Pelvic Floor Distress Inventory Scores Improve After Prolapse Surgery Regardless of Surgical Approach but Not After Observation Alone

Esther Han[1], Laura N. Nguyen[1], Jason Gilleran, Jamie Bartley, Kim A. Killinger, Judith A. Boura, and Larry T. Sirls

OBJECTIVE To evaluate the effect of different surgical procedures on Pelvic Floor Distress Inventory (PFDI) scores in women with pelvic organ prolapse.

MATERIALS AND METHODS Women with prolapse were enrolled from 2008 to 2014. Baseline data and outcomes at 1 year were collected including subscales of the PFDI. Patients who had surgery (SGY) within the first year were compared to those who did not (N-SGY). Subanalyses of SGY included vaginal vs abdominal, with or without concurrent hysterectomy (HYST, N-HYST), placement of mesh (MESH, N-MESH), and concurrent posterior repair/perineorrhaphy (POST, N-POST).

RESULTS A total of 233/239 patients underwent surgery in the first year. For SGY vs N-SGY, SGY had significant improvements in PFDI and all subscale scores at 1 year while N-SGY did not. When comparing vaginal to abdominal approach, MESH to N-MESH and HYST to N-HYST, there were no differences between any scores at baseline or 1 year between the groups. However, all within group symptom scores improved from baseline to 1 year (P <.0001 for all). In comparing POST to N-POST, there were no differences between groups at 1 year in PFDI and Urogenital Distress Inventory and Pelvic Organ Prolapse Distress Inventory subscale scores. Colorectal-Anal Distress Inventory scores were significantly higher at baseline for POST (P <.0001) but not at 1 year (P = 0.37). All within group scores statistically significant improved at 1 year.

CONCLUSION Women who underwent surgical repair for prolapse had significantly improved overall PFDI and subscale scores regardless of surgical approach and concurrent procedures. UROLOGY 124: 62–71, 2019. © 2018 Elsevier Inc.

Pelvic organ prolapse (POP) affects up to 50% of multiparous women. Symptoms can range from vaginal bulge, incomplete bladder emptying, positioning to void, splinting for bowel movements, to pelvic pain.[1,2] A recent study showed that 19% of women will undergo surgery for POP in their lifetime.[3] The decision to undergo surgical correction of POP is primarily based on symptom severity and degree of bother. Over 30 years ago, health-related quality of life was introduced as the most important outcome for prolapse surgery as it assesses a person's total sense of well-being and considers social, physical, emotional, and sexual function.[4] The Pelvic Floor Distress Inventory (PFDI) is a psychometrically robust questionnaire developed in 2001 to assess the health-related quality of life of POP patients.[5] In addition to the overall score, it includes 3 subscales (Pelvic Organ Prolapse Distress Inventory, POPDI; Urogenital Distress Inventory, UDI; and Colorectal-Anal Distress Inventory, CRADI) which provide a comprehensive evaluation of POP, lower urinary tract, and lower gastrointestinal tract symptoms and their effect on prolapse patients.

In this study, we compared PFDI scores in patients who underwent surgical treatment to scores in those who did not have surgery. The objective of this study was to identify whether surgery, compared to observation or conservative treatment options, was associated with change in PFDI or its subscales. Our secondary objective was to further evaluate those who underwent surgery to identify whether specific surgical factors, including abdominal/robotic or vaginal approach, concurrent hysterectomy, concurrent posterior

[1] *Esther Han and Laura Nguyen contributed equally to this work as co-first authors.*

From the Beaumont Health, Royal Oak, MI; the McMaster University, Hamilton, Ontario, Canada; the Oakland University William Beaumont School of Medicine, Royal Oak, MI; the Ascension Macomb-Oakland Hospital, Warren, MI; and the 13534 Wildflower LN, Grand Haven, MI

Address correspondence to: Esther Han, D.O., Beaumont Health, 3535 W. 13 Mile Road Ste 438, Royal Oak, MI 48073. E-mails: esther.han@beaumont.org; esther.han@gmail.com

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repair or perineorrhaphy, or use of mesh augmentation were associated with symptom outcomes.

METHODS

All women presenting with a chief complaint of POP between 2008 and 2014 were invited to enroll in an Institutional Review Board-approved prospective, longitudinal, and observational database by an independent research nurse. The research nurse was, however, not blinded. Patients were eligible for study inclusion if they had prolapse of any grade in at least 1 compartment on physical examination and consent was obtained. Patients were excluded if they did not present to their initial enrollment visit, if they voluntarily withdrew during the study period, or if they died during the study period. Five fellowship-trained urologic surgeons performed surgery with the involvement of residents and fellows. Study subjects provided demographic information. Prolapse grade and operative data were collected from existing medical records. PFDI was mailed and completed upon enrollment, then repeated 1 year after enrollment. If patients underwent surgery within the first year, questionnaires were repeated at 1 year after surgery. Phone calls and repeated mailings were conducted to maximize longitudinal data collection. Clinical significance was defined as meeting the minimum important difference (MID); this is available for the PFDI (MID 45),[6] UDI (MID 11),[7] and CRADI (MID 5).[8] No MID, however, has been defined for the POPDI. Presence of pain was assessed at baseline and at 1-year follow-up, using question 20 of the PFDI, "Do you usually experience *pain* or *discomfort* in the lower abdomen or genital region?". If patients answered "yes," they ranked the degree of bother from 1 "not at all" to 4 "quite a bit." A Global Response Assessment (GRA) was also collected from mailed surveys, using a 7-point Likert scale. Response options were as follows: markedly worse, moderately worse, slightly worse, no change, slightly improved, moderately improved, and markedly improved.

For analysis, patients were grouped by whether or not they had surgery within the first year after enrollment. Patients underwent surgery based on their preferences and surgeon recommendation. Patients who did not undergo surgery may have had pessary or pelvic floor physical therapy. Subanalyses of patients who underwent surgery were then performed by surgical approach (vaginal or abdominal), with or without concurrent hysterectomy, with or without mesh placement, and with or without concurrent posterior repair.

Abdominal prolapse repair was performed by open or robotic abdominal sacrocolpopexy (ASC) using Amid type 1 mesh, most commonly with Restorelle Y-mesh (Coloplast). Vaginal-approach prolapse repair was performed either with or without mesh augmentation. If mesh was placed, AMS Elevate system or Ethicon Gynecare Prolift systems were used; both are Amid type 1 mesh and have previously been shown to have similar perioperative experiences.[9] If performed, concomitant posterior repair was carried out via a midline plication, or rarely with mesh using AMS Elevate system or Ethicon Gynecare Prolift systems. In both anterior and posterior compartments, use of mesh was based on surgeon preference. Surgeons provided extensive preoperative counseling to patients as to the risks and benefits of a mesh-augmented repair. Perineal repair with muscle plication was performed based on surgeon decision in patients with a widened genital hiatus.

Statistical Analysis

Data were analyzed by descriptive statistics, using 2-sample *t* tests and Wilcoxon rank sum tests to compare continuous data and chi-squared and Fisher's exact tests to compare categorical data, using SAS/STAT software (v9.3) of the SAS system. A P value <.05 was considered statistically significant.

RESULTS

During the study period, 293 patients were enrolled. Of these, 233 (80%) underwent surgery in the first year. The patients who had surgery were younger than the patients who did not have surgery (63 vs 67 years; P = .009) but no difference was seen in race (P = .22) or marital status (P = .38). There were no statistically significant differences in grade of prolapse in each compartment between groups (Supplemental Table 1). The patients who did not undergo surgery included those managed with pelvic floor physical therapy (n = 3), pessary (n = 16), or observation (n = 41). Three patients who underwent surgery also had pelvic floor physical therapy (n = 1) or pessary (n = 2).

Surgery vs. No Surgery

Patients who underwent surgery were significantly more symptomatic at baseline than those who did not undergo surgery. Overall PFDI scores, as well as POPDI and UDI subscale scores, at baseline were significantly higher. Baseline differences in PFDI and UDI scores met the MID of 45 and 11 points, respectively; no MID is available for the POPDI. Baseline CRADI scores were not significantly different between groups. At 1 year, questionnaire data were available for 175/233 (75%) of patients who had surgery and 45/60 (75%) of patients who did not have surgery. Patients who had surgery had significant improvements in PFDI scores, as well as all subscale scores. Improvements in PFDI, UDI, and CRADI met the MID. Patients who did not have surgery did not have significant changes in PFDI score or any subscale scores. Improvements in PFDI, POPDI, and UDI scores at 1 year were significantly greater in patients who had surgery compared to those that did not, but CRADI scores were not different. Patients who had surgery were more likely to have pain at baseline than patients who did not have surgery (P = .018), but less likely to have pain at 1 year than those who did not have surgery (P = .038). There was no difference in bother from pain at baseline or 1 year between groups. Patients undergoing surgery had significant reduction in the prevalence of pain from baseline to 1 year (P <.0001), while there was no change in prevalence of pain in patients who did not have surgery (P = .062). Finally, patients who had surgery had greater improvement in overall prolapse symptoms at 1 year than those who did not (P <.0001; Table 1).

Abdominal vs. Vaginal Surgery

Seventy-five patients underwent abdominal surgery and 142 vaginal surgery. Sixteen patients were excluded from this subanalysis due to concurrent abdominal and vaginal surgery or unknown surgical approach. Patients undergoing vaginal surgery were older (median 64 vs 60 years; P = .006), but there were no differences in race (P = .28) or marital status (P = .08; data not shown). All patients undergoing abdominal surgery had mesh placed (75/75, 100%), while 96/142 (68%) of patients undergoing vaginal surgery had mesh placed. Rate of hysterectomy did not differ with surgical approach (abdominal 25/75, 33% vs vaginal 39/142, 28%; P = .37).

There were no differences between PFDI scores or any subscale scores at baseline or 1 year between the groups. However, all within-group symptom scores improved from baseline to 1 year (P <.0001 for all), and the PFDI and UDI improvements in both groups met the MID. The CRADI score improvement was

Table 1. Pelvic floor distress inventory and subscale questionnaire scores, pain, and overall prolapse symptom change in patients who did and did not undergo surgery

Outcome Measure	Surgery *n* = 233	No Surgery *n* = 60	*P* Value
PFDI questionnaire			
PFDI			
Baseline	*n* = 231	*n* = 60	
Median (IQR)	113 (71, 155)	61 (44, 120)	**<.0001***
Range	0-258	8.3-232	
1-year	*n* = 176	*n* = 46	
Median (IQR)	31 (8.3, 54.2)	54 (25, 87.5)	**.0006***
Range	0-215	0-204	
Change	*n* = 175	*n* = 46	
Median (IQR)	−71 (−106, −30)	−5.2 (−31.3, 12.5)	**<.0001***
Range	−254 to 61.5	−93.8 to 83.3	
Within group *P* value	**<.0001***	.30	
POPDI			
Baseline	*n* = 233	*n* = 60	
Median (IQR)	42 (25.0, 58.3)	25 (12.5, 45.8)	**<.0001***
Range	0-95.8	0-95.0	
1-year	*n* = 178	*n* = 46	
Median (IQR)	0 (0, 12.5)	17 (8.3, 37.5)	**<.0001***
Range	0-66.7	0-87.5	
Change	*n* = 178	*n* = 46	
Median (IQR)	−33.3(−50, −16.7)	0 (−4.2, 4.2)	**<.0001***
Range	−95.8 to 20.8	−58.3 to 33.3	
Within group *P* value	**<.0001***	.18	
UDI			
Baseline	*n* = 231	*n* = 60	
Median (IQR)	42 (25.0, 66.7)	29 (16.7, 50.0)	**.001***
Range	0-100	0-95.8	
1-year	*n* = 177	*n* = 46	
Median (IQR)	8.3 (0, 25.0)	25 (8.3, 37.5)	**.001***
Range	0-95.8	0-79.2	
Change	*n* = 176	*n* = 46	
Median (IQR)	−20.8 (−46, −8.3)	−1.7 (−16.7, 4.2)	**<.0001***
Range	−100 to 33.3	−37.5 to 33.3	
Within group *P* value	**<.0001***	.26	
CRADI			
Baseline	*n* = 233	*n* = 60	
Median (IQR)	21.9 (6.3, 40.6)	15.6 (6.3, 31.3)	.13
Range	0-93.8	0-81.3	
1-year	*n* = 177	*n* = 46	
Median (IQR)	9.4 (0, 21.9)	6.3 (3.1, 25.0)	.63
Range	0-84.4	0-62.5	
Change	*n* = 176	*n* = 46	
Median (IQR)	−6.3 (−19.6, 0)	0 (−6.3, 6.3)	**.001***
Range	−87.5 to 37.5	−31.3 to 37.5	
Within group *P* value	**<.0001***	.62	
Pain			
Baseline			
Pain present	105/232 (45.3%)	17/60 (28.3%)	**.018***
Pain is bothersome			.29
Not at all	0/105 (0%)	0/17 (0%)	
Somewhat	37/105 (35.2%)	6/17 (46.2%)	
Moderately	37/105 (35.2%)	5/17 (38.5%)	
Quite a bit	31/105 (29.5%)	2/17 (15.4%)	
1-year			
Pain present	21/177 (11.9%)	11/46 (29.0%)	**.038***
Pain is bothersome			.57
Not at all	2/21 (9.5%)	0/11 (0%)	
Somewhat	11/21 (52.4%)	8/11 (72.7%)	
Moderately	5/21 (23.8%)	1/11 (9.1%)	
Quite a bit	3/21 (14.3%)	2/11 (18.2%)	
Within group *P* value	**<.0001***	.662	

Continued

Table 1. Continued

Outcome Measure	Surgery $n = 233$	No Surgery $n = 60$	*P* Value
Overall change in prolapse symptoms			
Markedly worse	4/175 (2.3%)	1/45 (2.7%)	**<.0001***
Moderately worse	4/175 (2.3%)	1/45 (2.7%)	
Mildly worse	11/175 (6.3%)	14/45 (32.4%)	
Same	14/175 (8.0%)	19/45 (46.0%)	
Slightly improved	10/175 (5.7%)	3/45 (8.1%)	
Moderately improved	26/175 (14.9%)	3/45 (8.1%)	
Markedly improved	106/175 (60.6%)	4/45 (8.9%)	

CRADI, Colorectal-Anal Distress Inventory; IQR, interquartile range; PFDI, Pelvic Floor Distress Inventory; POPDI, Pelvic Organ Prolapse Distress Inventory; UDI, Urogenital Distress Inventory.
Bold values indicate values that are statistically significant. (P < 0.05).
* Statistically significant.

significant in the vaginal but not the abdominal group. There were no differences in prevalence of pain at baseline or 1 year (baseline $P = .93$, 1 year $P = .68$) or bother from pain (baseline $P = 1.00$, 1 year $P = .99$) between patients undergoing abdominal and vaginal surgery. Pain decreased in both abdominal and vaginal surgery patients ($P < .0001$ for both). The majority of patients in both groups were moderately or markedly improved on GRA (vaginal 74/104, 71% vs abdominal 50/60, 83%), and there was no difference in change of overall prolapse symptoms between groups ($P = .17$; Table 2).

Mesh vs. No Mesh

Mesh was placed in 177 (76%) patients undergoing surgery. There were no differences in age ($P = .71$), race ($P = .35$), or marital status ($P = .42$) between patients by mesh placement status (data not shown). Of those having mesh placed, 75 (42%) had abdominal surgery, 96 (54%) had vaginal surgery, and 6 (3%) had combined abdominal-vaginal surgery. Concurrent hysterectomy was performed in 55/177 (31%) and 13/56 (23%) of patients who did and did not have mesh placed, respectively.

PFDI scores and all subscale scores were similar between groups both at baseline and at 1 year. There were statistically significant improvements in all scores within both groups. These improvements were clinically significant for all scores for which the MID is available. There was no baseline difference in patient reported pain between groups ($P = .30$). The prevalence of pain improved in both groups ($P < .0001$, $P = .0008$), with no difference in rates of pain between groups at 1 year ($P = .55$). Bother from pain was similar between groups at both time points (baseline $P = .29$, 1 year $P = 1.00$). Overall GRA score improvement was greater in patients who had mesh placed ($P = .045$), though the majority of patients in both groups reported moderate or marked improvement (mesh 105/133, 79% vs no mesh 27/42, 64%; Table 3).

Hysterectomy vs. No Hysterectomy

Sixty-eight patients (29%) who had surgery had a concurrent hysterectomy. Patients who had hysterectomy were younger (median 61 vs 64 years, $P = .013$) but no differences were seen in race ($P = .49$) or marital status ($P = .15$; data not shown). There was also no difference between groups in surgical approach (hysterectomy: abdominal 25/66, 38%; vaginal 39/56, 59%; combined abdominal and vaginal 2/66, 3% vs no hysterectomy: abdominal 50/158, 32%; vaginal 103/158, 65%; combined abdominal and vaginal 5/158, 3%; $P = .64$) or placement of mesh (hysterectomy 55/68, 81% vs no hysterectomy 122/165, 74%; $P = .26$).

Patients who did and did not have concomitant hysterectomy had no differences in baseline or 1 year PFDI scores or any subscale score. Within-group scores showed statistically significant improvement overall and in all subscores; these improvements all met the MID, when available, except for CRADI improvement in the hysterectomy group, with median improvement of 4.7 points (MID 5). The prevalence of pain was not different between groups at baseline ($P = .35$) or at 1 year ($P = .67$) and improved in both groups ($P < .0001$ for both). Bother from pain was also not different at either time point (baseline $P = .40$, 1 year $P = .31$). Overall prolapse symptom change was not different between groups ($P = .66$; Supplemental Table 2).

Posterior Repair vs. No Posterior Repair

Of patients who had vaginal surgery, 40% (57/142) underwent posterior repair or perineorrhaphy. There were no differences in age between groups ($P = .96$).

Baseline PFDI score, UDI, and POPDI subscale scores were not different between groups. Baseline CRADI scores, however, were higher in patients who underwent posterior repair and/or perineorrhaphy (posterior repair and/or perineorrhaphy: 37.5 vs no posterior repair/perineorrhaphy: 14; $P < .0001$). There were no differences between groups at 1 year in PFDI scores, or UDI and POPDI subscale scores. These scores all also improved from baseline to 1 year in both groups, with all improvements meeting the MID if available. CRADI scores at 1 year were not different between groups ($P = .37$), with statistically significant improvement in both groups (posterior repair and/or perineorrhaphy: $P < .0001$ vs no posterior repair/perineorrhaphy: $P = .019$). However, median score improvement in patients who did not undergo posterior repair or perineorrhaphy was 3.1, not meeting the MID. The prevalence of pain was not different between groups at baseline ($P = .87$) or at 1 year ($P = .26$; Table 4). Prevalence of pain decreased whether or not patient underwent posterior repair ($P = .0001$ and $P = .0004$, respectively). Bother from pain was also not different between groups at either time point (baseline $P = .50$, 1 year $P = .62$). Overall change in symptoms of prolapse by GRA from baseline to 1 year was also not different between groups ($P = .47$; Table 4).

DISCUSSION

We examined patient-reported symptoms in a prospective cohort of POP patients and compared the PFDI scores of those who had surgery to those who did not. We found that women who had surgery were in general more symptomatic at baseline and had improvement in prolapse, urinary, and bowel symptoms at 1 year, improvement in pelvic pain, and

Table 2. Pelvic Floor Distress Inventory and subscale questionnaire scores, pain, and overall prolapse symptom change in patients undergoing surgery from abdominal and vaginal approaches

Outcome Measure	Abdominal Surgery *n* = 75	Vaginal Surgery *n* = 142	*P* Value
PFDI questionnaire			
PFDI			
Baseline	*n* = 75	*n* = 140	
Median (IQR)	110 (69, 147)	117 (71,159)	.41
Range	4.2-258	0-249	
1-year	*n* = 62	*n* = 103	
Median (IQR)	28 (8.3, 52)	31 (6.3, 58)	.66
Range	0-100	0-215	
Change	*n* = 62	*n* = 102	
Median (IQR)	−79 (−104, −33)	−68 (−107, −24)	.55
Range	−254 to 13.5	−240 to 61	
Within group *P* value	**<.0001***	**<.0001***	
POPDI			
Baseline	*n* = 75	*n* = 142	
Median (IQR)	42 (25, 58)	46 (33, 58)	.23
Range	0-96	4.2-92	
1-year	*n* = 62	*n* = 105	
Median (IQR)	0 (0, 17)	0 (0, 12.5)	.72
Range	0-50	0-67	
Change	*n* = 62	*n* = 105	
Median (IQR)	−37.5 (−50, −21)	−33 (−50, −12.5)	.21
Range	−92 to 8.3	−96 to 21	
Within group *P* value	**<.0001***	**<.0001***	
UDI			
Baseline	*n* = 75	*n* = 140	
Median (IQR)	37.5 (21, 62.5)	46 (25, 71)	.12
Range	0-96	0-100	
1-year	*n* = 62	*n* = 104	
Median (IQR)	8.3 (0, 21)	8.3 (0, 27)	.57
Range	0-75	0-96	
Change	*n* = 62	*n* = 103	
Median (IQR)	−21 (−46, −8.3)	−25 (−46, −4.2)	.86
Range	−92 to 21	−100 to 17	
Within group *P* value	**<.0001***	**<.0001***	
CRADI			
Baseline	*n* = 75	*n* = 142	
Median (IQR)	20 (6.3, 37.5)	22 (6.3, 47)	.22
Range	0-94	0-78	
1-year	*n* = 62	*n* = 104	
Median (IQR)	9.4 (0, 19)	6.3 (0, 28)	.76
Range	0-47	0-84	
Change	*n* = 62	*n* = 104	
Median (IQR)	−3.1 (−19, 0)	−6.3 (−22, 0)	.63
Range	−87.5 to 22	−59 to 37.5	
Within group *P* value	**<.0001***	**<.0001***	
Pain			
Baseline			
Pain present	34/75 (45.3%)	63/141 (44.1%)	.93
Pain is bothersome			1.00
Not at all	0/34 (0%)	0/63 (0%)	
Somewhat	12/34 (35.3%)	21/63 (33.3%)	
Moderately	12/34 (35.3%)	22/63 (34.9%)	
Quite a bit	10/34 (29.4%)	20/63 (31.7%)	
>1-year			
Pain present	7/62 (11.3%)	14/104 (13.5%)	.68
Pain is bothersome			.99
Not at all	1/7 (14.3%)	1/14 (7.1%)	
Somewhat	2/7 (28.6%)	9/14 (64.3%)	
Moderately	3/7 (42.9%)	2/14 (14.3%)	
Quite a bit	1/7 (14.3%)	2/14 (14.3%)	
Within group *P* value	**<.0001***	**<.0001***	

Continued

Table 2. Continued

Outcome Measure	Abdominal Surgery $n = 75$	Vaginal Surgery $n = 142$	*P* Value
Overall change in prolapse symptoms			
Markedly worse	0 (0%)	4/104 (3.9%)	.17
Moderately worse	3/60 (5.0%)	1/104 (1.0%)	
Mildly worse	1/60 (1.7%)	8/104 (7.7%)	
Same	3/60 (5.0%)	10/104 (9.6%)	
Slightly improved	3/60 (5.0%)	7/104 (6.7%)	
Moderately improved	11/60 (18.3%)	14/104 (13.5%)	
Markedly improved	39/60 (65.0%)	60/104 (57.7%)	

Bold values indicate values that are statistically significant. (P < 0.05).
* Statistically significant.

improvement in overall prolapse symptoms. Importantly, women reported significant improvement in the total PFDI and all subscales regardless of surgical approach and/or concurrent procedures. These improvements were not seen in women who did not have surgery.

To our knowledge, this is the first study to examine how different surgical approaches affect PFDI and its subscales in women with prolapse. Barber evaluated 106 women (42 pessary and 64 surgery) using both the PFDI and the Pelvic Floor Impact Questionnaire at baseline and 3 months. PFDI and Pelvic Floor Impact Questionnaire were responsive to change after both surgical and nonsurgical treatments for POP.[5] Patients treated with surgery were found to have significant improvement in each of the PFDI subscales compared to those treated with pessary.

We observed that significant improvement in CRADI scores was reported regardless of approach at 1 year compared to baseline. The high probability of multicompartment defects requiring concurrent repair may explain this.[10,11] At our institution, the apex is addressed

Table 3. Pelvic Floor Distress Inventory and subscale questionnaire scores, pain, and overall prolapse symptom change in patients undergoing surgery with and without mesh placement

Outcome Measure	With Mesh $n = 56$	Without Mesh $n = 177$	*P* Value
PFDI questionnaire			
PFDI			
Baseline	$n = 175$	$n = 56$	
Median (IQR)	116 (68, 156)	108 (76, 146)	.83
Range	0-258	0-242	
1-year	$n = 133$	$n = 43$	
Median (IQR)	29 (8.3, 52)	33 (8.3, 67)	.36
Range	0-215	0-193	
Change	$n = 132$	$n = 43$	
Median (IQR)	−78 (−109, −33)	−56 (−96, −17)	.071
Range	−254 to 41	−179 to 61	
Within group *P* value	**<.0001***	**<.0001***	
POPDI			
Baseline	$n = 177$	$n = 56$	
Median (IQR)	46 (29, 67)	33 (25, 50)	.004
Range	0-96	0-87.5	
1-year	$n = 135$	$n = 43$	
Median (IQR)	0 (0, 12.5)	8.3 (0, 17)	.40
Range	0-67	0-54	
Change	$n = 135$	$n = 43$	
Median (IQR)	−37.5 (−54, −21)	−25 (−46, −8.3)	.006
Range	−96 to 21	−83 to 17	
Within group *P* value	**<.0001***	**<.0001***	
UDI			
Baseline	$n = 175$	$n = 56$	
Median (IQR)	42 (25, 67)	50 (27, 67)	.48
Range	0-100	0-100	
1-year	$n = 134$	$n = 43$	
Median (IQR)	8.3 (0, 25)	15 (0, 29)	.55
Range	0-85	0-96	
Change	$n = 133$	$n = 43$	
Median (IQR)	−25 (−46, −8.3)	−17 (−46, 0)	.20

Continued

Table 3. Continued

Outcome Measure	With Mesh	Without Mesh	*P* Value
	n = 56	*n* = 177	
Range	−100 to 33	−96 to 17	
Within group *P* value	**<.0001***	**<.0001***	
CRADI			
Baseline	*n* = 177	*n* = 56	
Median (IQR)	22 (6.3, 41)	27 (12.5, 55)	.10
Range	0-94	0-78	
1-year	*n* = 134	*n* = 43	
Median (IQR)	9.4 (0, 19)	12.5 (0, 28)	.29
Range	0-68	0-84	
Change	*n* = 134	*n* = 43	
Median (IQR)	−5.4 (−25, 0)	−7.1 (−16, 0)	.89
Range	−87.5 to 37.5	−56 to 28	
Within group *P* value	**<.0001***	**.003***	
Pain			
Baseline			
Pain present	83/176 (47.2%)	22/56 (39.3%)	.030
Pain is bothersome			.29
Not at all	0/83 (0%)	0/22 (0%)	
Somewhat	26/83 (31.3%)	11/22 (50.0%)	
Moderately	32/83 (38.6%)	5/22 (22.7%)	
Quite a bit	25/83 (30.1%)	6/22 (27.3%)	
1-year			
Pain present	21/177 (11.9%)	11/46 (29.0%)	.55
Pain is bothersome			1.00
Not at all	2 (1.5%)	0	
Somewhat	8 (6.0%)	3 (7.0%)	
Moderately	4 (3.0%)	1 (2.3%)	
Quite a bit	3 (2.2%)	0	
Within group *P* value	**<.0001***	**.0008**	
Overall change in prolapse symptoms			
Markedly worse	2/133 (1.5%)	2/42 (4.8%)	**.045***
Moderately worse	3/133 (2.3%)	1/42 (2.4%)	
Mildly worse	4/133 (3.0%)	7 /42 (16.7%)	
Same	10/133 (7.5%)	4/42 (9.5%)	
Slightly improved	9/133 (6.8%)	1/42 (2.4%)	
Moderately improved	21/133 (15.8%)	5/42 (11.9%)	
Markedly improved	84/133 (63.2%)	22/42 (52.4%)	

Bold values indicate values that are statistically significant. (P < 0.05).
* Statistically significant.

approximately 80% of the time with vaginal prolapse surgeries. If apical support is restored (ie, with sacrocolpopexy or uterosacral/sacrospinous ligament fixation), this anatomic correction can indirectly improve posterior prolapse and may explain why we observed significant improvement in CRADI scores for women who did not have posterior repair (although the improvement did not meet the MID). Guiahi et al reported that ASC restored posterior vaginal anatomy without a concomitant posterior repair, reporting 61% of women had greater than or equal to stage 2 posterior prolapse prior to ASC (without posterior repair) while only 8% had greater than or equal to stage 2 posterior prolapse 1 year after ASC.[12] Similarly, a study with longer follow-up (5 years) showed that symptoms of obstructed defecation improved after ASC regardless of concomitant posterior repair and that 96% (23/24) of women without concomitant posterior repair (ASC only) had sustained resolution of posterior prolapse at 5 years.[13]

POPDI was improved after all types of surgical correction. That any surgical approach results in improvement should be reassuring to the patient and clinician. However, change in UDI may be affected by multiple factors. Correction of prolapse may lead to improvement in urinary symptoms, but could also result in de novo stress urinary incontinence, or urinary urgency and frequency.[14] A 2016 Cochrane review on surgery for apical vaginal prolapse found sacrocolpopexy was associated with a lower risk of awareness of prolapse, recurrent prolapse on examination, repeat surgery for prolapse, postoperative stress urinary incontinence and dyspareunia than vaginal surgery.[15] Likewise, in our study, UDI improved significantly for all subanalyses. This information can aid surgical counseling in reassuring patients that they will likely see significant improvement in their lower urinary tract symptoms, again regardless of surgical approach.

Another important issue we explored was the presence of pain. The PFDI question regarding pain is particularly important because prolapse surgery can improve pelvic pain. After performing a retrospective cohort study on a prospectively collected, multicenter, multinational dataset,[16,17] Liedl et al found the percentage of patients reporting pain (defined by 5 questions from the PFDI including

Table 4. Pelvic Floor Distress Inventory and subscale questionnaire scores, pain, and overall prolapse symptom change in patients undergoing surgery with and without concurrent posterior repair and/or perineorrhaphy

Outcome Measure	Posterior Repair and/or Perineorrhaphy *n* = 57	No Posterior Repair or Perinerrhaphy *n* = 85	*P* Value
PFDI questionnaire			
PFDI			
Baseline	*n* = 56	*n* = 84	
Median (IQR)	123 (84, 178)	116 (68, 155)	.23
Range	15-249	0-239	
1-year	*n* = 43	*n* = 60	
Median (IQR)	31 (6.3, 62.5)	29 (7.3, 54)	.40
Range	0-174	0-215	
Change	*n* = 43	*n* = 59	
Median (IQR)	−66 (−111, −34)	−69 (−103, −21)	.56
Range	−240 to 23	−239 to 61	
Within group *P* value	**<.0001***	**<.0001***	
POPDI			
Baseline	*n* = 57	*n* = =85	
Median (IQR)	46 (25, 58)	42 (25, 58)	.61
Range	0-96	0-96	
1-year	*n* = 45	*n* = 60	
Median (IQR)	0 (0, 12.5)	0 (0, 12.5)	.97
Range	0-62.5	0-67	
Change	*n* = 45	*n* = 60	
Median (IQR)	−37.5 (−54, −17)	−30 (−50, −12.5)	.55
Range	−96 to 21	−87.5 to 17	
Within group *P* value	**<.0001***	**<.0001***	
UDI			
Baseline	*n* = 56	*n* = 84	
Median (IQR)	42 (25, 67)	46 (27, 73)	.55
Range	0-100	0-100	
1-year	*n* = 44	*n* = 60	
Median (IQR)	0 (0, 37.5)	8.3 (0, 25)	.99
Range	0-96	0-85	
Change	*n* = 44	*n* = 59	
Median (IQR)	−21 (−45, 0)	−29 (−50, −4.2)	.34
Range	−100 to 17	−100 to 17	
Within group *P* value	**<.0001***	**<.0001***	
CRADI			
Baseline	*n* = 57	*n* = 85	
Median (IQR)	37.5 (16, 56)	14 (0, 31)	**<.0001***
Range	0-78	0-72	
1-year	*n* = 44	*n* = 60	
Median (IQR)	9.4 (0, 31)	6.3 (0, 20)	.37
Range	0-78	0-84	
Change	*n* = 44	*n* = 60	
Median (IQR)	−12.5 (−33, −4.7)	−3.1 (−19, 1.6)	.012
Range	−59 to 19	−59 to 37.5	
Within group *P* value	**<.0001***	**.019***	
Pain			
Baseline			
Pain present	25/57 (43.9%)	38/84 (45.2%)	.87
Pain is bothersome			.50
Not at all	0/25 (0%)	0/38 (0%)	
Somewhat	8/25 (32.0%)	13/38 (34.2%)	
Moderately	7/25 (28.0%)	15/38 (39.5%)	
Quite a bit	10/25 (40.0%)	10/38 (26.3%)	
1-year			
Pain present	4/43 (9.3%)	11/65 (16.9%)	.26
Pain is bothersome			.62
Not at all	0/4 (0%)	0/10 (0%)	
Somewhat	1/4 (25.0%)	7/10 (70.0%)	
Moderately	2/4 (50.0%)	2/10 (20.0%)	
Quite a bit	1/4 (25.0%)	1/10 (10.0%)	
Within group *P* value	**.0001***	**.0004***	

Continued

Table 4. Continued

Outcome Measure	Posterior Repair and/or Perineorrhaphy $n = 57$	No Posterior Repair or Perinerrhaphy $n = 85$	*P* Value
Overall change in prolapse symptoms			
Markedly worse	1/47 (2.1%)	3/66 (4.5%)	.47
Moderately worse	1/47 (2.1%)	2/66 (3.0%)	
Mildly worse	5/47 (10.6%)	3/66 (4.5%)	
Same	5/47 (10.6%)	9/66 (13.6%)	
Slightly improved	1/47 (2.1%)	6/66 (9.1%)	
Moderately improved	6/47 (12.8%)	10/66 (15.2%)	
Markedly improved	28/47 (59.6%)	33/66 (50.0%)	

Bold values indicate values that are statistically significant. ($P < 0.05$).
* Statistically significant.

the one used in our study) decreased significantly at 6 months follow-up; this was maintained at 2 years.[18] They hypothesized that hypermobility of the apex can irritate the pelvic plexus causing chronic pelvic pain. Of note, this study included only mesh-augmented anterior and/or posterior prolapse repairs. In our study, we observed that baseline prevalence of pain was higher in patients who subsequently underwent surgery than in those who did not. At 1 year, however, significantly fewer surgical patients reported pain than nonsurgical patients. All subgroup analyses showed that regardless of surgical approach, concurrent procedures or use of mesh, significantly fewer patients reported they had pain at 1 year.

The strengths of this study include the prospective data collection by a research nurse using validated questionnaires. This was also a varied and generalizable population of patients cared for by multiple providers at a teaching institution. Limitations to our study include potential selection bias, as patients were not randomized. Because no significant differences were identified between groups on univariate analysis, multivariate analysis to adjust for unidentified confounders was not performed. Also, the majority of patients in our study had surgery, and patients who did not undergo surgery were largely observed and few were treated with physical therapy or pessary, which may have skewed our results. Differences in some characteristics between patients who did and did not undergo surgery were seen, with more significant baseline symptoms seen in patients who chose to undergo surgery. Also, as participation was voluntary, not all women who presented with prolapse underwent POP repair at our institution enrolled in the database. A postoperative Pelvic Organ Prolapse Quantification score (POPQ) was not universally recorded, but this study was focused on quality of life outcomes rather than anatomic changes due to the fact that it has been published that physical examination findings of prolapse do not necessarily correlate with patient bother. Lastly, some patients who enrolled in the database were lost to follow-up and did not return their surveys.

CONCLUSION

Women who had surgical repair of prolapse—regardless of approach, mesh use, or concurrent procedures—had significant improvement in PFDI and subscale scores. These patients also had significantly improved patient-reported lower abdominal and genital pain at 1 year.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.urology.2018.10.040.

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