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ORIGINAL RESEARCH

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The effects of psychological factors on urinary incontinence after robotic radical prostatectomy: pilot study

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Abstract

Urinary incontinence (UI) is a frequent complication of radical prostatectomy (RP), and identifying preoperative predictors may assist in patient selection and continence rehabilitation. We investigated the association between preoperative psychological factors and UI after RP. Consenting patients planned for RP were recruited prospectively to this pilot study. They responded to preoperative psychological surveys, including a depression anxiety stress scale, coping behavior questionnaire, general self-efficacy scale, revised life orientation test and locus of control scale (LCS). Incontinence severity was assessed by the International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF) and daily pad usage at 6 months after surgery. Correlation tests and linear regression models evaluated the association between psychological factors and UI. Twenty-five men with a median age of 69 years were enrolled. Continence outcomes at 6 months were a median ICIQ-SF score of 11 (Interquartile range (IQR) 7–14) and a median use of 2 pads per day (IQR 1–5). LCS was linearly correlated to ICIQ-SF scores (p = 0.05) and daily pad use (p = 0.005). Age and pathological staging were also linearly correlated to incontinence severity. LCS remained linearly associated with daily pad use on multivariate analysis adjusting for age and pathology (β = 0.61, p = 0.007). Locus of control is a psychological predictor for post-RP UI severity, and patients with external control may be prone to worse incontinence. The LCS may be used when counseling patients before surgery in order to clarify expectations regarding postoperative continence. Future studies to evaluate whether psychological intervention may be beneficial for continence rehabilitation are warranted.

Keywords

Radical prostatectomy; Urinary incontinence; Locus of control; Daily pad use

1. Introduction

Urinary incontinence (UI) is a major complication after radical prostatectomy (RP), and urinary continence may often not recover for as long as 1 year. At least 20% of patients following robotic RP will not be pad free, and 5% will have severe UI [1–3]. In addition to surgical factors, such as membranous urethral length, damage to the neurovascular bundle, and extensive dissection, non-anatomic elements have also been postulated as contributing factors to the development of UI after RP, including age, body mass index, pre-existing lower urinary tract symptoms, prostate size and oncologic factors [4–7]. The cause of incontinence after RP is most probably multifactorial, and the relationship between each risk factor and UI is complex.

Few studies have evaluated the association between behavioral, mental and psychological characteristics and UI after RP. Several psychological factors were found to be associated with postoperative outcomes. Preoperative fear and optimism predicted physical functioning and vitality at 12 months after various surgeries, including urologic operations [8]. In addition, preoperative worry, anxiety and depression may predict short-term surgical outcomes, self-ratings of recovery and functional disability, respectively [9]. For example, psychological factors have been suggested to play a significant role in rehabilitation following orthopedic surgeries [10].

The association between psychological factors and urinary continence after RP is unknown. In this pilot study, we prospectively quantified psychological characteristics among RP patients, and evaluated their role in the development of UI after RP.

2. Patients and methods

2.1 Patient selection and protocol

Consecutive patients with non-metastatic prostate cancer naive to therapies who chose to be treated surgically by RP were recruited prospectively between 01 January 2019 and 01 March 2020. Exclusion criteria were: non-Hebrew speakers, inability to respond to the questionnaire, past or present treatment with medications affecting bladder functioning (*e.g.*, anticholinergics), and preoperative UI. After obtaining their informed consent, the men responded to a self-assessment psychological survey in the preoperative clinic not more than 2 weeks before the operation. They filled in psychological questionnaires to assess their behavioral and mental status, including a depression and anxiety stress scale, coping behavior questionnaire, general self-efficacy scale, revised life orientation test and locus of control scale. None of the study participants had an informational interview with a psychiatrist before or after the surgery.

All of the patients were operated in the same center by 2 urologists who had completed their learning curve. The RP was performed *via* a robotic-assisted approach in all cases, with pelvic lymphadenectomy for patients with intermediate-/high-risk disease. A vesicourethral anastomosis was created as an intracorporeal running suture (3-0 V-Loc^{TM}) with or without a previously placed 6 o'clock suture. An indwelling catheter was inserted at completion of the anastomosis and removed 7–10 days postoperatively. The surgeons were blinded to the findings of the psychological survey of the study participants. Oncologic and functional follow-up evaluations were scheduled at 6 weeks and 6 months after surgery, and continence status and postoperative prostate-specific antigen (PSA) levels were evaluated at each visit. Study outcomes were limited to the first 6 months after surgery due to the relatively high rates of incontinence during this period. Data regarding rehabilitation of the pelvic floor after surgery and the administration of any additional treatments for the control of continence were not available. The study outcomes were postoperative incontinence severity as measured by the validated International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF) and the number of pads used on a daily basis [11].

2.2 Forms and questionnaires (Supplementary material)

2.2.1 Depression anxiety and stress scale (DASS-21)

This self-reporting questionnaire assesses the subjective distress related to depression, anxiety and stress. It consists of 21 statements scored between 0 ("Did not apply to me at all—NEVER") and 3 ("Applied to me very much, or most of the time—ALMOST ALWAYS"). Each emotional trait is then calculated separately and assigned to a stress severity category (normal, moderate, severe or very severe) [12].

2.2.2 Coping behavior questionnaire (COPE)

COPE is a self-reporting questionnaire for assessing an individual's coping mechanism, defined as attempts to minimize distress associated with negative life experiences. It consists of 30 questions scored between 1 ("I haven't been doing this at all") and 4 ("I've been doing this a lot"). The score can indicate the primary coping mechanism of the individual (*e.g.*, problem-focused, emotion-focused, avoidant). Low scores on all subscales may indicate that the responder does not experience many stressors with which he needs to cope, lacks reflective ability or has poor coping mechanisms [13].

2.2.3 General self-efficacy scale (GSE)

The GSE is a self-reporting questionnaire for assessing the individuals' self-beliefs to cope with difficult demands in life. It consists of 10 questions, scored between 1 ("not at all true") and 4 ("exactly true"). The higher the score, the higher is the level of self-efficacy to manage through severe illness or life changes [14].

2.2.4 Revised life orientation test (LOT-R)

The LOT-R is a self-reporting questionnaire for assessing the level of optimism about the future. It consists of 10 questions scored between 0 ("strongly disagree") and 4 ("strongly agree"). Three items are coded in reverse, yielding a total score between 0 and 24. The higher the score, the more optimistic is the individual [15].

2.2.5 Locus of control scale (LCS)

This self-reporting questionnaire assesses the individual's level of internal versus external control of reinforcement. It consists of 29 questions, each including a pair of statements of which one receives a single point. A high score indicates an external locus of control, while a low score indicates an internal one [16].

2.2.6 International consultation on incontinence questionnaire-short form (ICIQ-SF)

The ICIQ-SF is designed to evaluate the frequency, severity and impact on quality of life of urinary incontinence in research and clinical practice. It consists of 4 items querying the frequency of incontinence, amount of leakage, overall impact of urinary incontinence on daily life and a self-diagnostic item, yielding a total score between 0 and 21. Higher scores indicate more severe incontinence and a score of 0 is categorized as being indicative of full continence [17, 18].

2.2.7 Daily pad use form

On this form, the patient reports the number of pads used within a 24-hour period, with incontinence defined as $\geq$2 pads per day, 1 pad as socially continent and 0 pads as fully continent [19].

2.3 Statistical analysis

Descriptive statistics were used to summarize patient characteristics. Continuous variables were reported as median and interquartile range (IQR), and categorical variables as numbers and percentages. Pearson and Spearman's correlation coefficients were used to evaluate the correlation between behavior and mental status, as reflected by the scores of DASS-21, COPE inventory, GSE, LOT-R and LCS, and urinary incontinence severity, as measured by the ICIQ-SF and daily

pad use questionnaires. Univariate and multivariate linear regression models were used to evaluate the association between psychological characteristics and incontinence while adjusting for clinical and pathological variables. All statistical tests were 2-sided, and $p < 0.05$ was considered statistically significant. SPSS software was applied for all statistical analyses (IBM SPSS Statistics, version 25, 2017, IBM Corp., Armonk, NY, USA).

3. Results

Fifty-two patients were recruited to participate in the study according to the inclusion and exclusion criteria. Seven patients were eventually unable to complete the preoperative questionnaires due to lack of comprehension, and 20 additional patients were not compliant with the study follow-up, leaving 25 patients in the final study cohort (Fig. 1). The study participants' characteristics and clinical and pathological data are reported in Table 1.

The median age at surgery was 69 years (IQR 62–72) and the median PSA was 8.3 ng/mL (IQR 5.9–12). The median prostate volume according to transrectal ultrasound/magnetic resonance imaging was 43 mL (IQR 35–71). The radical prostatectomy pathology revealed maximal grade groups of 1, 2, 3, 4 and 5 in 4 (16%), 14 (56%), 6 (24%), 0 (0%) and 1 patient (4%), respectively. Seventeen patients (68%) had a pathological staging of pT2, 4 patients (16%) had extraprostatic extension, and 4 patients (16%) had seminal vesicle involvement. None of the patients had pathological lymph node involvement.

All of the participants completed the preoperative questionnaires, and the medians scores of the DASS-21, COPE, GSE, LOT-R and LCS questionnaires were 7 (IQR 1–17), 38 (IQR 33–45), 33 (IQR 28–37), 25 (IQR 21–29) and 7 (IQR 4–9), respectively (Table 1). Urinary incontinence outcomes at the 6-month follow-up as reflected by the median ICIQ-SF score and the median daily pad use were 11 (IQR 7–14) and 2 (IQR 1–5), respectively. Three patients (12%) were considered fully continent by both tests, an additional 6 patients (24%) were considered socially continent according to the daily pad use findings. The ICIQ-SF scores showed mild-moderate incontinence (mild 1–8, moderate 9–13) in 16 patients (64%).

Correlation analyses demonstrated a significant positive correlation (Spearman's coefficient = 0.53, $p = 0.006$) and a trend

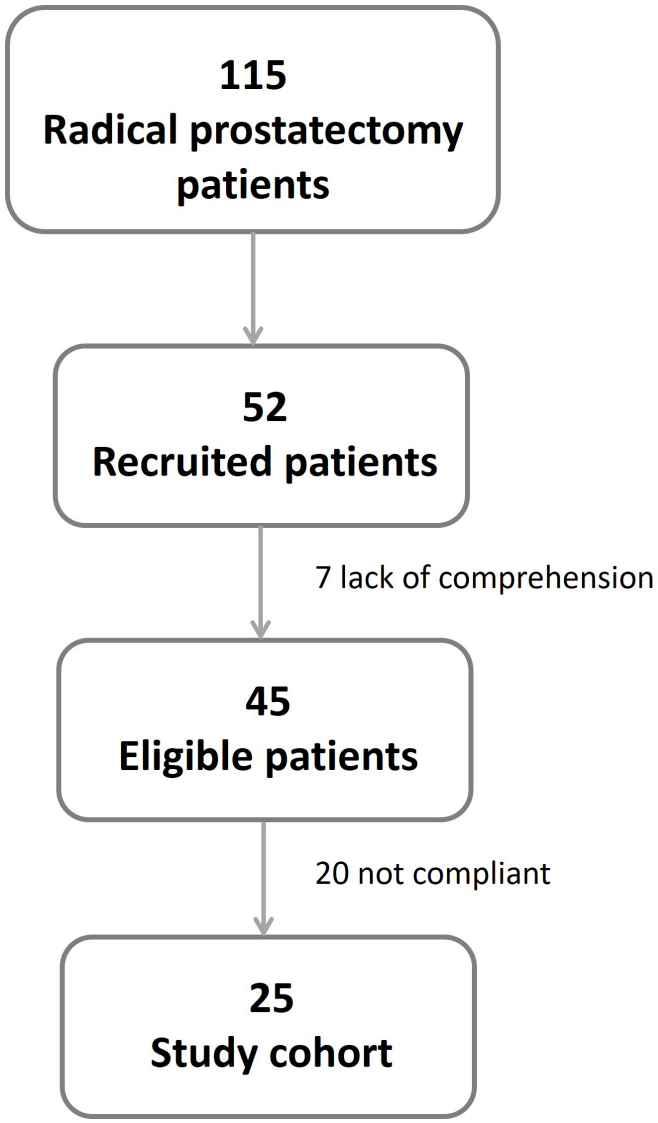

FIGURE 1. Flow-chart for study selection.

TABLE 1. Clinical and pathological characteristics of the study cohort, and scores of preoperative questionnaires (n = 25). Continuous variables are reported as medians (IQR) and categorical variables as numbers (%).

Variable		Value
Clinical		
	Age (yr)	69 (62, 72)
	PSA (ng/dL)	8.3 (5.9, 12)
	Prostate volume (mL)	43 (35, 71)
Pathological		
Maximal ISUP group grade	1	4 (16%)
	2	14 (56%)
	3	6 (24%)
	4	0 (0%)
	5	1 (4%)
Pathological T stage	T2	17 (68%)
	T3a	4 (16%)
	T3b	4 (16%)
Positive surgical margins		2 (8%)
Preoperative Questionnaires		
	DASS-21	7 (1, 17)
	COPE	38 (33, 45)
	GSE	33 (28, 37)
	LOT-R	25 (21, 29)
	LCS	7 (4, 9)

DASS: depression anxiety and stress scale; GSE: general self-efficacy scale; ISUP: International Society of Urology pathology; IQR: interquartile range; LCS: locus of control scale; LOT-R: revised life orientation test; PSA: prostate-specific antigen; COPE: Coping behavior questionnaire.

towards linear correlation (Pearson coefficient = 0.37, p = 0.06) between older age at surgery and increased daily pad use. There was also a trend towards a correlation between older age and worse ICIQ-SF score (Spearman's coefficient = 0.35, p = 0.08). Pathological T staging was also inversely associated with incontinence outcomes, with a higher tumor stage being linearly correlated to an improved ICIQ-SF score (Pearson coefficient = −0.4, p = 0.04) and lower daily pad use (Pearson coefficient = −0.39, p = 0.05). None of the other clinical and pathological variables were found to be correlated with ICIQ-SF or daily pad use. Among the preoperative questionnaires, only the LCS was found to be associated with urinary incontinence outcomes, with higher scores being significantly and linearly correlated to worse ICIQ-SF scores (p = 0.04) and increased daily pad use (p = 0.005) with Pearson coefficients of 0.4 and 0.55, respectively.

Univariate linear regressions (Table 2) revealed that a higher LCS score was significantly associated with a worse ICIQ-SF score (β = 0.76, p = 0.05) and increased daily pad use (β = 0.65, p = 0.005). Older age was also associated with a worse ICIQ-SF score (β = 0.37, p = 0.05), and adverse pT staging was associated linearly to both an improved ICIQ-SF score (β = −5, p = 0.04) and lower daily pad use (β = −2.86, p = 0.05). Age and pT, LCS remained linearly associated to daily pad use on multivariate analyses of LCS (β = 0.61, p = 0.007). Compared to the cohort's median score, patients with an LCS score ≤7 (n = 11) used fewer pads at 6 months (median = 1, IQR 0–2) than patients with an LCS score >7 (n = 14, median = 3.5, IQR 2–9) (p = 0.001, Fig. 2). There were no differences in the ICIQ-SF scores between the LCS groups.

4. Discussion

Our pilot study explored selected psychological factors and their correlation to UI severity of patients 6 months after undergoing RP surgery. The median ICIQ-SF score and the daily pad usage at 6 months were 11 and 2, respectively. The LCS was correlated to ICIQ-SF and to daily pad use, and it remained an independent predictor for incontinence severity after adjusting for clinical and pathological characteristics.

UI is a major concern after RP, specifically for low- and intermediate-low risk diseases, with incontinence rates reaching as high a 31% at 12 months even if nerve-sparing techniques are performed [20]. No single approach has demonstrated a clear superiority over others in terms of functional outcomes and quality of life [21]. Most patients may recover their continence after a long period, however, it stands to reason that a shorter time to recovery could be of great importance for preventing quality of life deterioration. Indeed, previous studies have shown a significant detrimental effect of pad use on quality of life, specifically, the number of pad exchanges per day and the timing of pad exchanges. Thus, an earlier continence recovery could be strongly desired after RP, especially in younger patients [22]. Men following RARP were more likely to be regretful and dissatisfied compared to those following an open approach, possibly owing to higher expectations of an "innovative" procedure [23].

The ICIQ-SF and daily pad use are accepted measurement tools for UI after RP by providing useful information and being closely correlated with the decrease in quality of life related to incontinence [11, 17]. Our patients' self-reported assessment demonstrated a median ICIQ-SF score of 11 and median of 2 pads per day 6 months after RP. These results are consistent with those of the prospective multicenter study performed by Tienza *et al.* [11]. Those authors assessed the continence of 746 patients after RP and their results at 12 months after surgery were a mean ICIQ-SF score of 10.8 (standard deviation (SD) = 4) and mean daily pad use of 1.75 (SD = 1).

Many efforts have been made to discover modifiable risk factors that are associated with UI after surgery. Surgical factors, such as robotic approach, posterior musculofascial reconstruction, nerve sparing and preservation of membranous urethral length are modifiable intraoperative factors that may be implemented by surgeons to reduce postoperative incontinence. The robotic approach itself may be performed in either transperitoneally or extraperitoneally in order to achieve the best functional outcomes while preserving adjuvant urethral structures [24]. In contrast, demographic and clinical factors,

TABLE 2. Univariate linear regression analyses of the association between urinary incontinence outcomes at 6 months (ICIQ-SF, daily pad use) as continuous variables and patients' characteristics including preoperative questionnaires (n = 25).

Variable	β	SE	*t*-value	*p*-value	β	SE	*t*-value	*p*-value
	ICIQ-SF score at 6 months				Daily pad use at 6 months			
Age (per year)	0.37	0.18	2.00	**0.05**	0.160	0.08	1.93	0.060
PSA (per 1 ng/dL)	0.02	0.10	0.21	0.83	0.005	0.06	0.08	0.930
Prostate volume (per 1 mL)	−0.02	0.04	−6.79	0.50	−0.008	0.02	−0.33	0.740
DASS-21 (per 1 point)	−0.01	0.12	−0.08	0.93	−0.020	0.06	−0.37	0.710
COPE (per 1 point)	0.03	0.09	0.32	0.74	−0.004	0.05	−0.06	0.950
GSE (per 1 point)	−0.07	0.16	−0.45	0.65	−0.010	0.10	−0.10	0.920
LOT-R (per 1 point)	−0.04	0.22	−0.21	0.83	0.030	0.13	0.27	0.780
LCS (per 1 point)	0.76	0.37	2.02	**0.04**	0.650	0.20	3.14	**0.005**
Maximal ISUP group grade (per 1 point)	−0.78	1.37	−0.57	0.57	−1.110	0.79	−1.39	0.170
pT staging (per 1 stage)	−5.02	2.41	−2.08	**0.04**	−2.860	1.38	−2.06	**0.050**
Positive surgical margins								
Negative	Ref				Ref			
Positive	−2.10	4.31	−0.48	0.63	−1.840	2.57	−0.72	0.480

DASS: depression anxiety stress scale; GSE: general self-efficacy scale; ICIQ-SF: International consultation on incontinence questionnaire short form; ISUP: International Society of Urology pathology; LCS: locus of control scale; LOT-R: revised life orientation test; PSA: prostate-specific antigen; COPE: Coping behavior questionnaire.
***Bold** indicates significance.*

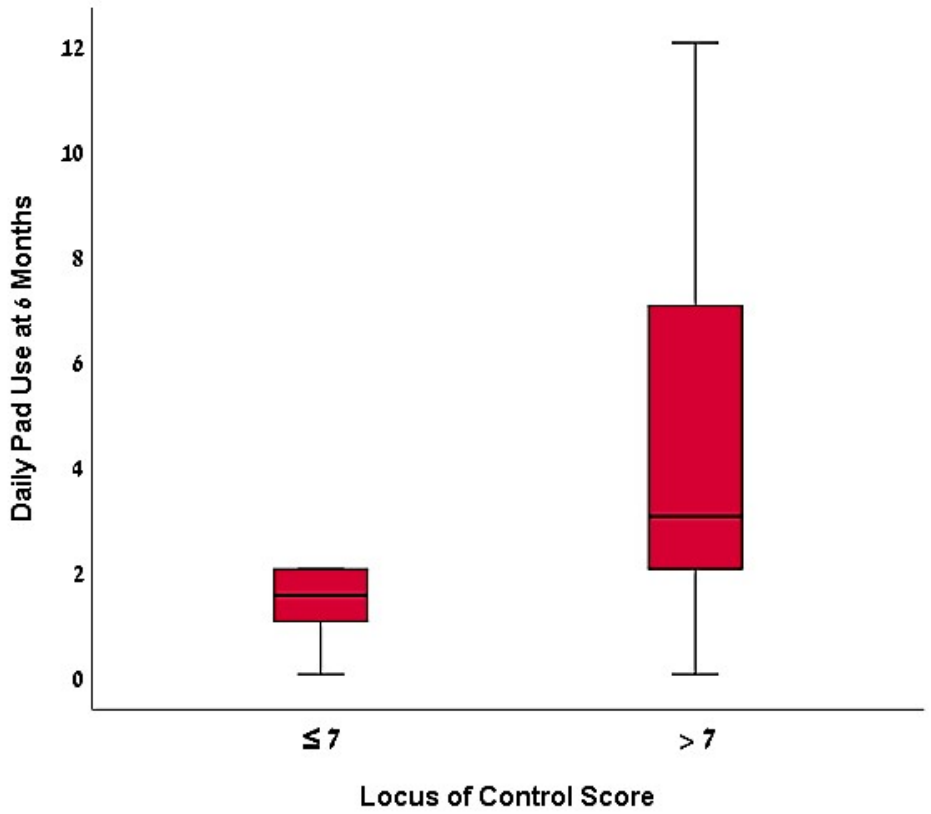

FIGURE 2. Box-and-whisker plot demonstrating the daily pad usage at 6 months after surgery among patients with a locus of control score above and below 7. The 25th and 75th percentiles are provided at the bottom and top of the boxes, respectively, and the horizontal lines inside the boxes indicate median values.

including age, prostate volume and disease staging, cannot be modified and may be used for patient selection or expectation management [5, 6]. Trials of treatment for men after RP have provided only moderate evidence of an overall benefit from pelvic floor muscle training in terms of UI reduction (Relative risk (RR) = 0.32, 95% confidence interval 0.20–0.51). The effects of other conservative interventions, such as lifestyle changes or psychological therapies, remain undetermined [25]. Men with prostate cancer experience obstacles to positive mental health, and little is known about the factors that impede their adjustment following treatment for the disease [26]. The effects of psychological factors, including stress, fear, optimism, coping mechanism and beliefs, on UI and continence rehabilitation after RP have not been previously investigated. These are often modifiable personal characteristics that may be altered for setting therapeutic goals [26].

Locus of control (LoC) is defined as an individual's beliefs in factors that are thought to determine life experiences. While strong internal control characterizes the belief that events happen mainly as a result of one's own life actions, strong external control attributes the life events to uncontrollable external factors, including chance or the actions of others [27]. LoC is a relatively stable component of an individual's psychology, requiring time or persistent therapy to change [28, 29]. The effects of LoC on postoperative outcomes and recovery have been highlighted by several studies, indicating that internal control is associated with better outcomes [30–32]. Burns *et al.* [31] found that LoC accounted for a significant variance in mental health scores among patients treated for prostate cancer. A stronger internal LoC over recovery predicted shorter lengths of hospital stay in coronary bypass patients [32] and internal control has been associated with improved survival following surgery in lung transplantations [30]. Mahler *et al.* [32] suggested that perceived control may facilitate recovery when patients feel that they do have some control over their recovery process. Similarly, in our cohort, a stronger external LoC independently predicted worse continence recovery, as reflected by more daily pad usage at 6 months after RP ($\beta = 0.61$, $p = 0.007$), while a stronger internal LoC was associated with better continence outcomes: specifically, patients who had an LoC score ≤ 7 were using significantly fewer pads at 6 months after surgery ($p = 0.001$). Interventions to reinforce a stronger sense of personal control (internal LoC) have already been proven to improve quality of life and recovery after adverse medical issues. Toscano *et al.* [33] concluded that understanding the LoC beliefs of melanoma and breast cancer patients after cancer diagnosis and throughout the course of the illness may help to identify appropriate psychological and supportive care to promote more adaptive behaviors for improving quality of life. In addition, specialized coaching to modify beliefs improved the quality of life and physical function 1 year after long hospitalization among frail hospitalized elderly patients [34]. Our current findings suggest that patients with stronger internal LoC are more determined to restore continence and are more adherent to continence rehabilitation programs. Reinforcing the individual's internal LoC by psychological interventions may assist in the postoperative continence recovery process. However, the findings of this pilot study are novel, and more research is needed to validate them.

The study has several limitations derived from its design and methodology. First, the high dropout rate (46%) might expose the study to selection bias. We assume that the extent and complexity of the questionnaires deterred patients to participate and adhere to the study. Second, the sample size is small, thus precluding the arrival at strong conclusions. Third, we assessed the psychological factors preoperatively, and slight alterations in the questionnaire scores might have occurred after surgery during the study period. However, it is important to emphasize that the main aim of the study was to investigate the pivotal psychological factors before surgery. Fourth, the incontinence rates in our cohort are relatively high, however, the results were collected at 6 months instead of 1 year postoperatively and others have reported similar rates [35, 36]. Finally, we did not provide data on pelvic floor muscle training performance and adherence or additional treatments for the control of continence. Despite these limitations, this is a novel pilot study which highlights an additional layer of factors that may be associated with UI after RP, specifically, the psychological layer, that we recommend addressing with the possibility of improving outcomes.

5. Conclusions

Assessing psychological factors by means of questionnaires before RP is highly recommended in order to enhance outcome. Stronger external LoC is a psychological determinant that might be associated with poorer continence outcomes at 6 months after RP, while stronger internal LoC portends a more optimistic result. Additional studies that evaluate psychological factors among RP patients and the value of implementing psychological interventions to modify patients' beliefs as part of the continence rehabilitation process to improve outcomes after RP are warranted.

AVAILABILITY OF DATA AND MATERIALS

The data presented in this study are available on reasonable request from the corresponding author.

AUTHOR CONTRIBUTIONS

ZS and NJM—Conception and design; ZS, YV and LD—Acquisition of data; ZS, YV, LD and YS—Analysis and interpretation; ZS and LD—Drafting of the manuscript; RM, YS, YBY, MB, OY and NJM—Critical revision of the manuscript; ZS and RM—Statistical analysis; NJM—Supervision.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The research described in this article was conducted in accordance with the ethical principles and guidelines established by Tel Aviv Sourasky Medical Center Helsinki Institutional Review Board. The study protocol received approval from the ethics committee under the reference number 056418TLV in 2018. At recruitment, all patients signed an informed consent to participate in the study.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://oss.jomh.org/files/article/1763070856364212224/attachment/Supplementary%20material.pdf.

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