Retrospective Study

Non-Invasive Pelvic Floor Rehabilitation in Cancer Population: An Incomplete Cohort

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Background: Pelvic floor dysfunction and its associated symptoms are a common clinical challenge in the cancer population. Despite the noninvasive nature of pelvic floor rehabilitation (PFR) for this condition and the promising clinical results observed with its use, PFR appears to be an underused therapy.

Objectives: The purpose of this study was to quantify the association between physical therapy of the pelvic floor and its effect on pain relief and the associated symptoms in cancer patients with pelvic floor dysfunction.

Study Design: Retrospective cohort study.

Methods: With the use of an electronic database in our pain medicine department, we retrospectively quantified the pain relief and symptom improvement in patients diagnosed as having chronic pelvic floor dysfunction who had undergone PFR.

Results: Of the 68 patients available for analysis, 49 met the inclusion criteria. Baseline characteristics of included patients were generally similar. The duration of pelvic pain before PFR was 53.7 months (mean) (SD, 182.5 months; median, 12 months). Of the 49 study patients, 23 (47%) had bladder dysfunction, 24 (49%) had dyspareunia, 2 (4%) had erectile dysfunction, and one (2%) had rectal dysfunction. Most symptoms associated with pelvic floor dysfunction resolved after PFR.

Limitations: Single-center, small data, retrospective study.

Conclusions: PFR is an effective tool for treating the pain associated with pelvic floor dysfunction and its related symptoms. This conservative approach can contribute to lowering the use of opiate analgesics.

Key words: Pelvic floor dysfunction, pelvic pain, pelvic floor rehabilitation, cancer pain

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The pelvic floor consists of a complex arrangement of muscles and ligamentous attachments that create a diaphragm from the pubis to the sacrum/coccyx and ischial tuberosities. The pelvic floor provides structural support of the pelvic organs, including the bladder, urethra, prostate, vagina, uterus, anus, and rectum, along with indirect support of the intra-abdominal contents. Functionally, the pelvic floor contributes to the control and intentional evacuation of urine and feces, sexual arousal functions, and orgasm (1). The integrity of the muscular structures, the blood supply (predominantly derived from parietal branches of the internal iliac artery), and the nerve supply (primarily from sacral nerves S3-S4 and the pudendal nerve) are necessary to maintain the functionality of the pelvic floor (2).

Clinical manifestations of pelvic floor dysfunction include chronic pain and a variety of symptoms such as hypertonicity, hypotonicity, or inappropriate coordination of the pelvic muscles. The symptoms can be urologic, gynecologic, sexual, or colorectal, and are often interrelated. Whereas symptomatic urologic dysfunctions may include incontinence, dysuria, frequency, urgency, and nocturia (3,4), colorectal symptoms might consist of constipation, the sensation of incomplete emptying, the sense of urgency to defecate, dyschezia, and incontinence (5). Sexual manifestations associated with pelvic floor dysfunction include dyspareunia, vulvovaginal discomfort, erectile dysfunction, and premature ejaculation in men (6,7).

In the cancer population, the presence of visceral, urologic, colorectal, and gynecological pathology in association with chemical, radiologic, and surgical treatments may cause neuromuscular, neurologic, and vascular injuries to pelvic floor structures (8,9), contributing to increased prevalence of pelvic floor dysfunction and their negative effects on the quality of life in patients who have received treatment for pelvic cancer (10).

Conservative pelvic floor interventions have been shown to be beneficial for improving the quality of life in survivors of pelvic cancer (11). Although the symptoms of pelvic floor dysfunction affect the quality of life of cancer patients and cancer survivors, pain seems to be the most disruptive feature. Hence, polypharmacy and high doses of opiates are commonly used (12). We have seen many patients with uncontrolled chronic pelvic pain secondary to pelvic floor dysfunction in our cancer population. Therefore, the purpose of our study was to examine the potential association between pelvic floor rehabilitation and the relief of pain and associated symptoms in our cancer population.

Methods

Study Setting and Population

Our study was performed at an academic comprehensive cancer care center where longitudinal data are regularly collected from patients during cancer treatment. The study population was selected from an electronic database of patients whose progress was monitored in our pain medicine department. Our Institutional Review Board approved the study (IRB protocol #2021-0508). The patients' chief complaint on presentation was pelvic pain, and the evaluation included a complete medical history and physical examination. The physical exam did not include a digital vaginal or rectal evaluation.

Selection of Cases

We identified participants by searching the billing codes in our pain medicine clinic database for chronic pelvic pain and pelvic floor dysfunction between January 1, 2018, and January 1, 2022. We used search terms under ICD-9 and ICD-10 codes (ICD-10-CM M99. 05 and R10. 2). All patients were treated by various oncology subspecialists.

Eligibility criteria included a cancer diagnosis, clinical evidence of chronic pelvic floor dysfunction based on a clinical evaluation by our pain specialists, patients referred to the physical therapy department for PFR, and compliance with at least 3 sessions of PFR per physical therapists' recommendation. A total of 68 patients were identified, 49 of whom met the inclusion criteria and were included in our study (Fig. 1).

Variables Studied

The following data were collected through medical record review: patient demographics, including gender, age, cancer diagnosis, cancer treatment (i.e., chemotherapy, radiation, surgery), and cancer status (i.e., active or in remission). To quantify the effect on pain relief associated with physical therapy of the pelvic floor in patients with chronic pelvic floor dysfunction, we compared the documented self-rated pain level based on the numeric rating scale (NRS) of one (no pain) to 10 (worst pain), on referral day and at follow-up after pelvic floor rehabilitation. We also quantified the morphine equivalent daily doses (MEDD) before and after the intervention.

To quantify the effect of physical therapy of the pelvic floor on symptoms associated with chronic pelvic floor dysfunction (e.g., dyspareunia, incontinence), we compared the presence or absence of documented changes.

Statistical Analysis

The Chi-square test or Fisher exact test was used to evaluate the association between categorical variables. The Wilcoxon signed rank test was used to assess whether the change in pain score before and after treatment was significantly different from zero. The Wilcoxon rank sum test was used to evaluate the difference in a continuous variable between patient groups. A *P*-value less than 0.05 indicated statistical significance. A box plot was generated as a visual aid to

show the difference in the distribution of a continuous variable between patient groups. Statistical software packages SAS version 9.4 (SAS Institute, Inc., Cary, NC) and Splus version 8.2 (TIBCO Software Inc., Palo Alto, CA) were used for all the analyses.

Results

Demographics

Demographic information for the 49 patients included in the analysis is summarized in Table 1. The mean age was 51 years, with a range of 23 to 79 years. Among study patients, 86% were women, and 14% were men. The most common cancer diagnoses were colorectal (20 patients, 41%) and gynecological (11 patients, 22%). The remaining patients had various metastatic or secondary tumors of the pelvic area. A total of 71% of the patients had undergone surgery, 69% had received chemotherapy, 63% had had radiation therapy, and only 8% had undergone hormonal therapy.

Main Results

Among those patients available for analysis, the baseline demographics and clinical backgrounds were generally similar. The duration of pelvic pain before PFR was 53.7 months (mean) (SD, 182.5 months; median, 12 months). NRS pain scores were statistically higher before PFR (4.16 [mean] [SD, 3.14; median, 4]) than after PFR (2.35 [mean] [SD, 39; median, 2]). The median pain score reduction was 2 with a range of (max-min = 2 – (-7) = 9) ($P < 0.0001$) (Fig. 2). The use of opiates was also statistically higher before PFR (21.87 [mean MEDD] [SD, 43.51; median, 10]) than after PFR (8.74 [mean MEDD] [SD, 2.76; median, 0]). The median MEDD reduction was 20 with a range of (max-min = 10 – (-250) = 260) ($P < 0.0001$) (Fig. 3).

Among the 49 study patients, most (n = 47) have one or combined symptoms of pelvic floor dysfunction in addition to pain. Of those, 23 (47%) had bladder dysfunction before PFR, which persisted in one patient. Among the 24 (49%) with dyspareunia, 2 still had it after treatment. Finally, among the 2 (4%) with erectile dysfunction and one (2%) with rectal dysfunction, symptoms resolved after PFR.

Discussion

Our study showed that PFR can effectively decrease self-reported pain levels for patients with active cancer. Pelvic pain and the broad spectrum of complaints as-

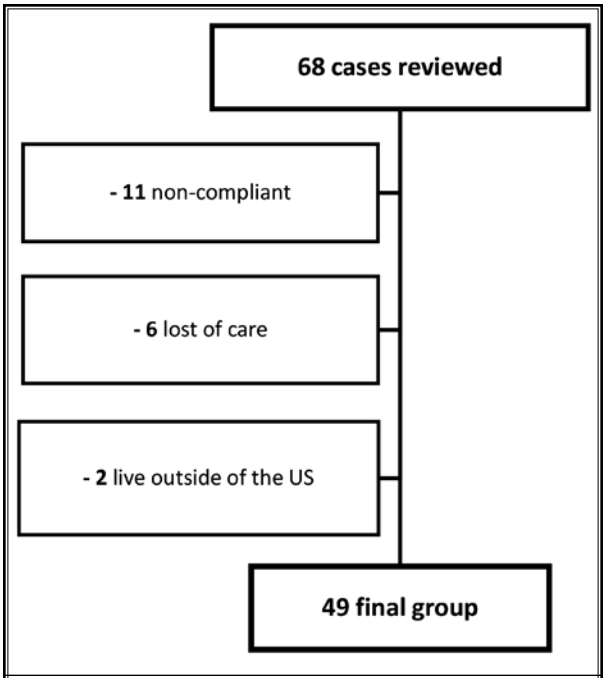

Fig. 1. *Flowchart*.

Table 1. *Patient demographics and treatment information (n = 49)*.

Variable	Category	Count	(%)
Age (years)	< 60	34	69
	> 60	15	31
Gender	Women	42	86
	Men	7	14
Cancer diagnosis	Vulva	5	10.2
	Breast	10	20.8
	Leukemia	2	4.1
	Cervix	2	4.1
	Colorectal	20	40.8
	Endometrial	1	2.0
	Lymphoma	3	6.1
	Mandible	1	2.0
	Melanoma	1	2.0
	Ovary	3	6.1
	Sarcoma	1	2.0
Therapy	Surgery	35	71.4
	Chemotherapy	34	69.4
	Radiation therapy	31	63.3
	Hormone therapy	4	8.2

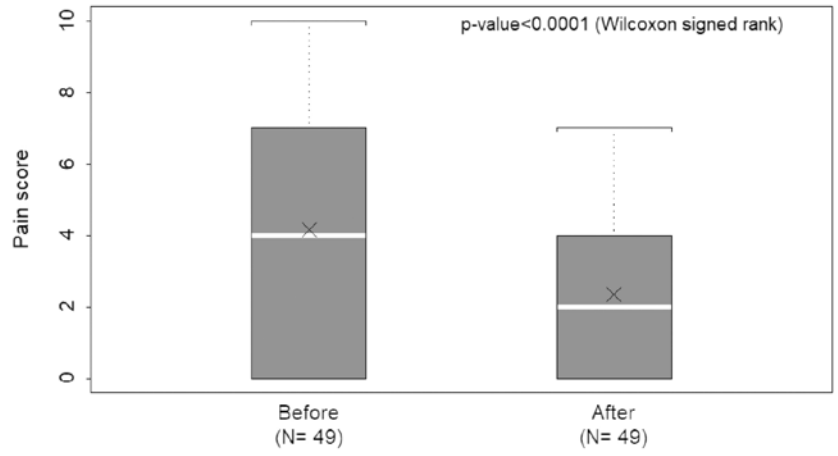

Fig. 2. *NRS self-reported pain scores before and after pelvic floor rehabilitation.*
Bar graphs show the median (white bar inside of the box) along with the mean ("X" symbol) of the NRS before and after PFR. The top bracket at the end of the vertical dotted line represents the maximum value. A *P*-value of < 0.0001 from the Wilcoxon signed rank test indicates that the change in the pain score from before to after treatment was significantly different from zero.

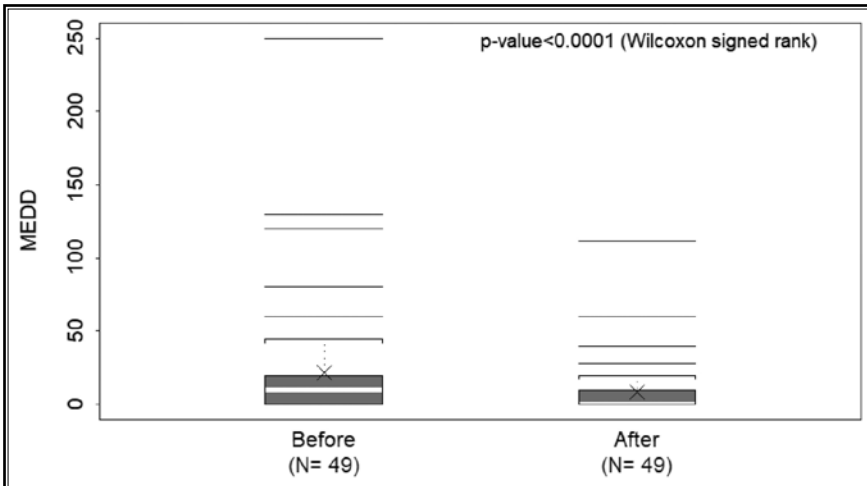

Fig. 3. *Morphine equivalent daily dose (MEDD) before and after pelvic floor rehabilitation.*
Bar graphs show the median (white bar inside of the box) along with the mean ("X" symbol) of the MEDD before and after PFR. Horizontal lines beyond the end of the vertical dotted line show the outliers. A *P*-value of < 0.0001 from the Wilcoxon signed rank test indicates that the change in the MEDD from before to after treatment was significantly different from zero.

sociated with pelvic floor dysfunction are believed to alter the visceral-somatic convergence. In the oncologic population, radiation therapy, surgery, hormone therapy, and even cancer itself can result in acute and chronic pelvic pain (13,14). Obstetric surgery may lead to muscular pain with hypertonicity of the pelvic floor (15); in these cases, hypertonicity of the musculature manifests as severe pain, typically with poor response to conventional opiate analgesics (16). Pain might be localized or diffuse, acute or chronic. The patterns of muscle, fascia, nerve, and visceral dysfunctions and pain can be highly individualized among patients, presenting as proctalgia, coccygodynia, sacroiliitis, orchialgia, vulvodynia, and interstitial cystitis (17-22). Moreover, related symptoms include voiding and defecation difficulties with poor evacuation techniques. Acquired avoidance of urination or bowel movements might be lifestyle-attributing factors (23,24). Abnormal posture, gait, and skeletal asymmetry, commonly present in oncologic patients, may contribute to pelvic muscular pain (25,26). The causes and functional processes of conditions related to PFD are not fully understood. Widening of the levator hiatus and laxity of the pelvic floor with descent relative to the pubococcygeal line have been associated with increased intrabdominal pressure with straining to defecate (27,28). Similarly, defecation and urination require complex coordination of increased intra-abdominal pressure with relaxation of the pelvic floor and sphincter complex, requiring intact anorectal sensation and proprioception (29).

The noninvasive component of PFR includes lifestyle changes such as diet modification, weight control, and core and pelvic floor exercises to incorporate functional movement training and antagonist muscle strengthening (30). Other conservative interventions may include local heat, ice, electrical stimulation/TENS, cold laser therapy, yoga, guided

visualization, meditation, and mindfulness-based stress reduction (31-33). When indicated, manipulation is an essential part of a comprehensive approach; this can include patient splinting (digital support of the vagina or perineum to facilitate voiding or defecation) and pessary use for stress urinary incontinence. The success of PFR depends on quality interventions provided by the physical therapist trained in pelvic floor disorders; such interventions include trigger point massage, myofascial release, strain-counterstain, and joint mobilization (34,35). Biofeedback, a mainstay for treating patients with PFD, provides neuromuscular training for appropriate pelvic floor contraction-relaxation using intra-anal, intravaginal, or surface electrodes incorporated with strengthening and relaxation exercises with visual and/or auditory responses to their efforts (36,37).

Invasive techniques such as intravesical injection of botulinum toxin A, sacral nerve stimulation, trigger point injections, and corrective surgeries have improved symptoms in this population (38-40). However, these invasive techniques were not applied in patients included in this study.

Contraindications for PFR include the patient's inability to consent or follow basic verbal cues and persistent wounds in the treatment area. An intravaginal or intrarectal digital exam for assessment of muscle tone is important in formulating a personal treatment plan (41). However, caution should be exercised in severely immunocompromised patients since manipulation may release bacterial content into the systemic circulation (42).

Limitations

Although the present study showed good results, its retrospective nature led to inadequacies and limitations on data acquisition that could not be addressed. The small sample size and single-center data limited the precision of estimating the treatment effect, potentially posing some degree of risk of false-positive findings.

Conclusions

Pelvic floor rehabilitation is an effective tool for treating the pain associated with pelvic floor dysfunction and its related symptoms in cancer patients. This conservative approach can contribute to reducing pain and lowering the use of opiate analgesics.

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