



Long term sexual function following rectal cancer treatment

Joyce H. Pang^{a, *}, Zoë Jones^b, Orrin B. Myers^c, Sarah Popek^a

^a Department of Surgery, University of New Mexico School of Medicine, Albuquerque, NM, USA

^b Surgical Associates of Alamogordo, Gerald Champion Medical Center, Alamogordo, NM, USA

^c Department of Family and Community Medicine, University of New Mexico School of Medicine, Albuquerque, NM, USA



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ABSTRACT

Introduction: Rectal cancer treatment can lead to sexual dysfunction.

Methods: We designed a retrospective survey-based study to quantify rates of sexual dysfunction in rectal cancer survivors. Patients that underwent surgery for rectal cancer between 2005 and 2016 at our institution were identified, and the following were distributed: Quality of Life measure for oncology (QoL-30), Female Sexual Function Index (FSFI), and International Index of Erectile Function (IIEF).

Results: Survey response rate was 21%, 17 females and 30 males (n = 47). 50% of males recalled a physician asking about sexual function during or after treatments, compared to 18% of females (p = 0.034). More than 50% of those surveyed wished one of their physicians had discussed the possibility of sexual dysfunction. In men, the QoL-30 significantly correlated with IIEF orgasmic function (r = 0.50, p = 0.004) and IIEF overall satisfaction (r = 0.60, p < 0.001).

Conclusions: Our findings demonstrate that rectal cancer patients experience posttreatment sexual dysfunction, desire discussion with their physicians on this topic, and that there are gender differences in how providers approach counseling regarding posttreatment sexual dysfunction.

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Introduction

Efficacy of multimodal treatment for rectal cancer has improved, resulting in improved overall and disease-free survival worldwide.^{9,30} In 2016 there were an estimated 727,350 colorectal cancer survivors, and a projected 885,940 in 2026.¹⁴ There is growing recognition of the importance of survivorship, which encompasses long term quality of life.²⁶ It is well documented that multimodality treatment for rectal cancer results in insults to gastrointestinal and genitourinary function. Less investigation has been performed into the long-term impact on sexual function, especially in women. Sexual dysfunction after rectal cancer treatment has an estimated prevalence in up to 68% of men and 93% of women.¹ The incidence and severity of long term (greater than one year) sexual dysfunction secondary to rectal cancer treatment and its impact on quality of life is not well known. As our understanding of the key components of quality of life expands, the contribution of sexual function is gaining importance. Identification and treatment of sexual dysfunction in rectal cancer survivors have the potential to

significantly impact quality of life.

Sexual function is a key component of quality of life. Our understanding of the etiology of sexual dysfunction after rectal cancer treatment has become more sophisticated. Radiation, chemotherapy and surgery each contribute to anatomic and physiologic changes which impact different aspects of sexuality such as the ability to achieve erection, ejaculation in men and orgasm in both men and women.^{8,10} Psychological and social variables are now understood to also significantly impact sexual function, although these are more difficult to measure quantitatively.^{2,12} The National Comprehensive Cancer Network (NCCN) recently incorporated sexual function into the Clinical Practice Survivorship Guidelines, underscoring the growing recognition of the importance of long-term sexual function in relation to quality of life as well as the increased prevalence of cancer survivors.⁶ These guidelines provide an algorithm for evaluation and treatment of sexual dysfunction for men and women. Treatment guidelines include hormone treatment, treatment of comorbid conditions and specialist referral recommendations, such as sexual health specialists, psychotherapy, gynecology and urology.

Standardized survey tools have been developed to assess sexual function (the Female Sexual Function Index (FSFI)²³ and the International Index of Erectile Function (IIEF)²⁴). In addition,

* Corresponding author UNM School of Medicine, Department of Surgery, MSC10 56101, University of New Mexico, Albuquerque, NM, 87131-0001, USA.

E-mail address: jhpang@salud.unm.edu (J.H. Pang).

specialized new techniques are being used to quantitatively measure sexual function in men and women, which makes the ability to dissect out the physiologic variables more feasible. Tests specific for female function include pudendal arteriogram, vaginal photoplethysmography, and genito-sensory analyzer. In men nocturnal penile tumescence and rigidity, dynamic duplex ultrasound, and dynamic infusion cavernosometry and cavernosography are being introduced.

The objective of this study was to identify rates of long-term sexual dysfunction and determine patient interest in treatment during long-term survivorship.

Methods

Male and female patients who underwent surgery at the University of New Mexico Health Sciences Center for rectal cancer from 2005 to 2016 were eligible for this study. Institutional Review Board approval was obtained. The electronic medical record at the University of New Mexico was queried by CPT code for rectal cancer, proctectomy, low anterior resection, abdominal perineal resection and colectomy. Charts were then reviewed for concordance with ICD-9 and ICD-10 codes for rectal cancer. Surveys were mailed to patients identified by CPT code. The survey was comprised of the Quality of Life Questionnaire Colorectal Cancer Module (QLQ-CR29) in conjunction with the Quality of Life measure for oncology (QOL-30) and either the Female Sexual Function Index (FSFI) or International Index of Erectile Function (IIEF) [Appendix A].

Surveys were de-identified. Variables evaluated include time from surgery, use of neoadjuvant or adjuvant chemoradiation versus no chemoradiation, and type of surgery (sphincter preserving versus abdominal perineal resection). Patients were not asked about the presence of a permanent stoma on the survey, though patients with permanent stomas were included. Patients were queried if their physicians had initiated discussion regarding sexual function at any time during treatment and if patients pursued any treatment for sexual dysfunction. Patients were reimbursed with a \$20 gift card for survey completion. They were given the option of receiving this via certified mail or picking it up in person at the Department of Surgery. The survey was available in Spanish and English. Inclusion criteria included patients with Stage I-IV rectal cancer who underwent treatment with surgery, radiation and/or chemotherapy. Patients who underwent transanal excision, transanal endoscopic microsurgery (TEM), or transanal minimally invasive surgery (TAMIS) as predominant treatment for their rectal cancer were not included. Exclusion criteria was an inability to read and write Spanish or English, an incorrect mailing address, or if the patient was deceased. The mailing included a cover letter, informed consent and the survey. Informed consent was implied by completing and returning the survey.

The survey was comprised of demographic questions, outcome specific questions and three validated questionnaires, the Quality of Life Measure of Oncology (QOL-30) and either the Female Sexual Function Index (FSFI) or the International Index of Erectile Function (IIEF) [Appendix A]. Demographic data collected included ethnicity, level of education, sexual orientation, and treatment received for rectal cancer. Outcome specific questions were designed to determine patient experiences with counseling and treatment of sexual dysfunction.

The Quality of Life Measure of Oncology-30 (QOL-30) is a validated scale constructed by the European Organization for Research and Treatment of Cancer (EORTC) Quality of Life Study Group for patients with cancer. This scale determines the functional effect of cancer and its associated treatment on the patient as it is experienced by the patient. This scale is comprised of physical, cognitive, emotional, social and role functioning variables. The Quality of Life

Questionnaire Colorectal Cancer Module (QLQ-CR29) is designed to augment the QOL-30 and delineate bowel and genitourinary function.

Sexual function was evaluated in women using the Female Sexual Function Index (FSFI). The FSFI is a validated tool comprised of 19 questions measuring 6 domains: desire, arousal, lubrication, orgasm, global satisfaction and pain.¹³ The scoring system has a maximum of 36 points with a cutoff of <26.55 designating dysfunction.^{23,31} Male patients completed the International Index of Erectile Function (IIEF) to evaluate sexual function. The IIEF is 15 item questionnaire evaluating 5 domains: erectile function, orgasmic function, sexual desire, intercourse satisfaction and overall satisfaction.²⁴ The IIEF has a maximum score of 30 and < 25 is considered to be consistent with erectile dysfunction.³

Frequencies and percentages were used to summarize responses to individual items. Means and standard deviations were computed for continuous scales. Chi-square tests and Fisher exact tests were used to compare categorical variables. Spearman rank correlation analyses were used to assess associations between sexual and bowel dysfunction scales. All analyses were performed with SAS, with a significance value of $p < 0.05$ used.

Results

290 patients who underwent treatment for rectal cancer with proctectomy, lower anterior resection, abdominal perineal resection or colectomy at the University of New Mexico between 2005 and 2016 were identified. Of those patients, 56 were excluded as there was an incorrect mailing address on file or the patient was deceased at the time of the study. An additional 7 patients were excluded as they were identified as not having Spanish or English as their primary language. Of the 227 patients who presumably received the survey, a total of 47 responded [Fig. 1]. Respondents identified predominantly as White (51%), Hispanic/Latino (32%), and Native American/American Indian (11%) [Table 1].

Response rate was 21% (290 eligible), 17 females and 30 males ($n = 47$) [Table 1]. Average time from initial rectal cancer treatment to survey response was between 4 and 5 years, with a range of 1–11 years. Our survey included all types of treatment for rectal cancer. Of our respondents 15 (32%) were treated with chemoradiation and surgery, and 10 (21%) treated with surgery alone. At the time of survey 15 (32%) of respondents were sexually active with 11 (37%) males and 4 (24%) of females reporting being sexually active, respectively ($p = 0.353$). When asked for the reason they were not sexually active, the most frequent answer from male respondents was the lack of a partner (23%). For female respondents the most frequent reason was that they were not healthy enough for sex (23%). Among male patients 28 (93%) reported evidence of erectile dysfunction based on IIEF < 25, and 15 (88%) of female patient FSFI scores indicated sexual dysfunction [Tables 2 and 3]. Both the mean scores for both female and male patients were significantly under the cutoff for dysfunction. The mean score for female patients on the FSFI was a 6.8 (sexual dysfunction indicated with score < 26.55). For male patients on the IIEF the mean score was a 12.1 (erectile dysfunction indicated with score < 25). 50% of males recalled one of their physicians asking about sexual function during or after treatment, as compared to 18% of females ($p = 0.034$). Our survey included the question, “Do you wish one of your doctors had discussed the possibility of sexual dysfunction with you?” with 28 (60%) of patients responding yes to this question. Equal percentages of male and female patients answered “Yes” (60%, 59%). For males who responded “Yes”, 10 of 18 (56%) stated they had discussed sexual dysfunction at some point on their treatment timeline. For females who responded “Yes”, 2 of 10 (20%) stated that they had

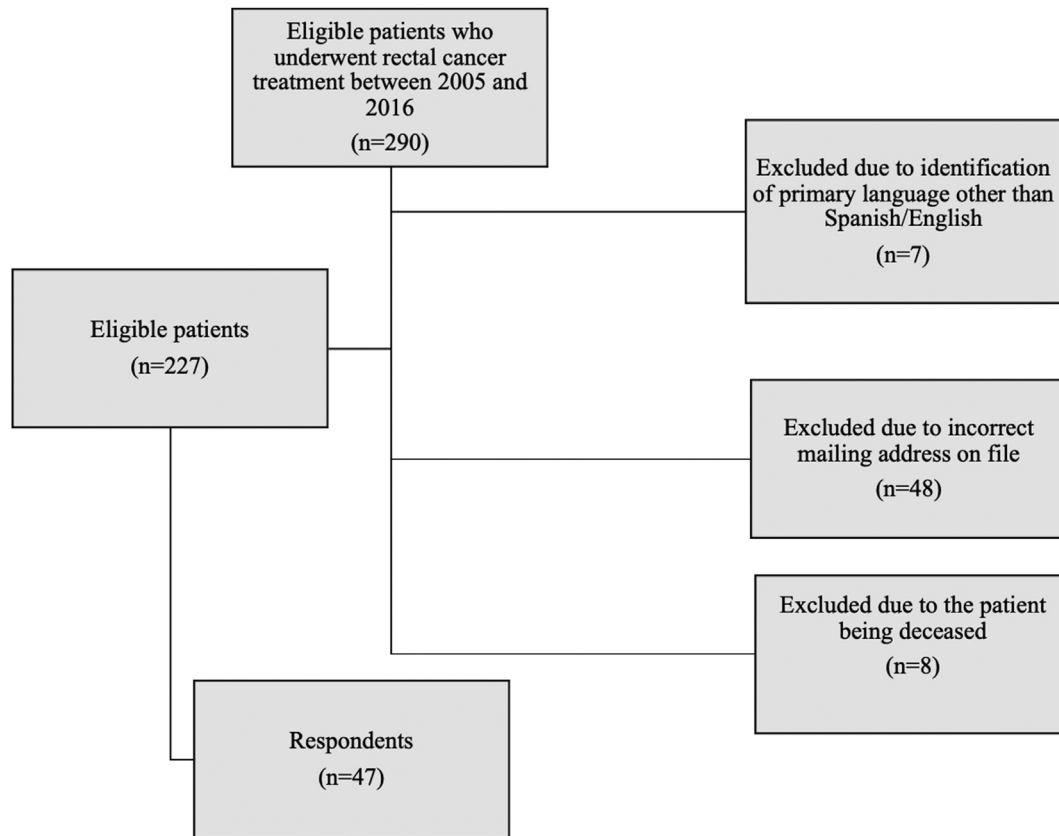


Fig. 1. Selected patients and exclusion criteria.

discussed sexual dysfunction at some point in their treatment timeline. In males, the QoL-30 significantly correlated with IIEF orgasmic function ($r = 0.50$, $p = 0.004$) and IIEF overall satisfaction ($r = 0.60$, $p < 0.001$), whereas in females, sexual dysfunction was not significantly associated with quality of life. An overwhelming majority of respondents also reported not discussing their sexual dysfunction with their physicians (94% of females, 57% of males), and not undergoing treatment for sexual dysfunction (88% of females, 70% of males).

Discussion

In our study the goal was to identify rates of sexual dysfunction at 5 years or greater after completing treatment for rectal cancer. During pretreatment counseling, 18% of female patients recalled discussing the possibility of sexual dysfunction with a provider. The most common provider with whom this discussion occurred was the surgeon (100%). In contrast, 50% of male patients discussed sexual dysfunction, again with the surgeon as the most common discussant (33%). At the time of evaluation, 32% of the patients were sexually active. During survivorship, less than 30% of respondents experiencing sexual dysfunction discussed their symptoms with their physician or underwent treatment. This was significantly more pronounced in female patients experiencing sexual dysfunction, as not a single female patient reported discussing sexual dysfunction symptoms with their physician, and only one respondent stated that she had undergone treatment. These low numbers have previously been shown to be related to several variables. Providers face significant time constraints for counseling on quality of life topics. Second, many providers and patients are embarrassed discussing sexual function. Lastly, there is a lack of

training regarding diagnostic tools and treatment options on the part of providers, especially for female patients.²¹ Previous studies have demonstrated that discussions regarding sexual function occur twice as often in male patients compared to female patients (64% vs 28%),²¹ which was also found in our study. Communication disparities begin at the time of diagnosis with limited or no discussion of possible effects of treatment on sexual function, as well as limited or no ongoing assessment of function during and after completion of treatment.

Data has been extrapolated from the gynecological cancer patients to estimate long term impact of radiation and pelvic surgery on women's sexual function. The number of treatment options based on physiologic changes as a result of rectal cancer treatment are scarce with limited sample sizes and/or long-term data. Da Silva et al. showed that women treated for colorectal cancer had deterioration in sexual function post treatment, both at 6 months and 12 months. Notably 81% of women surveyed ($N = 93$) stated that discussion of sexual issues was extremely or somewhat important.⁴ From our results, 58% of females wished that the possibility of sexual dysfunction had been discussed with them with a provider during rectal cancer treatment, with only 18% of female patients surveyed reported that they had such a discussion. Our results also demonstrate that women do experience sexual dysfunction following rectal cancer treatment, with 88% of respondents scoring below the cutoff score on the FSFI.

Male patients who have undergone treatment for prostate cancer have been used as a surrogate measure for rectal cancer patients when estimating long term sexual function. Similar to prostate cancer treatment, rectal cancer surgery can damage both sympathetic and parasympathetic nerves which impacts erection and ejaculation. Radiotherapy also causes damage to the same

Table 1
Patient characteristics.

	All (n = 47)		Male (n = 30)		Female (n = 17)	
	n	%	n	%	n	%
<i>Q1. How would you characterize your ethnicity?</i>						
White	24	51.1	16	53.3	8	47.1
Hispanic or Latino	15	31.9	8	26.7	7	41.2
Native American or American Indian	5	10.6	4	13.3	1	5.9
Other	3	6.4	2	6.7	1	5.9
<i>Q2. What is your highest level of education?</i>						
Grade school	1	2.1	1	3.3	0	0
High school	17	36.2	10	33.3	7	41.2
University	20	42.6	12	40.0	8	47.1
Graduate degree	8	17.0	6	20.0	2	11.8
<i>Q3. Are you sexually active?</i>						
No	32	68.1	19	63.3	13	76.5
Yes	15	31.9	11	36.7	4	23.5
<i>Q3a. Are you bothered by not being sexually active? (if Q3 = No)</i>						
Did Not Answer	6	18.8	3	15.8	3	23.1
No	9	28.1	2	10.5	7	53.8
Yes	17	53.1	14	73.7	3	23.1
<i>Q4. How do you characterize your sexual identity?</i>						
Heterosexual	39	83.0	25	83.3	14	82.4
Bisexual	1	2.1	1	3.3	0	0
Other	5	10.6	4	13.3	1	5.9
<i>Q5. If you are not sexually active, why not? (if Q3 = No)</i>						
I don't have a partner	11	23.4	4	13.3	7	41.2
My partner is not interested in sex	2	4.3	1	3.3	1	5.9
I am not interested in sex	6	12.8	2	6.7	4	23.5
I am not healthy enough for sex	9	19.1	7	23.3	2	11.8
My partner is not healthy enough for sex	3	6.4	2	6.7	1	5.9
<i>Q6. If you are sexually active, what type of activities do you participate in? (if Q3 = Yes)</i>						
Vaginal intercourse	23	48.9	17	56.7	6	35.3
Anal sex	0	0	0	0	0	0
Oral sex	7	14.9	6	20.0	1	5.9
Masturbation	7	14.9	6	20.0	1	5.9
Caressing/foreplay	12	25.5	8	26.7	4	23.5
<i>Q7. How was your rectal cancer treated?</i>						
Surgery alone	11	23.4	10	33.3	1	5.9
Radiation + chemotherapy followed by surgery	27	57.4	14	46.7	13	76.5
Surgery followed by chemotherapy	8	17.0	5	16.7	3	17.6
Other	1	2.1	1	3.3	0	0
<i>Q8. At the time of your diagnosis do you remember your surgeon talking to you about the possibility of sexual problems after surgery?</i>						
No	35	74.5	21	70.0	14	82.4
Yes	11	23.4	8	26.7	3	17.6
<i>Q9. Do you wish one of your doctors had discussed the possibility of sexual dysfunction with you?</i>						
Did Not Answer	6	12.8	5	16.7	1	5.9
No	13	27.7	7	23.3	6	35.3
Yes	28	59.6	18	60.0	10	58.8
<i>Q10. Did any of your doctors ask you about your sexual function either during or after your treatment?</i>						
No	29	61.7	15	50.0	14	82.4
Yes	18	38.3	15	50.0	3	17.6
<i>Q11. What type of doctor asked you? (if Q10 = Yes)</i>						
Oncologist	4	8.5	2	6.7	2	11.8
Surgeon	13	27.7	10	33.3	3	17.6
Primary Care Physician	4	8.5	4	13.3	0	0
<i>Q12. If you are experiencing sexual dysfunction, have you discussed this with your doctor?</i>						
Did Not Answer	2	4.3	1	3.3	1	5.9
No	33	70.2	17	56.7	16	94.1
Yes	12	25.5	12	40.0	0	0
<i>Q13. If you are experiencing sexual dysfunction, have you undergone any treatment?</i>						
Did Not Answer	4	8.5	3	10.0	1	5.9
No	36	76.6	21	70.0	15	88.2
Yes	7	14.9	6	20.0	1	5.9
<i>Q14. If your doctor told you about a treatment plan for sexual dysfunction would you be interested in participating?</i>						
Did Not Answer	6	12.8	5	16.7	1	5.9
No	11	23.4	3	10.0	8	47.1
Yes	30	63.8	22	73.3	8	47.1

Table 2
FSFI scores from female respondents.

	n	Mean	Min	Median	Max
FSFI Total Score	17	6.8 ± 9.5	1.2	1.8	27.8
FSFI Desire	17	1.9 ± 1.1	1.2	1.2	4.8
FSFI Arousal	17	1.0 ± 1.5	0.0	0.0	4.2
FSFI Lubrication	16	1.1 ± 1.7	0.0	0.0	5.1
FSFI Orgasm	16	1.1 ± 1.9	0.0	0.0	4.8
FSFI Satisfaction	16	1.1 ± 2.0	0.0	0.0	5.6
FSFI Pain	16	0.9 ± 1.9	0.0	0.0	5.6

FSFI: Female Sexual Function Index; FSFI total score <26.55 indicates sexual dysfunction.

nerves and blood vessels but through a different mechanism. Radiotherapy causes progressive fibrosis of the smooth muscle within the penis translating to increasing rates of erectile dysfunction with time. Delineating the impact of radiotherapy on sexual function in both rectal and prostate cancer has been difficult. Resnick et al. evaluated 3,533 patients with a diagnosis of prostate cancer with the Prostate Cancer Outcomes Study (PCOS).²² There were no significant differences in sexual dysfunction between the surgery and radiotherapy arms in long term follow up (15 years) although there were higher rates of dysfunction at 2 years in the surgery alone arm. Our survey included all types of treatment for rectal cancer, and was not designed to evaluate sexual dysfunction rates based on one type of therapy.

Prior work has identified higher age, female, sex, rectal cancer, not having a partner, lower educational level, and depressive symptoms as increasing risk for sexual dysfunction and less sexual activity.^{5,28} Although these variables were captured in our study, no significant correlation to sexual dysfunction was found. However, this may be due to low response rates.

In our study QOL did not directly correlate with sexual function in female patients. In contrast, QOL strongly correlated with both orgasmic function and sexual satisfaction in men. This dichotomous finding highlights how men and women find satisfaction differently in sexual relationships. Previous studies have suggested that sexual physical contact may be more appealing to men compared to women,⁷ and that older women may find satisfaction in non-penetrative demonstrations of intimacy.²⁹ Sexual satisfaction is a different concept than sexual dysfunction for women, and does not necessarily have a correlation to penetrative or orgasmic activity.

Treatment for sexual dysfunction in cancer survivors exists. Treatment options for the physiologic effects of vaginal atrophy include physical aides such as vaginal moisturizers and lubricants, including topical lidocaine.²⁰ In men, there is a growing body of literature to support early intervention after treatment for prostate cancer in order to prevent endothelial and smooth muscle damage which is hypothesized to preserve long term sexual function. Penile rehabilitation is comprised of prompt use of oral phosphodiesterase type 5 inhibitors after completion of treatment and may also include intracorporeal injection, and vacuum erection devices. How this may apply to penile rehabilitation after rectal cancer is unclear.

Table 3
IIEF scores from male respondents.

	n	Mean	Min	Median	Max
IIEF Erectile Function	30	12.1 ± 7.9	1.0	11.0	26.0
IIEF Orgasmic Function	30	4.5 ± 4.0	0.0	3.5	10.0
IIEF Sexual Desire	30	5.9 ± 2.3	2.0	0.0	10.0
IIEF Intercourse Satisfaction	30	3.9 ± 5.0	0.0	0.0	14.0
IIEF Overall Satisfaction	30	3.9 ± 2.8	1.0	0.0	10.0

IIEF: International Index of Erectile Function; IIEF erectile function score <25 indicates erectile dysfunction.

Behavioral therapy is a crucial component of treatment to address the psychosocial component of sexual dysfunction consisting of a combination of education and skills-based instruction.

This initial survey study has several limitations including a small sample size secondary to low response rate (22%), the potential for recall bias given the reliance on patient-reported answers, and lack of evaluation of baseline sexual function prior to rectal cancer treatment. Given the low response rate, it is possible that patients with sexual dysfunction were more likely to respond than those who were not, creating a self-selecting respondent group. We aimed to reduce recall bias by utilizing validated tools (QOL-30, FSFI, IIEF) in our questionnaires. Despite this, the reliance on self-reported answers leads to a potential for recall bias. In addition, due to the retrospective nature of the study, sexual function prior to rectal cancer treatment was not assessed. Thus we were not able to evaluate preexisting sexual dysfunction, or compare pre- and post-treatment sexual function. The survey used did not include specific questions on the presence of a stoma and the effects of the stoma on sexual function. Traditional belief has been avoidance of a stoma results in improved quality of life.¹⁵ However, the last three reviews on quality of life by the Cochrane Database have been unable to conclude that patients without a stoma have a superior quality of life.^{17–19} In evaluating health-related quality of life (HRQOL) and sexual function with and without an ostomy, Sun et al. found that ostomy status correlated with sexual dysfunction and lower overall HRQOL.²⁷ Other factors that were not evaluated included time since chemoradiation and time since treatment conclusion, which may also affect sexual function. Future work will comprise a prospective trial to evaluate pre- and post-treatment sexual function and eliminate recall bias. The topic of sexual dysfunction and specifics of the survey tool remains very provocative to many patients which limits response rate.¹¹ Ideally a prospective trial will introduce these concepts early and desensitize patients, thus increasing response rates.

The gender of the treating physician was not specifically evaluated in this study. Previous studies have shown that the gender of the treating physician correlates with different styles of patient communication.²⁵ Future directions of study should include this data, as it would be interesting to explore whether there is correlation between the gender of the treating physician and differences in communication regarding sexual dysfunction with patients.

Conclusion

Most patients do not receive counseling regarding possible future sexual dysfunction at the time of diagnosis or after completing therapy. Many rectal cancer patients experience sexual dysfunction postoperatively and desire intervention, however men and women are counseled differently regarding postoperative sexual dysfunction. Eliminating this disparity will require education for both providers and patients in order to establish a treatment algorithm. The etiology of sexual dysfunction is multifactorial, and cannot be attributed to physical outcomes alone post rectal cancer treatment. Understanding the psychologic component is critical in the development of multimodality treatment protocols for sexual dysfunction.

As treatment options for sexual dysfunction increase, there also needs to be a movement towards training providers to identify and counsel those who are experiencing sexual dysfunction. This is especially lacking in female patients. The multitude of providers involved in the care of rectal cancer survivors (primary care physicians, medical oncologists, radiation oncologists, surgeons) allows for many opportunities for sexual dysfunction to be addressed in the course of care.

Limitations in this study include reliance on patient recall,

incomplete response to all survey questions, and small sample size. This study is also limited by the lack of a control group of patients with similar age and demographics. However, this study demonstrates the need for further discussion and treatment of sexual dysfunction in rectal cancer survivors. Design of a prospective trial and ultimately development of a treatment algorithm for sexual dysfunction in rectal cancer patients are the next steps.

Declaration of competing interest

This work was performed at the University of New Mexico School of Medicine, Albuquerque, NM, USA. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. Each author certifies that this research was approved by the University of New Mexico Institutional Review Board (IRB #16-276) and that all investigations were conducted in accordance with ethical principles of research. The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript that might pose a conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amjsurg.2020.06.064>.

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