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Urinary and sexual morbidity after total mesorectal excision in male patients

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Abstract
Introduction: The present study evaluate the morbidity of total mesorectal excision (TME) with autonomic nerve preservation of rectal cancer concerning urinary and sexual complications in male patients.
Patients and Methods: Forty men underwent total mesorectal excision as a treatment of rectal cancer were evaluated post-operatively through regular examination, follow up, and questionnaires regarding urinary and sexual functions outcome.
Results: Erection was possible in 32 out of 40 patients (80%); penetration ability was possible in 30 patients (75%). Inability for erection and intercourse occurred in 4 patients (10%), and retrograde ejaculation in 1 patients (2.5%). Bladder voiding dysfunction was reported in 6 patients (15%).
Conclusion: Total mesorectal excision gave favorable results as regards sexual and urinary function outcome, and should be recommended as the surgical technique of choice for proctectomy.

Keywords: Rectal cancer, Total mesorectal excision, Urinary dysfunction, Sexual dysfunction.

Introduction

Peri-fascial rectal excision, also called total mesorectal excision, with preservation of the pelvic autonomic nerves has become the gold standard for rectal cancer surgery. Total mesorectal excision defined as excision of the rectum with the surrounding mesorectum enclosed by the visceral pelvic fascia and lateral ligaments till the level of levatorani muscle (pelvic floor). Transection of the surrounding mesorectum at a level near the rectum considered sub-total mesorectal excision. Today, total mesorectal excision, has become the gold standard for rectal cancer surgery [1].

Why total mesorectal excision? Intramural spread of rectal cancer occurs more in the transverse axis rather than longitudinal one of the rectal wall. Spread of rectal cancer within the mesorectum occurred not only upward but also downwards. Total mesorectal excision aims at free circumferential resection margin, with acceptable low local recurrence (4-8%), and high 5 years disease free-survival (70-80%) [2].

There are four major objectives in the treatment of patients with rectal cancer: local control of the disease; long-term survival; preservation of the anal sphincter, bladder, and sexual function; and improvement of quality of life. These can be achieved with accurate pre-operative staging, appropriate referral for neoadjuvant therapy, and a precise surgical technique using the principles of total mesorectal excision [3].

Despite, there is a growing debate about health-related quality of life for patients after rectal cancer surgery with a better prognosis of total mesorectal resection. Local recurrence, and urinary and sexual dysfunction are still debilitating serious problems. Normal urinary bladder and sexual function is controlled by superior hypogastric plexus (sympathetic) and from the pelvic splanchnic nerves (parasympathetic). Injury to the sympathetic nerve supply results in bladder instability and ejaculatory difficulties, whereas injury to parasympathetic nerve supply results in poor bladder contraction and erectile dysfunction [4].

The fourth pelvic parasympathetic nerve (S4) is of utmost importance, it travel close to the inferior vesical vein. It is essential for the sensation and voiding function of the urinary bladder, and therefore, selective preservation of this nerve proves beneficial in preserving urinary function. Unfortunately, these nerves are located near to the mesorectum that they are liable to be injured during total mesorectal resection. Direct visualization and accurate dissection during mesorectal resection is important for the preservation of pelvic autonomic nerves [5].

Postoperative urinary and sexual dysfunction resulting from inadvertent damage to the pelvic hypogastric and splanchnic nerves is a recognized complication of rectal resection. Before the introduction of total mesorectal resection, the incidence of post-operative urinary and sexual dysfunction was 10-30% and 40-60%, respectively. Even with the incorporation of autonomic nerve-preserving techniques in total mesorectal resection, urinary and sexual dysfunctions remain recognized complications in 5-12% and 10-35% of patients, respectively [6].

This clinical study evaluated male sexual and functional outcomes in a consecutive series of patients who underwent total mesorectal resection for rectal cancer.

Patients and Methods

Sixty males with histologically proven primary adenocarcinoma of the rectum who underwent autonomic nerve-sparing mesorectal excision were studied. The patients had no history of urinary and/or genital operations or preoperative urinary or genital dysfunction. Exclusion criteria were documented preoperative erectile and/or urinary dysfunction, metastatic disease, and T4 stage disease [TNM American Joint Committee on Cancer]. Also, patients who had

direct invasion of the autonomic nerves found intraoperatively were excluded from the study.

Diagnosis and staging were made through rectal examination, colonoscopy and tissue biopsy, and computed tomography. The position of the tumor and distance from the anal verge were also estimated at colonoscopy. Tumors were categorized according to the distance above the anal verge as being in the lower rectum (up to 6 cm), mid-rectum (7-11 cm), and upper rectum (12-15 cm).

When digital examination disclosed a neoplasm reaching the anatomic anal canal, a cylindrical abdominoperineal resection was performed in all patients. Autonomic nerve-sparing total mesorectal excision was performed when no direct invasion of the autonomic nerves was found intraoperatively. In the case of adherence or infiltration of the tumor, the hypogastric nerves and/or the inferior hypogastric plexus were sacrificed unilaterally or bilaterally.

Expected stoma site should be marked in the surgical ward before the patient transferred to the theater. Although mechanical bowel preparation is not mandatory in the opinion of some surgeons, it is considered to be a standard step by most of the surgeons and should be remain the standard until more recent studies are conclusive.

Elastic bandages applied to both lower limbs is mandatory before induction of anesthesia, as this is the second common site where deep venous thrombosis occurs. Early postoperative use of subcutaneous fractionated heparins is beneficial in DVT prevention in selected high risk patients. Intravenous antibiotics known to be active against Gm-ve bacteria and anaerobes given intravenously about one hour before skin incision for maximal effect in prevention of wound sepsis.

Patient is positioned on the operating table in the supine or modified-lithotomy position, a suitable Foley's catheter is applied, and the rectum is washed with saline/povidone iodine (1:1) solution. The aim of surgery is en bloc excision of the rectal tumor (with safety margin) with complete pararectal lymph nodes and lymphatics dissection as they impeded in the mesorectum. Additional pelvic lymphadenopathy should be dealt with according to stage of the tumor [7].

One important oncologic principle for proctectomy is sharp dissection of the rectum and mesorectum. This guard against disruption of the mesorectum and dissemination of the tumor, and sharp dissection is considered to be meticulous approach for identification of important structures adjacent to the surgical field and avoids accidental injury to it.

Also blood loss proved to be less with this maneuver. Blunt dissection of tissue in rectal cancer surgery results in poor outcome via unorganized circumferential edges, where the indistinct distraction of tissues rather than proper surgical principles determines the borders of surgical resection.

The lateral dissection should not exceed the proper fascia of the rectum, just staying outside the mesorectum. Also, the rectum must be mobilized posteriorly and anteriorly to afford adequate distal margin. This should include sharp dissection through Denonvillier's fascia anteriorly and Waldeyer's fascia posteriorly.

The abdominal cavity is entered through a long midline incision. Meticulous exploration for metastases is started including hepatic bimanual palpation. The pelvis is also explored to ensure resectability of the rectal tumor. In the absence of wide spread metastatic disease or an unresectable primary tumor, the abdominal phase of the operation is started. Attention is first focused on lateral attachments of the descending and sigmoid portions of the colon. Incision is made along the lateral side of peritoneal reflection ("white line of Toldt") and the plane between colonic mesentery and retroperitoneum is entered. This avascular plane can be quickly advanced using a combination of upward and medial traction on the descending colon, lateral traction applied to the retroperitoneum, and scalpel or scissor dissection. The left ureter should be explored and retracted laterally.

Mobilization of the mesentery of the left colon continue to the midline until the peri-aortic tissues are reached. After this point, mobilization of the splenic flexure is started. The greater omentum is separated from the l half of the transverse mesocolon by lesser sac entering and continuing dissection downwards to the mesentery base. Dissection is continued upwards and around the splenic flexure to split the phrenicocolic and splenocolic ligaments and freeing the flexure. Now, the left colon is completely mobilized to the midline, the inferior mesenteric artery is identified and ligated at its origin from the aorta preserving the small fibers of the pre-aortic sympathetic/superior hypogastric plexus. These nerves should be dissected from the inferior mesenteric artery by maintaining dissection plane between the aorta and inferior mesenteric artery flush with the posterior wall of the artery.

Also, the inferior mesenteric vein is divided at this level. The proper left colic artery is ligated and divided in a manner that the ascending and descending branches communication of the artery is maintained. Dissection is then continued down to the edge of the distal descending colon with the course of the descending branch of the left colic artery. This will maintain good blood supply to the colostomy or anastomosis from the middle colic artery. Marginal artery is ligated and divided at this level. Then the descending colon is divided between intestinal clamps.

The pelvic part of surgery is then started. The tissue plane posterior to the inferior mesenteric artery in the midline is dissected sharply. This dissection is continued over sacral promontory down into the pelvis. Dissection plane is between presacral fascia and mesorectal investing fascia.

Hypogastric nerves must be identified and preserved. Once they have retracted laterally out of injury way, the lateral ligaments of the rectum can be divided close to the sidewall of the pelvis. This dissection is best performed using Ligasure or Ultracision.

The anterior dissection is started by incising the peritoneal reflection between the urinary bladder and the anterior wall of the rectum.

If the mass originated from the anterior rectal wall, peritoneum must be incised anterior to the reflection as this will facilitate entering the plane of dissection between seminal vesicles/prostate gland and Denonvilliers' fascia. This preserves a fascial covering of the tumor, but increase incidence of injury to parasympathetic nerves, which present anterior to Denonvilliers' fascia.

For posterior wall cancer, dissection begins posterior to the peritoneal reflection between Denonvilliers' fascia and anterior rectal wall to decrease incidence of nerve injury. Once complete rectal mobilization achieved distal to the tumor, rectum is divided and anastomosis created manually or using circular stapler.

The incision through Denonvilliers' fascia should be created in a U-shaped fashion to prevent neurovascular bundles damage that supply the seminal vesicles (anterolateral to the rectum). Denonvilliers' fascia is applied closer to the prostate than the rectum, just anterior to the fascia propria and dissection proper

plane. By preserving Denonvilliers' fascia, post-operative sexual morbidity can be minimized without compromisation of the oncologic outcome of the procedure.

If the case of abdominoperineal resection, the low rectum is not divided. The anus is closed with a purse-string suture to prevent shedding of tumor cells. An elliptical incision is made around the anus from the tip of the coccyx, ischial tuberosities, to the mid perineal body. Incision is deepened into ischiorectal fossa following the bloodless plane between perirectal fat and the sphincters. Levators are divided at first posteriorly under the coccyx, then incision is extended laterally.

The upper end of the resected specimen is brought out from the posterior perineal wound. Anterior dissection is completed under vision in a retrograde fashion. This technique provides excellent exposure and decrease the risk of injuring the distal ureters, prostate gland, and urethra. After specimen removal, perineal wound is irrigated and closed using interrupted 0-vicryl sutures (figure-of-eight). The skin is closed over suction drain with vertical mattress stitches of 3–0 vicryl.

In anterior resection, the anastomosis was performed manually or with stapler. Although not routine practice, a protective stoma with a transverse loop colostomy may be performed in selected patients with mid- rectal tumors when the total mesorectal excision was performed. The colostomy was closed after approximately 2-3 months.

Follow-up consisted of regular visits at 3-month intervals for the 1st year. Follow-up studies aims at detection of distant metastases or local recurrence, patients were followed up by physical examination, CEA assay every 3 months, chest X-ray and pelviabdominal CT, and colonoscopy every 6 months.

Bladder and sexual functions were evaluated with a self-administered questionnaire after the initial surgery. Regarding bladder function, the questionnaire inquired about incomplete bladder emptying, urgency, interruption of micturition, reduced force of flow, need to strain, incontinence, dysuria, and need for self-catheterization [International Prostate Symptom Score (IPSS)]. Uroflowmetry was done to detect maximum flow rate (ml/sec) and amount of voided urine (ml). Bladder dysfunction was classified as major in patients with incontinence or self-catheterization and as minor with other symptoms.

Male sexual function was evaluated. Patients were given a questionnaire on sexual function, and responded to questions concerning libido, erectile potency and the ability to accomplish sexual intercourse, ejaculate, and experience orgasm [Erectile Function domain score in International Index of Erectile Function (IIEF-EFD) and Ejaculation domain score in Male Sexual Health Questionnaire (MSHQ-EjD)]. Patients underwent Duplex ultrasound and pulsed Doppler analysis to detect impaired hemodynamic blood flow parameters to record systolic occlusion pressure in the cavernosal arteries of the penis.

Results

Sixty patients with adenocarcinoma of the rectum were enrolled. After exclusion of four patients who were not sexually active and two had a history of urinary incontinence before the surgical resection, four with T4 stage disease, three with metastatic disease, four with infiltration of the nerves by the tumor (the hypogastric nerve was sacrificed), and three partial mesorectal excisions (upper rectal tumor). Thus, 40 patients fulfilled criteria of selection and ultimately evaluated.

Patient characteristics are summarized in Table 1. The mean age at surgery was 48.6 (26-56) years; the distance between the tumor and the anal verge was 6.4 (3-13) cm; tumor stage was pT1 in 10 (25%) patients, pT2 in 10 (25%), and pT3 in 20 (50%); and node stage was pN0 in 18 (45%), pN1 in 12 (30%), and pN2 in 10 (25%). Treatment strategies were summarized in Table 2.

Table 1: Characteristics of the patient population

Variable	Patients (n= 40)
Age (years)	48.6 (26-56)
Distance from the anal verge (cm)	
High-rectum	6
Mid-rectum	26
Lower rectum	8
Type of surgery	
Lower anterior resection	36
Abdominoperineal resection	4
pT stage	
T1 5	10
T2 5	10
T3 10	20
pN stage	
N0 9	18
N1 6	12
N2 5	10

Table 2: Treatment strategy in 100 patients.

Procedure	
Sphincter preserving surgery	36
Stapled anastomosis	8
Hand sewn anastomosis	28
Abdominoperineal resection	4
Adjuvant therapy	
Radiotherapy	
Pre-operative	9
Post-operative	25
Chemotherapy	
Pre-operative	7
Post-operative	16
Pre-and post-operative	1
Combined	6
Co morbidities	
Cerebrovascular disease	6
Hypertensive disease	16
Coronary artery disease	12
Pulmonary disease	6
Diabetes	9
Renal impairment	2
Liver impairment	3

Complications

A- Early post-operative complications:

Early complications occurred in 9 patients (22.5%). The incidence of various complications is show in Table 3. The most common complication was anastomotic leak which occurred in 10%. The signs of clinical anastomotic leakage in the present study was based on of the following: gas, pus, or fecal discharge from the pelvic drain; pelvic abscess; peritonitis, and discharge of pus from the rectum. 7.5% were clinical leak; and 2.5% were revealed solely on contrast radiography, which was performed as a routine postoperative examination. Three patients were treated conservatively while one patients underwent proximal colostomy. The remaining complications were treated conservatively.

Table 3: Post-operative complications in 100 patients.

Complications	Treatment		
	Total number	Conservative treatment	Reoperation
Early complications	9	8	1
Anastomotic leak	4	3	1
Wound infection	3	3	0
Wound dehiscence	1	1	0
Postoperative bleeding	1	1	0
DVT	1	1	0
Pulmonary embolism	1	1	0
Late complications			
Incisional hernia	2	0	2
Adhesive intestinal obstruction	2	1	1

Some patients had more than one co morbidity.

B- Late post-operative complications

During the follow-up period, 2 patients, presented with incisional hernia. Adhesive small bowel obstruction was observed in 2 patients and one of them was managed operatively with adhesiolysis.

Urinary function (Table 4)

A- ***Standard questionnaire***

Thirty four patients (85 %) out of the 40 patients subjected to questionnaire after total mesorectal excision and pelvic nerve preservation did not report any urinary complaint such as pain, burning or discomfort during urination; or increased frequency. The remaining six patients (15%) experienced one or more of the early urinary complaint. All patients could void urine spontaneously and no patient became incontinent or went on chronic retention requiring catheterization.

Table 4: Urinary functions.

Mean maximum urine flow rate ml/sec	No of patients	%
<10	6	15
10-20	8	20
>20	26	65
Voided urine (ml)		
<300	6	15
300-500	12	30
>300	22	55

B- ***Uroflowmetry***

Postoperative urodynamics revealed normal mean maximal urinary flow rate and voided volume in 85% of patients. 15% of patients revealed mean maximal urinary flow rate less than 10 ml/sec and voided volume less than 300 ml. No patients revealed chronic retention requiring catheterization nor patients had significant residual urine.

Sexual function (Table 5)

A- Standard questionnaire

Erection was possible in 32 out of 40 patients (80%); penetration ability was possible in 30 patients (75%). Complete inability for erection and intercourse was observed in 4 patients (10%). Retrograde ejaculation was noted in 1 patients (2.5%).

Table 5: Sexual functions.

Sexual function	No of patients	%
Erection	32	80
Penetration ability	30	75
Absent orgasm	6	15
Complete sexual failure	4	10
Unable to ejaculate	3	7.5
Retrograde ejaculation	1	2.5
Normal biphasic penile duplex	32	80

B- U.S color Doppler study

Duplex US was performed in all patients which revealed normal biphasic arterial and venous pulsations on both sides in 32 patients (80%) and abnormal in only 8 patient (20%).

Discussion

Assessments outcome in colorectal cancer include disease recurrence, long-term survival, mortality and morbidity. However, quality of life is now regarded as key item in assessing intervention outcome. Sexuality is considered to be an important aspect of life quality. While treatment of rectal cancer has clearly succeeded in improving outcome for the disease, patients are still complaining of complications and long-term consequences of cancer treatment. Sexual dysfunction after treatment of rectal cancer is common and have negative impact on the quality of life [8].

Meticulous surgical performance is the most important prognostic factors in patients with rectal cancer. Excision techniques have become more radical to reduce recurrence rates and improve survival after surgery for rectal cancer. Total mesorectal excision can improve these results; however, unless considerable attention is paid to autonomic nerve preservation, this radical approach may in theory result in sexual and urinary dysfunction [9].

Normal bladder and sexual function is dependent on the parasympathetic and sympathetic nerve supply. The sympathetic nerves emerge from the thoracic and lumbar spinal cord, synapse in the sympathetic ganglion, and send postganglionic hypogastric fibers to join the preganglionic parasympathetic nerve originating in the pelvic plexus. These autonomic nerves run along the pelvic side walls and then continue anteriorly, and are susceptible to injury during mesorectal resection at many points from ligation and division of the inferior mesenteric artery to anterior dissection of the rectum [10].

Postoperative voiding and sexual dysfunctions may occur from ischemic injury, thermal damage, nerve concussion, and local inflammatory effects on the hypogastric nerve and the sacral splanchnic plexus during dissection of the pelvis. Sympathetic supply injury results in ejaculatory difficulties and detrusor instability, whereas parasympathetic supply injury results in weak detrusor contraction and erectile dysfunction [11].

The degree of injury depends not only on the extent of nerve trauma (e.g., unilateral versus bilateral), but also on which component of the autonomic supply has been injured, giving rise to variable symptoms of bladder and sexual dysfunction. Injury to the autonomic pelvic nerves is one of the most important causes of sexual and urinary dysfunction after rectal cancer surgery. Since these nerves are susceptible to injury during total mesorectal resection, they should be avoided based on knowledge of their anatomical relationship to pelvic organs [12].

Before the introduction of total mesorectal excision, the reported incidences of postoperative urinary and sexual dysfunction were 10-30% and 40-60%, respectively. Even with the incorporation of autonomic nerve-preserving techniques in total mesorectal excision, urinary and sexual dysfunctions remain recognized complications in 0-12% and 10-35% of patients, respectively [13].

In the present study, good clinical results were obtained with total mesorectal dissection, taking care to reproduce the sharp dissection as described by Heald *et al*. [14].

Comparisons between studies are difficult because of different exclusion criteria and outcome measures, wide varying rates of voiding and sexual dysfunction following rectal surgery have been reported in the literature (Table 6).

During rectal surgery, autonomic nerve preservation procedure causes less genitourinary function morbidity. The functional advantages of autonomic nerve preservation were documented in previous studies that evaluated the effect of autonomic nerve preservation on rectal cancer surgery by the use of questionnaires. Since the introduction of autonomic nerve preservation, voiding complications diminished to a level of 0% to 5% [15]. For example, Nesbakken *et al* reported that, when comparing results before and 3 months after the operation, rectal cancer surgery with preservation of pelvic autonomic nerve showed no significant changes in voiding capacity [16].

The incidence of bladder dysfunction was low following total mesorectal excision (Table 6). In the present study, minor urinary dysfunction was present in 15% of the patients; this result is similar to that described by other studies in the literature (Table 6). Similarly, the present study showed insignificant complications as regard to voiding.

The transient decrease in Qmax observed in uroflowmetry might be explained by postoperative inflammatory changes in the perivesical tissues and the possible resolution of partial nerve damage with time, resulting in great improvement and even complete recovery [17].

Even with extreme attention to technical details, impotence developed in 4 patients (10%). Although the present series is small, this percentage is better than the reported results (Table 6) [6]. The proper evaluation of sexual function is not easy because it depends on both physiological and psychological factors, so the results of symptoms recorded via questionnaires should be interpreted with caution. In the present series, orgasm was absent in 15% and 7.5% were unable to ejaculate, which is consistent with other studies in the literature (Table 6) [6].

In contrast with voiding function preservation, sexual dysfunction still a very important problem after surgery of rectal cancer. Previous studies proved that partial preservation of the pelvic autonomic nerves was enough to attain eventual recovery of voiding function. The main cause of sexual dysfunction is intra-operative injury of the neurovascular bundles; partial dissection of the pelvic plexus affects also sexual function [18].

Results of previous studies on male sexual function following surgery of rectal cancer show rates of impotence from 20% to 50%. Ameda *et al* reported that post-operative sexual dysfunction was a serious complication, even after complete preservation of the pelvic autonomic nerves [18]. Hendren *et al* also stated that a high incidence of erectile dysfunction is detected after excision of rectal cancer, in spite of the use of nerve-preserving surgical techniques [19].

The incidence of sexual dysfunction depends on the extent of surgical resection, which might be reduced with nerve preservation techniques. In the present study, all patients underwent bilateral autonomic nerve preservation. Results showed that a high proportion of rectal cancer patients suffer from erectile dysfunction following surgery. Overall, four patients (10%) experienced complete loss of sexual function. These patients did not show any improvement after one year of follow-up period. Therefore, it is suggested that the main cause of post-operative erectile dysfunction is concealed nerve injury rather than neurapraxia. The intimate relationship (anatomic) of the superior hypogastric nerve, the bilateral inferior hypogastric plexus, and the bilateral cavernosal nerves to the rectal wall and prostate explains their possible high risk of injury. Nerve damage may occur after branching of the bladder nerves in the narrow deep pelvis where meticulous dissection may be difficult. The high incidence of erectile dysfunction may be due to the vulnerability of the pelvic autonomic nerves to damage [15].

Although other factors may influence post-operative erectile dysfunction, a statistically significant relationship could not be determined between erectile dysfunction and well-known adverse factors as age of the patients, clinical stage, technique of the operation, smoking, chemoradiotherapy, and other comorbidities because of the relatively small number of patients in clinical studies [20].

Preservation and maintenance of erectile function are important challenges to the surgeon in the future. In order to improve quality of life after surgery, urology surgeons will need to make more efforts to detect patients who suffer from erectile dysfunction and treat them by cooperating and collaborating with rectal or pelvic surgeons. Also, patients need to be informed about possible morbidities connected to the operation and how these side effects can be treated if they occurred [20].

Although there is no standardized regimen exists at the present time, sexual function rehabilitation after surgery or erectile dysfunction prophylaxis has become a common practice of urology surgeons. Lindsey *et al* reported that sexual dysfunction was satisfactorily improved by use of sildenafil only in 79% of patients with erectile dysfunction after surgery for either inflammatory bowel disease or rectal cancer. Baseline measurement and enthusiastic penile rehabilitation after rectal surgery should be considered [21].

Several treatment modalities directed against inflammatory reaction, immunological responses, ischemic changes, production of free radical, lipid peroxidation, and apoptosis have been under evaluation in animal models with preliminary promising results for some agents. Intracorporeal immunophilin ligands with PDE5is, erythropoietin, vascular endothelial growth factors, nitric oxide donors, and stem cells has caused enormous excitement, but more scientific investigations are needed before implementing this strategy of therapy in rehabilitation practice of erectile dysfunction [22].

Poylin *et al* stated that prophylactic perioperative use of tamsulosin (alpha blocker that relaxes bladder neck muscles) may significantly decrease urinary retention incidence in men undergoing rectal surgery. This may play a significant role in avoidance of retention of urine, especially in patients undergoing rectal cancer surgery [23].

Table 6: Studies on urinary and sexual function published after the introduction of total mesorectal excision [6, 15]

Author	Number of patients	Bladder dysfunction (%)	Loss of erection (%)
Enker	42	5	13
Leveckis *et al*.	20	15	19
Havenga *et al*.	136	32	17
Maas *et al*.	47	28	11
Saito *et al*.	91	26	24
Nesbakken *et al*.	27	13	28
Nagawa *et al*.	22	27	45
Maurer *et al*.	19	21	55
Quah *et al*.	37	24	24
Kim *et al*.	68	25	25
Morino *et al*.	50	14	37
Cakabay *et al*.	20	5	5
Pocard *et al*.	9	0	44
Mass *et al*.	47	28	11
Sterk *et al*.	49	23	38
Ameda *et al*.	52	30	88

Conclusion

Results of the present study proved acceptable outcome of urinary dysfunction after proctectomy. Although prognosis is favorable on the long run, urinary dysfunction should not be omitted because it is very common and it disturb life quality. Postoperative assessment of voiding should have priority at every follow-up cession, and treatment should be prescribed if indicated. Also, autonomic nerve preservation during proctectomy should be given priority in surgical practice.

Erectile dysfunction is the one of the most common morbidity after rectal surgery. Its negative impact on life among cancer patients survived surgery is well known in the literature. However, advances in technology have modified the natural history of sexual dysfunction. Rehabilitation for patients undergoing rectal surgery is complicated and requires multiple specialties and progressive approach. Psychological aid to the patient and his partner in a family support programs can enhance the effect of pharmacotherapy. PDE5is used immediately after surgery are helpful. In case of failure, intracavernosal or intraurethral use of PGE1 should be tried, alone or in combination with other medications as PDE5is. They may be repeated two to three times every week. Recently, neuromodulation, nerve repair, and stem cell therapy are helpful in minimizing nerve injury, augmentation of nerve regeneration, and/or endothelium and cavernosal smooth muscle protection are, limited to high-end research center but could be soon integrated in future programs of rehabilitation.

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