



Assessment of sexual Dysfunctions after Colorectal Surgery

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Abstract: Introduction: Before the discovery of the Total Mesorectal Excision (TME), the incidence of post-operative sexual dysfunction was 40-60%. Sexual dysfunctions remain a recognized complication in spite of adoption of autonomic nerve preserving techniques in TME. **Aim of the work:** The aim of this research is to assess the incidence of sexual dysfunctions following rectal or colonic surgery. **Patients and methods:** The study included (137) patients who underwent colorectal surgeries for benign and malignant diseases obtained from a retrospective patient database performed in Ain Shams and Minia University hospitals by using validated questionnaires. The Brief Sexual Function Index was used to assess male sexual function, while Female sexual function was assessed by the Female Sexual Function Inventory. **Results:** Age is a predisposing factor for sexual dysfunctions in males; type of operation doesn't significantly affect sexual functions with a trend toward more severe symptoms after the abdomino-perineal resection (APR). Patients who received long course neo-adjuvant (chemoradiotherapy) reported significantly more problems with the sexual drive. In female only APR affect sexual functions. We concluded that the domain specific score for sexual drive tend to be significant worse after APR. **Conclusion** Preservation of the autonomic nerve is of major importance, particularly in low rectal resection to avoid sexual dysfunction. Neo-adjuvant CRT is the risk factors for sexual dysfunction in male patients.

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Keywords: Rectum Surgery, Total Mesorectal Excision, sexual dysfunction, neo-adjuvant chemo-radiation, hypogastric nerve plexus.

1. Introduction

Improvements in the treatment and early detection of rectal cancer indicate that more patients treated for rectal cancer will live with the consequences of treatment modalities [1]

The incidence of colorectal cancer is about 4% in patients younger than 50 year of age. However, the incidence of the disease increased at rate of 1.5% per year from 1992 to 2005 in this age group. The most significant increase has been detected in the 20-30 year age group, where there has been 2.5% increase in men and a 5.6% increase in women per year. [2]

Before the discovery of the Total Mesorectal Excision (TME), the incidence of post-operative sexual dysfunction was 40-60%. Sexual dysfunctions remain a recognized complication in spite of adoption of autonomic nerve preserving techniques in TME, [3]

Although benign lesions' resection doesn't need radical resection, some benign lesions require very deep pelvic dissection that may affect the branches of the pelvic nerves. These lesions include ulcerative colitis and familial polyposis coli. [4]

Male sexual problems include erectile dysfunction, absence of or retrograde ejaculation. Female sexual as decreased vaginal secretion,

dyspareunia and decreased ability to achieve orgasm[4].

Aim of the Work

The aim of this study is to evaluate sexual functions after colonic or rectal surgery. It included patients who performed colorectal surgery either for benign or malignant conditions. By using validated questionnaires; we studied these functional problems in relation to: sex, age, length of follow-up, type of surgical procedure, receiving neo-adjuvant and adjuvant therapy.

2. Patients and Methods

Patients

This study included 137 patients who underwent rectal or colonic surgery for malignant or benign lesions, either performed open or laparoscopic at Ain-Shams University hospitals and Minia university hospital, and who met the inclusion criteria.

Patients participated in this study either through clinic visits or by mailing an introductory letter or by telephonic conversation. Over the course of study, 74 male patients and 63 female were approached, participated and enrolled to the study.

Inclusion Criteria

1- Patients with rectal or colonic surgery for malignant or benign lesions who underwent open or laparoscopic resection.

2- Age: From 16 to 65 years

Exclusion Criteria

1- Patients who were dead or lost follow up for any reason

2- Severe mental and/or physical handicap.

3- Local recurrences for malignant cases.

4- Those in which the assessment of sexual function was difficult (e.g. elderly or sexually inactive patients)

5- Patients already suffering from any preoperative sexual dysfunction.

6- Patients who were unwilling to participate.

Methods

Informed consent was obtained from every participant. Data were kept confidential by replacing names on the questionnaires with a code number; all patients who accepted the study completed validated and specific questionnaires to assessing their problems. All questionnaires were translated in Arabic (appendix 1-5) and the results were analyzed and expressed in English. Each sex was analyzed by separate questionnaires for the sexual function.

The following data were recorded: age at study completion, sex, type of surgery, and type of intestinal reconstruction if any, early and late major complications, neo-adjuvant and adjuvant treatment received.

Recruitment and Data Collection

The Brief Sexual Function Index (BSFI) (appendix 2) was the tool to assess male sexual function [5], with main consideration in evaluation of

erectile function, ejaculatory function, libido, orgasm, and overall sexual satisfaction.

As regard female sexual function, the assessment was done by the Female Sexual Function Inventory [6] (FSFI) (appendix 3); was used to evaluate sexual function in females. This questionnaire included 19 items. It evaluates six areas, sexual activity, desire, excitement, lubrication, satisfaction, and dyspareunia. The possible answers are numerically coded, and the total score is calculated by summing up these codes. The scores in each functional area are multiplied by a fixed numerical factor according to their importance for defining total sexual function, the possible scores for this questionnaire range from 1.2 to 36.0.

Data Analysis

Data were entered into SPSS version 7.5 files. Descriptive statistics, frequencies, and i-tests were used to compare differences, one way repeated Patients and Methods measure ANOVA using a general linear model was chosen to explore the differences.

3. Results**Sample**

The patient database included 235 patients, of those 137 patients completed the questionnaire, 36 patients died at the time of study conduction, 15 patients refused to complete the questionnaires, 39 patients couldn't be reached and 8 due to other causes that are mentioned in the exclusion criteria. The final sample was 137 patients, 74 males and 63 females.

Patient Demographic and Clinical Data:

Patient demography, neo-adjuvant therapy, operative technique and adjuvant therapy are shown in (Table 1).

Table 1. Patient Characteristics and Clinical Data

Patients criteria	All Patients criteria 137	Male Patients criteria 74(54.01%)	Female Patients criteria 63(45.99%)
Age (mean ± SD)	44.14±15.67	43.54±15.41	44.87±16.09
Duration (mean ± SD)	31.65±28.44	32.11±30.47	31.1±26.07
Type of operation			
Open LHC	7(5.1%)	5(6.8%)	2(3.2%)
Lap LHC	11(8%)	6(8.1%)	5(7.9%)
Open IAR	31(22.6%)	16(21.6%)	15(23.9%)
Lap. LAR	27(19.7%)	15(20.3%)	12(19%)
Open APR	21(15.3%)	8(10.8%)	13(20.6%)
Lap. APR	17(12.4%)	9(12.2%)	8(12.7%)
Benign Operations	23(16.8%)	15(20.3%)	8(12.7%)
Neo-adjuvant			
Long course	62 (43.8%)	28(37.8%)	34(54%)
Short course	1 (0.7%)	1(13.5%)	0 (0%)
No	74 (54%)	45(60.9%)	29(46%)
Adjuvant			
Yes	88 (64.2%)	49(62.7%)	39(59.2%)
No	49 (35.8%)	25(37.3%)	24(40.8%)

LHC: left hemi-colectomy, LAR: low anterior resection, APR: abdomino-perineal resection

The age of our patients ranged from 16 to 65 years old (Mean \pm SD=44.14 \pm 15.67). Out of them 74(54.01%) were males and 63(45.9%) were females. Low Anterior Resection (either laparoscopic or open) was the predominant procedure in our study by 58 patients (42.4%). 38 patients (27.7%) underwent APR, 18 patients (13.1%) underwent left hemi-colectomy and 23 patients (16.9%) underwent surgery for different benign conditions.

The benign lesions included ulcerative colitis and familial polyposis coli. These lesions although being benign but need deep pelvic dissection that may be injurious to the pelvic nerves.

Sexual functions

Males

The BSFI analysis reflect a negative correlation between the overall total Score and age but the correlation was not significant (P value= 0.913) Table (2).

The overall symptom score revealed positive correlation between the total score and the duration relapsed between the time of the operation and the time of the questionnaire, but the correlation was also not significant (p- value= 0.907) table (3)

There was a non-significant trend towards male sexual dysfunction after APR. However, there was no significant differences in the total scores observed (p-value= 0.140, but the domain specific score for sexual drive tend to be significant worse after APR table (4).

Table 2. Correlation between sexual functions and age

In males		Age	
Questionnaire	Scores	r	P value
Sexual function	Sexual drive	0.052	0.753
	Erection	-0.273	0.078
	Ejaculation	0.172	0.248
	Problem assessment	0.063	0.689
	Overall satisfaction	-0.096	0.535
	Total	-0.018	0.913

Table 3. Correlation between sexual functions and duration

In males		Duration	
Questionnaire	Scores	r	P value
Sexual function	Sexual drive	0.038	0.804
	Erection	-0.055	0.716
	Ejaculation	-0.114	0.450
	Problem assessment	0.150	0.321
	Overall satisfaction	-0.044	0.774
	Total	0.018	0.907

Table 4. Correlation between sexual functions and operation

In males		Operation				P value
Questionnaire	Scores	LT hemocolectomy	LAR	APR	Benign	
Sexual function	Sexual drive	5.75 \pm 0.71	3.85 \pm 1.38	3.3 \pm 1.94	4.14 \pm 2.85	0.030*
	Erection	7 \pm 2.51	6.28 \pm 2.72	5.1 \pm 3.63	8.14 \pm 3.8	0.242
	Ejaculation	6.87 \pm 1.72	5.57 \pm 2.18	4.6 \pm 2.98	5.28 \pm 2.92	0.277
	Problem assessment	10.12 \pm 2.74	6.42 \pm 4.47	6.6 \pm 4.29	8.42 \pm 3.41	0.146
	Overall satisfaction	2.25 \pm 1.28	2 \pm 1.18	1.6 \pm 1.51	2 \pm 1.29	0.751
	Total	32 \pm 7.42	24.14 \pm 9.69	21.2 \pm 12.76	28 \pm 10.5	0.140

Table 5. Correlation between sexual functions and neo-adjuvant CRT

In males		Neo-adjuvant		P value
Questionnaire	Scores	Long course	No	
Sexual function	Sexual drive	3.14 \pm 1.7	4.58 \pm 1.78	0.015*
	Erection	6.14 \pm 3.39	6.64 \pm 3.06	0.625
	Ejaculation	4.64 \pm 2.49	5.93 \pm 2.41	0.107
	Problem assessment	5.07 \pm 3.95	8.61 \pm 3.82	0.007*
	Overall satisfaction	1.5 \pm 1.4	2.16 \pm 1.18	0.109
	Total	20.5 \pm 10.97	27.93 \pm 9.73	0.028*

Patients who received long course neo-adjuvant (Chemo Radio Therapy) reported significantly more problems with the sexual drive and problem assessment and there was a non-significant trend toward worse erectile, ejaculatory functions and overall satisfaction in the previously irradiated patients. Table (5).

Non-significant differences in overall sexual function or domain-specific scores were observed

between the group who received adjuvant chemotherapy and the group without.

Females

The FSFI scoring reflected a negative correlation between the overall total score and age, also there was non-significant negative correlation in the secondary end points (desire, arousal, orgasm and satisfaction) Table (6).

Table 6. Correlation between sexual functions and age

In females		Age	
Questionnaire	Scores	r	P value
Sexual function	Desire	-0.241	0.236
	Arousal	-0.107	0.588
	Lubrication	0.200	0.308
	Orgasm	-0.019	0.922
	Satisfaction	-0.151	0.443
	Pain	0.072	0.715
	Full score	-0.027	0.895

The overall symptom score revealed positive significant correlation between the total score and the duration relapsed between the time of the operation and the time of the questionnaire (p- value= 0.015) table (7).

Table 7. Relation between sexual functions and duration

In females		Duration	
Questionnaire	Scores	r	P value
Sexual function	Desire	0.314	0.118
	Arousal	0.080	0.686
	Lubrication	-0.068	0.730
	Orgasm	0.137	0.489
	Satisfaction	0.299	0.122
	Pain	-0.160	0.415
	Full score	0.472	0.015*

This study showed a non-significant difference in female sexual function either in the overall or domain-specific scores in any type of operation. However, there is positive trend towards sexual dysfunction after APR Table (8).

Table 8. Correlation between sexual functions and operation

In females		Operation				P value
Questionnaire	Scores	LT hemocolectomy	LAR	APR	Benign	
Sexual function	Desire	3.8±.34	3.05±1.26	2.6±1.11	3.84±0.91	0.246
	Arousal	3.6±0.6	2.83±1.69	2.7±1.16	2.9±1.52	0.852
	Lubrication	4.2±1.5	3.64±1.87	4.2±0.73	4.25±2.09	0.855
	Orgasm	3.46±1.97	3.29±1.75	3.53±1.25	3.73±2.11	0.965
	Satisfaction	4.53±0.46	3.93±1.15	3.8±1.42	3.66±1.39	0.787
	Pain	3.86±0.46	3.29±1.78	3.33±0.86	3.73±2.03	0.910
	Full score	23.46±4.24	19.49±8.61	20.16±5.53	25.24±3.26	0.426

Non-significant differences in overall sexual function or domain-specific scores were observed between the group who received neo-adjuvant chemotherapy or adjuvant therapy and the group without Table (9).

Approximately 24 % of male patients and 14 % of females in the APR group had sexual dysfunction as shown in Table (10).

Table 9. Correlation between sexual functions and neo-adjuvant chemoradiotherapy

In females		Neo-adjuvant		P value
Questionnaire	Scores	Long course	No	
Sexual function	Desire	2.91±1.09	3.46±1.17	0.226
	Arousal	2.74±1.35	3.04±1.52	0.598
	Lubrication	3.87±1.46	4.02±1.84	0.824
	Orgasm	3.41±1.52	3.49±1.84	0.905
	Satisfaction	4.03±1.21	3.81±1.18	0.637
	Pain	3.23±1.38	3.65±1.69	0.481
	Full score	20.21±6.72	22.21±7.17	0.469

Table 10. Incidence of sexual dysfunction in males and females after different operations

In males		Operation			P value
	LT hemocolectomy	LAR	APR	Benign	
Sexual function					
Not affected	9(81.8%)	28(90.3%)	13(76.4%)	14(93.3%)	0.694
Affected	2(18.2%)	3(9.7%)	4(23.6%)	1(6.7%)	
In females		Operation			P value
	LT hemocolectomy	LAR	APR	Benign	
Sexual function					
Not affected	7(100%)	25(92.6%)	18(85.7%)	8(100%)	0.802
Affected	0(0%)	2(7.4%)	3(14.3%)	0(0%)	

4. Discussion

This study was conducted to evaluate sexual dysfunction after colorectal surgery and the effect of different factors as sex, age, and type of rectal surgery, effect of neo-adjuvant and adjuvant therapy on these functions after surgery. Results were compared with other studies. Most of the previous studies included relatively smaller number of patients [7]. The Dutch multicenter trial studied 1861 patients with rectal cancer [8].

In current study, the patients' mean age was 44 years; this mean age is less than the mean age in most previous studies. The average age of the patients was 63 years and median age was 64 [9]. In Daniel et al study [10] they studied 18 female patients with mean age 65.5 year, the mean age in Vironen et al was 68 year [11]. This can be explained by the high incidence of rectal cancer which constituted most of our patients in young age. This young age group also allowed more reliable evaluation of sexual function. The current study also evaluated the effect of benign colorectal surgeries on postoperative sexual function; few studies examined the morbidity of surgery for benign diseases

on genital functions. Only Ovrebø et al examined the frequency of urogenital dysfunctions after rectal surgery for inflammatory bowel diseases in 15 males and 11 females, most of other studies were performed for cancer patients. [12]

The weakness of our study can be shown by absence of objective pre-operative information on organ function. Furthermore, no postoperative laboratory tests were done to confirm the dysfunction reported by the patients. Another defect is shown by missing surveys: the fact that sexually inactive patients cannot answer the questionnaire resulted in a relatively small number of patients. Furthermore, in order to obtain a clear discussion with the patients when obtaining informed consent for treatment, larger prospective studies are needed to clarify the morbidity.

The BSFI analysis in males showed deterioration of the sexual function with increase age as regard the ejaculation and overall satisfaction but these results was insignificant. Other studies have shown deterioration of sexual function over time [13, 14]. This also agrees with Qiu et al 2008 [15] who concluded that sexual dysfunction rate in men 50 years

old or above was slightly higher than in those under 50 years old, however no significant difference was seen between both groups, the result disagrees with Nishizawa et al [16]; they found that there were no differences in the incidences of erectile or ejaculation function by age. It is important to explain that elderly patients may suffer a preoperative decrease in sexual function. This may be physiological or related to a higher prevalence of chronic debilitating diseases.

The current study showed a non-significant trend towards sexual dysfunction in males after APR, but the domain specific score for sexual drive tend to be significantly worse following APR. This agrees with other studies [17-20]. The role of the perineal procedure in the occurrence of sexual dysfunction is clarified by the higher incidence of erectile dysfunction after APR. Distal branches of the pelvic autonomic nerves passing toward the penis are usually at risk during the perineal resection. In addition, the division of the levator ani and the transverse perineal muscles may affect erectile function by altering pelvic floor anatomy after perineal resection. The incidence of sexual dysfunction resulting from a proctocolectomy performed for benign conditions as inflammatory bowel diseases are very low at 0–20% as surgery can be restricted to the rectum without including the mesorectum [9].

Henderen et al. [21] reported that 43% of sexually active and 69% of all males had impaired International Index of Erectile Function (IIEF) scores after surgery for rectal cancer. Using a visual analog scale (VAS) for sexual activity, libido, potency, and ejaculation in 27 men undergoing rectal cancer surgery, Nesbakken et al. [22] reported reduced VAS score by 50%. Enker et al. [20] reported sexual function preservation in 56% of males undergoing abdominoperineal resection and in 86% of patients undergoing sphincter preservation. Impotence was reported by Santangelo et al. [21] in 44% and 26% of patients who underwent APR and anterior resection. The rate of genital dysfunction in patients underwent surgeries for benign conditions were 6.7% of male patients suggesting the possibility of nerve injury in benign conditions in spite of nerve sparing techniques. This was also concluded by Nesbakken et al. [22] who conducted a study on rectal surgery for inflammatory bowel disease on 26 patients; the rate of sexual dysfunction was 22% for males and 11% for the female patients.

The current study concluded that patients who received long course neo-adjuvant chemoradiotherapy (CRT) showed significantly more problems with the sexual function and there was a non-significant trend towards worse erectile, ejaculatory functions and overall satisfaction in previously irradiated male patients. Bonnel et al. [23] supported our results showing that patients that

received preoperative pelvic radiotherapy had worse ejaculatory function after surgery than those who didn't receive radiotherapy. These results suggest that preoperative pelvic radiotherapy may have a cumulative effect on sexual dysfunction after surgery for rectal cancer. Contin et al. [24] compared the sexual function of patients received preoperative short-term radiotherapy and long course adjuvant to that of patients who underwent only surgery. The female gender proved to be the only risk factor. But according to the recent European Registry of Cancer Care (EURECCA) consensus meeting [25], a general outcome noted that long-term sexual functions are significantly affected after neo-adjuvant treatment compared with patients who underwent surgery alone. Ejaculatory dysfunction is the most notable outcomes.

This may be explained either by that radiotherapy increases fibrosis and makes rectal dissection more difficult causing increased iatrogenic injury, or that radiotherapy causes vascular damage and makes the pelvic nerves more susceptible to ischemic damage. Also, nerve function could be affected due to the direct effect of radiotherapy. According to other study, the negative effects of preoperative pelvic radiotherapy were detected in men [26]. Lange et al [27]; however, an international multicenter trial concluded that surgery itself is the main factor erectile or ejaculatory problems and not the pre-operative radiotherapy [28]. Also Bruheim et al. [29] studied the sexual function in males after radiotherapy for rectal cancer. The difference was statistically significant. Non-significant differences in overall sexual function or domain-specific scores were noticed between the group who received adjuvant chemotherapy and the other group.

There is no much information about sexual function after colorectal surgery in females. Vaginal irritation or fibrosis caused surgical trauma or radiation may cause the dyspareunia and loss of vaginal lubrication. Many items of the neurophysiology of female sexual functions are unclear. However, there are many reasons to believe that nerve injury which can cause severe dysfunction in females as well as in male patients [30, 31]. Female patients represented 45.99 % (63 patients) of our sample. In the study on sexual function of the CLASICC trial participants (16), meaningful conclusions regarding female sexual function were not dependable because the response rates were low and there was a large amount of missing data. In this study, only nine females were sexually active. Three of these patients reported dyspareunia or other symptoms affecting their sexual life. We cannot get any conclusions on functional outcome from such a small number of patients [11].

The FSFI scoring reflected a negative correlation between the overall total score and age, also there was non-significant negative correlation in (desire, arousal, orgasm and satisfaction). The sexual scores of the women aged 50 years and below were decreased significantly [32]. The overall symptom score revealed positive significant correlation between the total score and the length of follow up. This study showed a non-significant difference in female sexual function either in the overall or domain-specific scores as regard the type of operation. In the Dutch TME trial, no differences were seen between patients who underwent an APR versus an anterior resection [33]. Non-significant differences in overall sexual function or domain-specific scores were observed between the group who received neo-adjuvant chemotherapy or adjuvant therapy and the group without.

In this retrospective study, we focused on the frequency of sexual dysfunctions after colonic or rectal surgery. The highest decrease in postoperative functions was for the APR group which was reported by 14.3% of patients for sexual functions, while the rate for sexual dysfunction after LAR was 10%. These results are lower than the results of Havenga et al. [8] He studied 46 women after rectal cancer resection and reported a 46% incidence of dyspareunia. Henderen et al. [21] reported that from a cohort of 79 females, 39% of sexually active women had Female Sexual Function Index (FSFI) scores that were considered abnormal after surgery for rectal cancer. In Nesbakken et al. [22] study; three of six women reported reduction of libido and sexual activity postoperatively by 50%.

Conclusions

Approximately 20 % of males and 14 % of females in the APR group had sexual dysfunction. The current study showed a non-significant trend towards male and female genital dysfunction after APR with significantly more erectile dysfunction in male patients. Preservation of the autonomic nerve is of major importance, particularly in low rectal resection to avoid sexual dysfunction. Neo-adjuvant CRT is the risk factors for sexual dysfunction in male patients.

Recommendations

Results in this study were at risk of bias due to small sample size and heterogeneous population, thus further prospective researches are needed to define clearly the morbidity and allow an accurate discussion with the patients before obtaining informed consent for surgery.

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