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### RESEARCH ARTICLE

#### IMPACT OF SURGICAL TREATMENT ON SEXUAL FUNCTION IN RECTAL CANCER

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#### Abstract

**Introduction:** The development of new surgical techniques and medical devices, like therapeutical multimodal approaches has allowed for better outcomes on patients with rectal cancer. Owing to that, an increased awareness and investment towards better outcomes regarding patients' sexual and urinary function has been recently observed.

**Objective:** Evaluate and characterize the sexual dysfunction of patients submitted to surgical treatment for rectal cancer.

**Materials and Methods:** An observational retrospective study including all male patients who underwent a surgical treatment for rectal cancer between January 2015 to December 2019. A total of 113 patients were included in the study. All patients were underwent major surgery for rectal cancer. An inquiry questionnaire presented to every patient about its sexual habits and level of function before and after surgery.

**Results:** All patients included in the study were males. Patient age range between 40-75 years with mean age of 57 years. Surgical procedure was rectum anterior resection (RAR) in 62(54.8%) patients and an abdominoperineal resection (APR) in 51(45.1%). 71(62.8%) patients described their sexual life as important/very important. Sexual function worsening was observed in 83 (73.4%) patients with complains of erectile dysfunction and ejaculation impairment. 30 (26.5%) patients didn't resume sexual activity after surgery. Increased age ( $p=0.06$ ), surgery performed (APR) ( $p=0.04$ ) and the presence of a stoma ( $p=0.04$ ) were predictors of erectile dysfunction after surgery.

**Conclusions:** This study demonstrated the clear negative impact in sexual function of patients submitted to a surgical treatment for rectal cancer. Since it is a valued feature for patients, it becomes essential to correctly evaluate/identify these cases in order to offer an adequate therapeutical option.

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#### Introduction:-

Colorectal cancer is one of the world's most common tumour, ranking fifth in Pakistan. Surgical therapy for colorectal cancer was used by nearly 10% of cancer survivors.<sup>(1)</sup> Currently, multimodal treatment is the gold

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standard, which usually includes some form of surgery. These patients have a higher chance of surviving due to improved results from existing therapies and an earlier stage of diagnosis. According to this, the goal of colorectal cancer treatment is not only to manage the disease, but also to minimize the side effects of the treatments.

Pelvic surgery is one of the most prevalent causes of both male and female urinary and sexual problems. Every patient who has a rectal cancer surgical excision (whether an abdominoperineal resection APR or a rectal anterior resection RAR) is at risk for these adverse effects.

Interestingly, 20-40% of these patients do not restart sexual life after surgery and 23-69% of men identify a de novo sexual dysfunction.<sup>(2-4)</sup> Neuronal injury is the classic explanation for the observed dysfunction. However, other factors like altered body image related to intestinal stoma or some side effects related to chemotherapy and radiotherapy may also play a role.

For many years the surgical approach described by Miles et al abdominoperineal resection APR was the only treatment option for these patients<sup>5</sup>. It has been linked to 44% of post-operative erectile dysfunction. More recently, with the development of new surgical techniques and medical devices, the morbidity associated with colorectal cancer surgical therapy has dropped dramatically, owing mostly to the use of RAR to remove the top two-thirds of the rectum. The complete mesorectal excision (TME) idea proposed by Heald and Ryall, has resulted in an improvement in disease-free survival rate as well as urinary and sexual dysfunction.<sup>(6)</sup>

The autonomic nervous system plays a major role in sexual and urinary function. Sympathetic system, through the superior hypogastric plexus and the hypogastric nerves that runs para aortic and on the posterolateral mesorectal surface, is associated to ejaculation and urinary continence mechanism. Parasympathetic system, through the inferior hypogastric plexus, the pelvic and cavernous nerves, which are located laterally in pelvis at the level of the rectal lower third, is involved in the entire erection and micturition mechanisms. According to this, all surgical procedures in pelvis are related to some degree of dysfunction of these systems.<sup>7,8</sup>

Some surgical techniques with nervous preservation have been proposed with the aim at decreasing these effects. Walsh and Mostwin in 1984 have described the preservation of cavernous nerves in radical prostatectomy which have accomplished an increase in the erectile function of these patients.<sup>9</sup> However, this principle is still seldom applied and studied in other pelvic surgeries. On the other hand, there are some cases where there are some factors that do not allow the application of that preservation, like a locally advanced tumor or some anatomic individual variability.<sup>10</sup>

Besides the clear evidence of real negative impact of these surgical techniques (whether APR or RAR) in sexual and urinary function, only a few articles have studied this subject. It seems that abdominoperineal resection is significantly associated with higher sexual dysfunction rates than rectal anterior resection.<sup>11-13</sup>

The purpose of this study is to assess sexual dysfunction following surgical treatment for rectal cancer and to determine which risk variables may predict this side effect after surgery..

### **Materials and Methods:-**

This is an observational retrospective study including 113 male patients who underwent surgical treatment for colorectal cancer between January 2015 to December 2019 in the Department of General Surgery Hayatabad Medical Complex Peshawar. Data on demography, tumor location and stage, surgical technique, comorbidities and postoperative complications were collected. Afterwards, an inquiry questionnaire was made to every patient about its sexual habits and level of function before and after surgery.

Inclusion criteria were male gender, surgical technique (APR or RAR), sexually active before surgery and with cognitive ability to answer the questionnaire. Emergent procedure, terminal state and death at the time of this study were excluded from the study.

A comparative analysis was performed between patients with and without erectile dysfunction (ED) after the surgery. A sub analysis focused on patients without pre-operative ED was made to compare those who did not experience any decrease in their sexual function with the ones who developed erectile dysfunction. A matched-pairs analysis was conducted to evaluate possible differences between the pre- and postoperative data, by means of t-test.

P value <0.05 was considered as statistically significant. Statistical calculations were performed using SPSS®, version 27.0.

### Results:-

A total of 113 male patients with rectal cancer were submitted to surgical treatment. The surgical procedure included a rectum anterior resection (RAR) in 62 (54.8%) patients with open approach in 55(88.7%), and 7 (11.3%) with laparoscopic approach. Abdominoperineal resection (APR) in 51 (45.1%) patients, 40 (78.5%) open and 11 (21.5%) laparoscopic. Most cases were at stage III 70 (62%), stage II in 30(26.5%) and only 13 (11.5%) at stage IV (Table 1). The average time interval between the end of radiotherapy + chemotherapy and the surgery was 7.5 ( $\pm$ 1.4) weeks.

The importance of sexual life can be seen in 9(7.9%) patients considering it “without importance”, “little importance” in 13(11.5%), “important” in 20(17.6%), “much importance” 30 (26.5%) and 41(36.2%) considered it “most important” (Figure-1).

Postoperatively in 83(73.4%) patients some degree of change in sexual function has been observed while 30 (26.5%) patients didn't resume sexual activity after surgery. Among 83 patients, 52(62.6%) reporting some erectile impairment, 21(25.3%) some ejaculatory impairment. Stoma presence have been described as a limiting factor by 10(12%) of patients. (Figure 2). Patients with and without ED compared after surgery and found differences in these groups regarding their age ( $p=0.007$ ), surgery performed ( $p=0.03$ ) and the presence of a stoma ( $p=0.03$ ). It revealed that APR and presence of comorbidities (smokers and diabetic patients) were predictors of erectile dysfunction after surgery.

**Table 1:-** Surgical Approach & Tumour Stage / Grade.

Surgical technique	Frequency	Percentage
Rectum anterior resection		
RAR	62	54.8%
Open approach	55	88.7%
Laparoscopic approach	7	11.3%
Abdominoperineal approach		
APR	51	45.1%
Open approach	40	78.5%
Laparoscopic approach	11	21.5%
Tumour grade		
Grade II	30	26.5%
Grade III	70	62%
Grade IV	13	11.5%

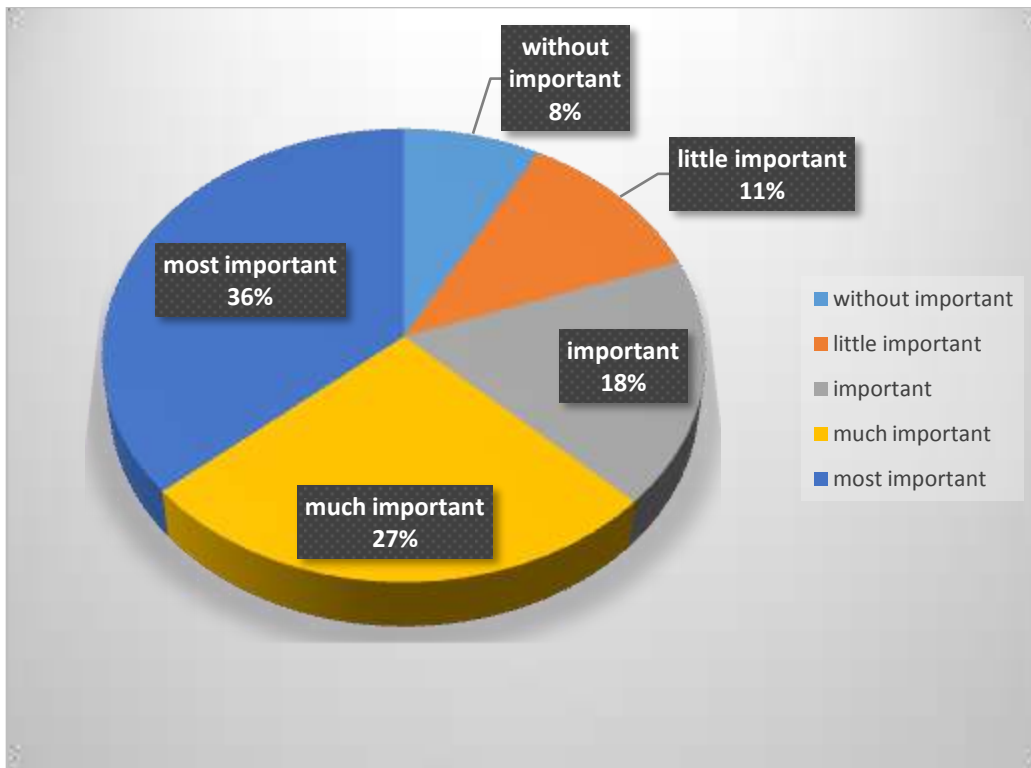


Figure 1:- Importance of sexual activity.

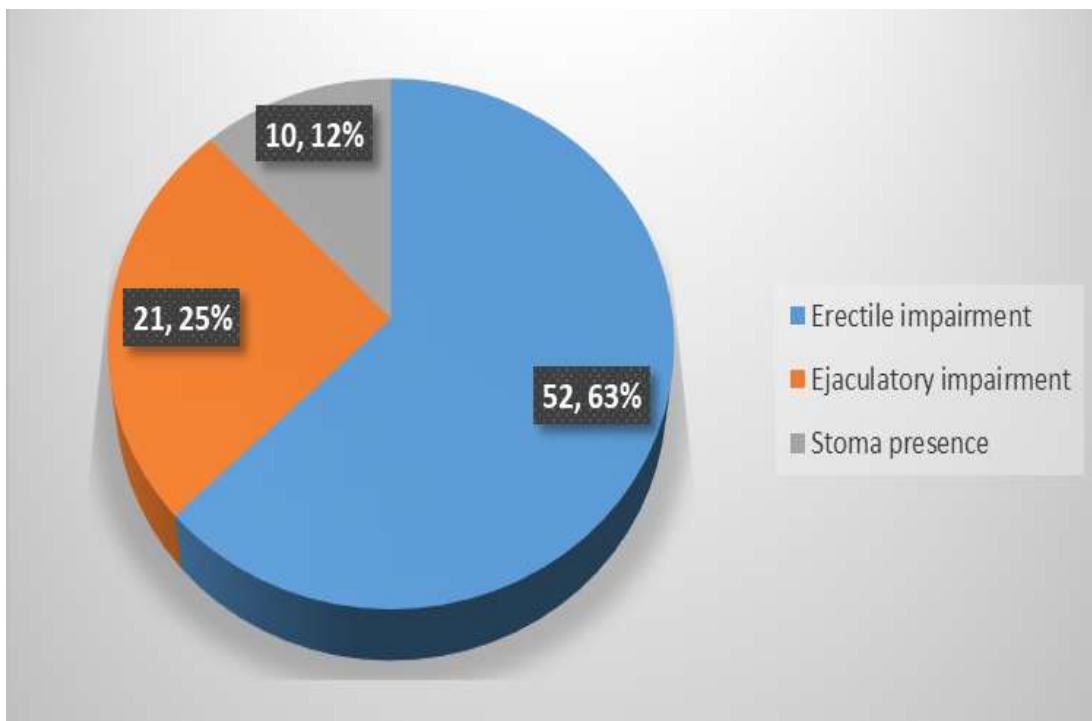


Figure 2:- Postoperative change in sexual function.

**Discussion:-**

This study presents the impact of rectal surgery for oncologic purposes on sexual function of male patients. In fact, 73% experienced some difference in their sexual habits. Probably the most alarming result is that 27% of patients did not resume their sexual life.

Oncologic treatment outcomes usually consider only mortality rates or disease free survival. However, owing to the success of these treatments, nowadays an investment on patient's quality of life is observed. It is precisely in that setting that sexuality is considered to be a major topic regarding an evaluation on someone's quality of life<sup>(14)</sup>. The results that are presented support this study, since 80% of patients consider sexual life as being "important", "with much importance" or "the most important".

Amongst the dysfunctions that were found, erectile dysfunction (ED) represented the most common one. The pre-surgical rate of ED (45%) is considered normal. Nonetheless, the increase in this rate after surgery is notorious approximately 80%. The cause of this dysfunction is considered to be multifactorial, since factors like altered body image perception (mainly in patients with a stoma) and radiotherapy seems to have some influence.<sup>15,16</sup> However, probably it is the neuronal injury (chiefly at the parasympathetic nervous system, at the inferior hypogastric plexus level that most contributes to this impairment, revealing that the adoption of surgical techniques with vasculonervous preservation when feasible, may also be important to improve outcomes.<sup>17</sup> In this study, increased age, surgical technique and the presence of a stoma revealed some degree of association with the presence of ED post-operatively. Interestingly, only 49% consider the stoma to be an important factor. When trying to define the weight of each variable for the outcome of "post-operative ED" it was found that age was the only independent factor, with an estimate doubling risk of developing ED after surgery for each decade of age.

Since this analysis could be biased by a high percentage of patients already with ED in the preoperative setting, a secondary analysis managed to define risk factors for developing an ED secondary to surgery. It was found that those risk factors were the type of surgery, the level of tumor in the rectum and the presence of comorbidities. The type of surgery itself was already predictable to be a risk factor. Also the tumor level, since it influences directly the surgery approach, coincident to what other groups revealed. A difference in these results is mainly the importance of comorbidities for the outcome of this surgery. In the multivariate model it became stressed that type 2 Diabetes Mellitus and/or tobacco smoker, when present, increased 21 times the risk of a patient developing ED.

In a prospective study by Sendur et al presented a post-operative erectile dysfunction rate after colorectal neoplastic surgery of 83%.<sup>(18)</sup> Risk factors already described are increased age, presence of stoma, radiotherapy, technique applied, tumor stage and surgeon's experience.

This study, however, has many limitations. First, the small number of cases - similar to other series published, this is an issue that limits the statistical power of the conclusions. The absence of an independent association with established risk factors for *de novo* ED, mainly the tumor location (lower third), the APR technique and radiotherapy is elucidative of this issue. Larger studies are lacking in order to confirm results purposed by the different studies available. Second, the study design as a retrospective study it is contaminated with many bias, like selection bias (since only patients that survived at the time of the study were included) and it does not allow to generalize these conclusions to all patients that went through these surgical approaches. Third, sexual function whether pre-or post-operative may not be completely trustworthy, since it was reported retrospectively by patients, and at different post-operative time.

The simple detection of this impairment does not imply an increase in the actual quality of life of these patients. One of the major goals of this study was to try to define which patients would be at the higher risk to develop a *de novo* ED. Every patient must be aware of the risks and consequences of each procedure. However, since usually the sexual life is considered to be a sensible topic, it is expected to be the doctor to ask the patient about this domain instead of passively waiting for the patient to expose their complaints. As a matter of fact, the correct identification of a patient with sexual dysfunction allows the physician to correctly direct him to proper treatment or even an evaluation on a Urology / Andrology consultation. The neuronal injury mechanism previously exposed explains the partial inefficacy of oral phosphodiesterase inhibitors. Regarding studies on patients after a radical cystoprostatectomy or a radical prostatectomy, the adoption of "penile rehabilitation" before and after surgery may increase the sexual function indexes of these patients and might play a role in patients submitted to rectal cancer surgeries.<sup>19</sup>

**Conclusions:-**

Sexual dysfunction is a typical side effect in people who have undergone colorectal cancer surgery. Aside from this the significant incidence of past sexual impairment due to the age of these patients, the unfavourable influence of this surgical therapy on sexual function was clearly confirmed.

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