that more significant preoperative mental health symptoms would negatively impact goal attainment.

Materials and Methods

In this prospective cohort study, we invited English-speaking, literate women aged 19 or older, undergoing various types of inpatient pelvic reconstructive surgery (including prolapse, incontinence, fistula and mesh complications procedures) at a tertiary care hospital in a major metropolitan city to participate. The University Research Ethics Board approved the study. Pregnant women were excluded.

Measures

Informed consent was obtained just prior to surgery, at which time participating women completed questionnaires in the preoperative area, prior to being transferred to the operating room. We collected demographic data such as age, height, weight, education, ethnicity, habits, and comorbidities (scored according to the validated Charlson Comorbidity Index: out of a maximum possibility of 37 points, the median score during the validation study was 2, IQR: 1-3) [19]. The Pelvic Organ Prolapse Quantification (POP-Q) measurements determined objective stage of prolapse at the preoperative clinic visit [20].

Preoperative mental health questionnaires included depression and anxiety symptoms assessments (Beck Depression and Anxiety Inventory questionnaires; BDI-II and BAI) [21,22] and pain catastrophizing self-assessment (Pain Catastrophizing Scale) [23]. High scores on these instruments reflect more depression, anxiety, or pain catastrophizing. The BDI-II score ranges from 0-63 and is interpreted as; 0-13: minimal range, 14-19: mild depression, 20-28: moderate depression, and 29-63: severe depression [24]. The BAI score also ranges from 0-63, and is interpreted as; 0-9: no or normal anxiety, 10-18: mild to moderate anxiety, 19-29: moderate to severe anxiety, and 30-63: severe anxiety [25]. The Pain Catastrophizing Scale score ranges from 0-52, and the mean and standard deviation of that scale during validation were 20.90 (12.50). [23]. This scale measures the inclination for an individual to magnify the pain experience[18], and was used to assess the potential moderating effect of pain catastrophizing on the relationship between depression and anxiety symptoms, and pelvic floor symptoms and impact. Pelvic floor symptoms bother

and impact on quality of life were assessed with the Pelvic Floor Distress Inventory (PFDI-20) [26], and Pelvic Floor Impact Questionnaire (PFIQ-7) [26]. High scores on these instruments reflect more burden of disease.

A self-assessment of postsurgical goals was also included. Women were asked to select their top three goals out of a list of ten possible goals for their surgery, including reducing pain, prolapse, urinary or bowel symptoms, improving body image, activities and social life, intimate relationships, or general health, living happily, or "other". The list was adapted by the authors, based on two previous articles on patient-centered outcomes and goals for surgical treatment of PFDs (Hullfish 2002 and Mamik 2013) [16,17]. Number and percentage of women who listed each goal in their top three was noted.

Other non-validated questions addressed trust in surgical team, expectations of results of surgery and postoperative pain, self-reported pain tolerance, and social support post-hospital discharge.

After completion of preoperative questionnaires, we recorded surgical diagnosis and procedure type from medical records.

On postoperative day one, the Short-form McGill Pain Questionnaire (SF-MPQ-2) was self-administered [27]. High scores reflect more pain (range 0-10).

Patients returned for a six-week postoperative visit, during which they rated the

achievement of preoperative goals on a scale of 0-10. They were not reminded of the goals they had selected preoperatively, but rather had a chance to rate the achievement of all possible goals, and to note those that did not apply to them. The BDI-II, BAI, PFDI-20, PFIQ-7 questionnaires were re-administered. The Patient Global Improvement Index (PGI-I) Scale for pelvic organ prolapse was also used at the postoperative visit [28]. It consists of a seven-item Likert-type scale ranging from "very much better" to "very much worse". Additional non-validated questions addressed satisfaction with information received before their surgery, perioperative care, and perioperative social support.

Data Analysis

Descriptive statistics, such as mean, standard deviation, median and interquartile range (IQR) were obtained for demographic and baseline variables. Correlation between pair of variables was assessed using Spearman correlation (denoted by rho). Wilcoxon signed rank test was used to examine the change in scores from pre- to postoperatively. Wilcoxon rank-sum test or t-test was applied for the comparisons of scores between groups defined by other variables. Univariate quantile regression was used to examine the impact of BDI-II/BAI on median postoperative PFDI-20/PFIQ-7 scores. Due to the skewness of the data, quantile regression was used instead of linear regression. The univariate effect of BDI-II/BAI was further assessed in strata defined by demographic variables and pain catastrophizing/tolerance score through the interaction term between BDI-II/BAI and the stratum variable. Continuous stratum variables were stratified by its sample median when no conventional cutoff existed. The moderating effect of each stratum variable was assessed by the test of homogeneity of effect. For BDI-II and BAI,

those who completed less than 80% of the questionnaire were excluded. A p value of less than 0.05 was considered significant. Analyses were performed using SAS 9.4 (SAS Institute, Cary, NC).

A sample size of 60 women was chosen based on recruitment feasibility. This would allow us to detect a correlation of at least 0.37 between BDI-II/BAI and PFDI-20/ PFIQ-7 scores at the 0.05 significance level with 80% power, after accounting for an anticipated loss to follow-up of 10%. A correlation smaller than 0.3 was generally considered as weak correlation and thus the current study was powered to detect moderate correlation between the various scales.

Results

Patient Population

Sixty-seven women were approached and sixty were included (five women declined to participate, two did not complete the baseline questionnaire) (Table 1). Fifty-seven women completed the 6-week postoperative questionnaire.

Patient Descriptive Data

Fifty-four women completed baseline BDI-II and 47 completed baseline BAI. Preoperatively, 6/54 (11%) women were categorized as mildly to severely depressed (4 mild, 1 moderate, and 1 severe) and 10/47 (21%) women had mild to severe anxiety (9 mild, 0 moderate, and 1 severe). The rest had no or minimal symptoms of depression or anxiety. One woman had both depression and anxiety symptoms in the severe range. Baseline PFDI-20 median score was 105.1 (58.3, 175.0) and PFIQ-7 was 61.9 (28.6,

109.5), both out of a maximum score of 300. Pain catastrophizing scores were low [median 6/52 (1, 12)]. Median (IQR) pain catastrophizing subscales scores were: Rumination 3/16 (0, 4), Magnification 1/12 (0, 2), and Helplessness 1/24 (0, 5.5). Eighty-eight percent of women described their pain tolerance as average or high. Ninety-three percent expected pain to be mild to moderate after surgery. Ninety percent of women believed their surgery was most likely to be successful, and 96.7% of women had "a lot of trust" or "complete trust" in their surgical team. Support expected at home after surgery was "quite a bit" or "a lot" in 86.7% of cases. Most women (98.3%) were "quite satisfied" or "very satisfied" with information received about their upcoming surgery. Many women consulted sources of information other than their primary surgeon and the surgical team. Sixty-three percent reported finding information on the internet, 25% obtained information from friends and/or family members, 20% spoke with other health care professionals (such as their family doctor, another gynecologist, a physiotherapist or friends in the medical profession), and 20% reported not seeking any additional information than the one provided by the surgical team.

There was no significant change in depression scores pre- to postoperatively ($p=0.242$). Anxiety scores improved significantly (median change in score -2.0, $p=0.011$). There were statistically and clinically significant changes in pre- to postoperative PFDI-20 (median=-69.4, $p<0.001$) and PFIQ-7 (median=-23.8, $p=0.001$) scores.

Primary Outcome

No significant correlation was found between preoperative depression/anxiety scores and

postoperative PFDI-20/PFIQ-7, nor was there a significant correlation between the change in depression/anxiety symptoms and PFDI-20/PFIQ-7 from pre- to postoperatively. There were moderate to strong correlations between postoperative BDI-II/BAI scores with postoperative PFDI-20/PFIQ-7 scores (Table 2). For each point decrease in postoperative depression/anxiety score, the pelvic floor symptoms and impact scores decreased by about 5.2 unit ($p \leq 0.008$).

The relationship between pre/postoperative depression scores and postoperative PFDI-20/PFIQ-7 was not significantly different by women's baseline demographics. In contrast, the effect of pre-operative anxiety scores on postoperative PFIQ-7 seemed to be moderated by comorbidity (6.23 increase in PFIQ-7 per unit increase in anxiety for those with comorbidity compared to no significant relationship for those without comorbidity; $P_{homogeneity}=0.039$). For post-operative anxiety scores, the effect on post-operative PFDI-20 was significantly different by age (anxiety translated to more bother for women age$\geq$58; $P_{homogeneity}=0.041$) and self-reported pain tolerance (anxiety translated to more bother in women with no to average pain tolerance; $P_{homogeneity}=0.015$).

Secondary outcomes

Fifty-five women completed preoperative goal assessment. The most common patient goal was to reduce condition-specific symptoms (Table 3). Overall, there was no consistent association between preoperative symptoms of depression or anxiety and the types of goals chosen. Forty-seven out of 51 (92.2%) women achieved their goal of reducing prolapse symptoms (defined as score 6 or more out of 10). The mean overall

goal attainment was 7.7/10 (1.7). Postoperative depressive symptoms were moderately negatively correlated with overall goal attainment (rho -0.46, $p<0.001$). Preoperative depressive symptoms, and both pre- and postoperative anxiety symptoms were not correlated with overall goal attainment.

Pain catastrophizing was strongly positively correlated with anxiety and depression symptoms at baseline (rho 0.54 and 0.53 respectively, with $p < 0.001$ for both), but not with baseline PFD symptoms, change in PFD symptoms, or global impression of improvement.

Pain scores on postoperative day one were weakly positively correlated with baseline depressive symptoms (rho 0.27, $p=0.054$) and moderately positively correlated with anxiety symptoms at baseline (rho 0.42, $p= 0.003$). There were no significant correlations between pain and baseline pain catastrophizing.

Postoperative global assessment of improvement showed 83.9% of women to be “much better” to “very much better”, 10.7% “a little better”, 5.4% “no change” to “a little worse”, and none “much worse” to “very much worse”. PGI-I score was not associated with preoperative depression and anxiety symptoms, or with baseline quality of life. A lower global improvement score was moderately correlated with higher postoperative depression symptoms (rho -0.33, $p=0.014$) and bother on PFDI-20 (rho -0.45, $p<0.001$).

Discussion

This cohort study assessed baseline mental health in a cohort of women undergoing pelvic floor surgery and examined relationships between mental health and surgical outcomes. At baseline, our cohort was overall optimistic about upcoming surgery. Surgical goals were realistic and mostly attained postoperatively. There was a low prevalence of depression, anxiety and pain catastrophizing. Eighty-four percent of women were very satisfied with the high level of PFD symptom and quality of life improvement postoperatively. Postoperative anxiety and depression, rather than preoperative symptoms, were significantly correlated with postoperative PFD symptoms and their impact on quality of life. Postoperative depression symptoms were also negatively correlated with overall surgical goal attainment. These results lead us to conclude that women with the most PFD symptoms postoperatively are more likely to display depression and anxiety symptoms after pelvic floor surgery. Association does not imply causality; therefore, this could be the result of non-satisfaction of expectations leading to disappointment, or of mental health symptoms affecting perception of improvement. It further underscores the importance of pre- and postoperative patient counseling, including discussions around realistic attainment of surgical goals, to optimize patient satisfaction.

In our study, baseline anxiety had the strongest correlation with immediate postoperative pain. Lower self-reported pain tolerance was also a predictor of higher postoperative pain, in accordance with a systematic review, which included data from several surgical specialties including gynecology [3]. Reducing baseline anxiety may improve postoperative pain, and more research is needed to develop interventions to this effect.

Women most commonly prioritized disease-specific goals, such as reducing prolapse symptoms. This is consistent with prior goal studies in urogynecologic surgery, which also note symptomatic relief as the most common goal in their patient cohort (81.8%) [16]. In our study, overall goal attainment was high postoperatively, but not all goals were attained equally, with urinary symptom goals being least likely to be improved (overall improvement score 6.6/10). Women who did not achieve their goals were more likely to experience depressive symptoms postoperatively. This result correlates well with our finding of higher burden of postoperative depressive symptoms in women with more residual PFD symptoms postoperatively.

Strengths of our study include its prospective design, as well as the use of detailed validated questionnaires to assess both mental health symptoms as well as PFD symptom burden. This study also assessed patient-centered outcomes, such as surgical goals, as well as multiple other potential confounders in surgical recovery, such as pain tolerance, pain catastrophizing, and home support. Our population included women undergoing varied different types of pelvic floor procedures, thus increasing the generalizability of results. The low prevalence of depression and anxiety symptoms in our cohort (lower than that in the general population) was an unexpected finding, which may be explained by self-selection bias, although few women declined to participate. Other limitations of this study include its short follow-up of six weeks, which may not have allowed women to return to all their usual activities and to fully appreciate the impact of surgery on their lifestyle and goals. For example, sexual function was not assessed, as women were

instructed to avoid sexual intercourse until their six-week postoperative visit. Mental health is known to affect sexual function [29] and longer term studies are needed to determine potential associations. In addition, our study was not powered to find a significant difference in the change of score from pre to postoperatively for any of the questionnaires used. Finally, questionnaires were administered on the day of the surgery, which could be associated with higher levels of anxiety. However, it is unlikely that this significantly affected results, as we asked patients to report anxiety symptoms for the last week excluding the current day, and the overall rate of anxiety symptoms reported by our population was low.

In conclusion, we did not find a correlation between baseline depression and anxiety symptoms with postoperative PFD symptom burden. We found that a significant improvement in pelvic floor symptoms after surgery was not associated with a concomitant improvement in depression and anxiety symptoms, in a cohort of women with very mild symptoms of depression and anxiety. Women with bothersome PFD symptoms after surgery had more depressive symptoms postoperatively. Larger studies are needed in women with more prevalent symptoms of depression and anxiety to better understand the impact of these mental health disorders on patient centered surgical outcomes.

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Tables

Table 1: Demographic Characteristics of Participants (n=60)	
Characteristic	**Value**
Age, mean (SD)	58.5 (12.2)
Education, n (%)	
▪ 8th grade	1 (1.7)
▪ High School	15 (25.0)
▪ College/University	39 (65.0)
▪ Postgraduate	5 (8.3)
Self-reported ethnicity, n (%)	
▪ Canadian	40 (66.7)
▪ European origins	8 (13.3)
▪ East/Southeast Asian	4 (6.7)
▪ South Asian	2 (3.3)
▪ Other	6 (10.0)
Body mass index (kg/m^2), mean (SD) (1 missing value)	26.9 (6.9)
Smoking cigarettes in last year, n (%)	
▪ Yes	3 (5.0)
▪ No	57 (95.0)
Charlson Comorbidity Index Score, mean (SD)	2.6 (1.7)

Indication for inpatient pelvic reconstructive surgery (multiple indications possible), n (%)	
▪ Pelvic organ prolapse (POP)	59 (98.3)
▪ Stress urinary incontinence (SUI)	19 (31.7)
▪ Both POP and SUI	19 (31.7)
▪ Fecal incontinence	2 (3.3)
▪ Abnormal uterine bleeding or fibroids	4 (6.7)
▪ Mesh exposure	1 (1.7)
▪ Rectal prolapse	1 (1.7)
▪ Vesicovaginal fistula	1 (1.7)
▪ Rectovaginal fistula	1 (1.7)
Preoperative prolapse stage, n (%)	
▪ 0	1 (1.7)
▪ 1	4 (6.7)
▪ 2	32 (53.3)
▪ 3	21 (35.0)
▪ 4	2 (3.3)
Previous gynecological procedure (multiple procedures possible), n (%)	
▪ Hysterectomy	19 (31.7)
▪ Prolapse repair	15 (25.0)
▪ Incontinence procedure	9 (15.0)

Procedure performed (multiple procedures possible), n (%)	
▪ Vaginal (± laparoscopically-assisted) hysterectomy	20 (33.3)
▪ Laparoscopic subtotal hysterectomy	1 (1.7)
▪ Abdominal hysterectomy	2 (3.3)
▪ Vaginal anterior/posterior repair (± biologic graft)	36 (60.0)
▪ Vaginal apical suspension (± permanent mesh)	27 (45.0)
▪ Laparoscopic sacrocolpopexy or sacrohysteropexy	4 (6.7)
▪ Abominal sacrocolpopexy or sacrohysteropexy	7 (11.7)
▪ Obliterative procedure	7 (11.7)
▪ Mid-urethral sling	24 (40)
▪ Other procedures*	6 (10.0)

* Other procedures include: one of each overlapping sphincteroplasty, vesicovaginal fistula repair, rectovaginal fistula repair, rectopexy, and two excisions of mesh exposures

Table 2: Correlation Between Pre and Postoperative PFDI-20/PFIQ-7 and BDI-II/BAI*				
	BDI-II		**BAI**	
	Preoperative	Postoperative	Preoperative	Postoperative
PFDI-20				
- Preoperative	0.16 p=0.28 n= 45	0.19 p=0.23 n= 44	0.25 p= 0.11 n=41	0.09 p=0.59 n=42
- Postoperative	0.19 p=0.16 n=54	**0.56** **p< 0.001** **n=55**	0.23 p=0.11 n=50	**0.50** **p<0.001** **n=52**
- Change from pre to postoperative	0.09 p=0.56 n=42		0.24 p=0.16 n=36	
PFIQ-7				
- Preoperative	0.26 p=0.15 n=33	0.25 p=0.16 n=34	0.37 p=0.04 n=30	0.18 p=0.30 n=33
- Postoperative	0.24 p=0.09 n=49	**0.52** **p<0.001** **n=50**	0.22 p=0.14 n=45	**0.36** **p=0.012** **n=47**
- Change from pre to postoperative	0.17 p=0.38 n=29		0.29 p=0.16 n=25	

* Data presented as correlation coefficients rho (degree of correlation), p value, n
Correlations' effect size interpreted as 0.10-0.29: small, 0.30-0.49: medium, ≥0.50: large
PFDI-20: Pelvic Floor Distress Inventory, PFIQ-7: Pelvic Floor Impact Questionnaire, BDI-II: Beck Depression Inventory-II, BAI: Beck Anxiety Inventory

Table 3: Patient Goals (n = 55)		
	Patients who had this goal in their top 3 preoperatively, n (%)	Postoperative goal attainment as a score /10, mean (SD)
Improving urinary symptoms	25 (45.5)	6.6 (3.1) n= 36
Improving bowel symptoms	10 (18.2)	7.4 (3.3) n = 28
Reducing prolapse symptoms	43 (78.2)	9.4 (1.5) n = 48
Reducing discomfort/pain	20 (36.4)	7.3 (2.3) n = 37
Improving intimate relationships	19 (34.5)	N/A*
Improving activities and social life	22 (40.0)	7.3 (2.7) n = 37
Improving body-image or physical appearance	4 (7.3)	7.1 (3.0) n = 29
Improving general health	12 (21.8)	7.7 (2.1) n = 35
Live happily	5 (9.1)	8.4 (1.8) n = 37

Other	5 (9.1)	3.8 (4.8) n = 4
Overall		7.7 (1.7) n = 55

** Not applicable: 6 weeks postoperative data (prior to resuming intercourse)*