Original article

Male sexual dysfunction after surgery for rectal cancer

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Abstract: Introduction: Sexual dysfunction is a quite frequent complication of surgery for rectal cancer mostly related to the intraoperative autonomic nerves injury. *Aim*: To investigate sexual dysfunctions after surgery for rectal cancer comparing two different surgical techniques. *Methods*: 85 male patients who had undergone surgery for rectal cancer were divided into two groups: group A (1995-1999), rectal excision associated to preaortic and caval lymphadenectomy and group B (2000-2011), mesorectal excision (TME) with careful autonomic nerve preservation. All patients were surveyed regarding their postsurgical sexual function and results were compared in the two groups. *Results*: The erectile dysfunction was reduced from 10% in group A to 5% in group B. The ejaculation dysfunction was 10% in group A and almost 0 in group B; coupled ejaculation and erection disorder was 10% in group A and 15% in B. The local recurrence rate was similar in the two series of patients (5.8% vs 5%). *Conclusions:* Analysis of our data shows that in rectal cancer surgery, a technique particularly focused to nerve preservation has reduced the percentage of isolated disorders of the ejaculation that are related to a lesion of the hypogastric plexus during the lymphadenectomy. Nonetheless in 15% of the patients coupled disorders of ejaculation and erection remain as unavoidable because related to a lesion of the pelvic plexus due to oncologic radicality in presence of locally advanced tumors.

Keywords: Rectal cancer surgery; Erectile dysfunction; Male sexual dysfunction; Total mesorectal excision.

INTRODUCTION

Sexual dysfunction is a quite frequent consequence of surgery for rectal cancer. The incidence of erectile or ejaculation disorders has been reported to be 15-70%[1-3] due to the intraoperative nerve injury. Preservation of pelvic autonomic nerves such as the pelvic plexus and superior hypogastric plexus seems to lower the incidence of sexual morbidity[4-5]. Some authors address the importance of preservation of the pelvic autonomic nerves in the prevention of sexual dysfunction after surgery for rectal cancer and imply that more radical excision carry a higher risk of nerve damage[6-8].

Clearly, adequate removal of the tumor is the first priority of surgery. This goal can be achieved until the mid-80's with organ excision and extensive lymphadenectomy (preaortic and caval). Subsequently was shown that TME (Total Mesorectal Excision) procedure was equally radical[9-10].

The principle of this technique is en bloc removal of the complete rectum and mesorectum together with any potential spread of cancer into perirectal fat, leaving negative surgical margins.

TME demanding a more precise dissection, respecting the anatomical planes and preserving the autonomic pelvic nerves that are adjacent to the resection plane seems to be able to preserve the autonomic innervation and the sexual function[2,6,11].

The purpose of this study is to assess the incidence of erectile and ejaculation dysfunction after rectal surgery for cancer analyzing this complication in relation to the surgical technique employed: rectal resection with preaortic and caval lymphadenectomy vs TME.

MATERIALS AND METHODS

From January 1995 to December 2011, 232 consecutive patients with histologically proven adenocarcinoma of the rectum underwent surgery at the VI Clinic of Surgery, "Sapienza" University, Policlinico "Umberto I", Rome. In all patients, one senior surgeon (C.M.) performed the operations.

139 patients were eligible for the study after applying the criteria of exclusion: female gender, death, abdomino-perineal amputation. 85 were eligible for follow-up of at least 3 years and were investigated for age, type of resection (high, low, ultra-low anterior resection, or coloanal anastomosis), tumor stage (T), postoperative pelvic complications, pre or postoperative chemo/radiotherapy and pelvic recurrence.

The study comprised 2 groups of patients: 65 patients (group A) were underwent TME o PME (partial mesorectal excision) associated with preaortic and caval lymphadenectomy from January 1995 to December 1999, 20 patients (group B) were underwent TME with particular attention to autonomic nerve preservation from January 2000 to December 2011.

The technique of TME as described by Heald involved complete removal of mesorectum containing lymph nodes through a sharp dissection along the avascular plane between the parietal and visceral pelvic fascia and leaving intact Denonvillier's fascia whenever the tumor allowed it.

Autonomic nerve preservation is done by identifying and sparing of the preaortic superior hypogastric plexus and the bilateral hypogastric nerves that join the sacral parasympathetic nerves to form the inferior hypogastric plexus anterolateral on both side from which originate the nerves erigentes.

In our experience we were unable to identify the nerves erigentes lying in a more anterior plane than the rectum. The chance to save the innervation of urogenital function exists, in our opinion, only when excision is contained in a space within the hypogastric plexus whose branches can be identified with careful preparation. Locally advanced rectal tumors with adherence or infiltration necessitated sacrifice of these pelvic nerve structures to obtain a clear lateral resection margin.

All 85 male patients were interviewed at last 1 year to the surgery and asked to answer a standardized questionnaire (IIEF, International Index of Erectile Function)[11] regarding their postoperative sexual function. Among these 85 patients, we extracted a sample of 40 patients with age ≤70 yrs., 20 for each group (A and B), homogeneous for all variables investigated.

The questionnaire comprises 15 questions and aimed at gathering data about sexual disorders in male patients; it is used in medical literature mostly after radical prostatectomy. In this study, two items concerning erection and ejaculation were selected from the IIEF items in identify patients with active sexual function before surgery.

We synthetically grouped the results obtained from the questionnaire as:

– presence of the disorder of erection only
– presence of the disorder of ejaculation only
– presence of both disorders of erection and ejaculation.

We compared the two groups of patients stratified also in relation to type of resection, tumor stage, pre or postoperative chemo-radiotherapy, pelvic postoperative complications and local recurrence.

The statistical evaluation was carried out using the SPSS 15 statistics program. The univariate analysis was performed using the chi-square test (exact Fisher Test). Statistical significance was accepted at $p \leq 0,05$.

RESULTS

The characteristics of the 85 patients eligible for follow up ≥ 3 years were shown in *Table 1*. Results of comparison of the sexual function in the two group of patients were shown in *Table 2*. The disorder of erection was reduced from 10% in group A (1995-1999) to 5% in group B (2000-2011) and the disorder of ejaculation was reduced from 15% in group A to zero in B; the incidence of both erection and ejaculation disorders was 10% in group A and 15% in group B. The local recurrence rate was similar in the two periods (5.8% vs 5%).

DISCUSSION

The rate of sexual dysfunction reported after surgery for rectal cancer varies from 15% to 70% and it is related to damage of the sympathetic and parasympathetic autonomic innervatio[1-3].

The retrograde ejaculation is reported in a range from 14% to 69% of the patients, while the impotence from the 11% to the 76%[1,13-16].

Damage of the superior hypogastric plexus and hypogastric nerves could lead to disturbed ejaculation. Disruption of the pelvic splanchnic nerves or the pelvic plexus could lead to erectile dysfunction.

Our results show ejaculation disorders in 10% of patients treated with traditional surgery, when the preaortic and caval lymphadenectomy was performed systematically.

Disorders of the ejaculation that may consist in the absence of the ejaculation, retrograde ejaculation, and painful ejaculation can result from damage of the superior hypogastric plexus or the hypogastric nerves, even if unilateral[7].

Section of the superior hypogastric plexus laterally to the aorta can occur during the preaortic lymphadenectomy or during the ligature of mesenteric artery at its origin. Sometimes the superior hypogastric plexus and the adjacent lymph nodes were deliberately sacrificed for oncologic radicalism.

At the level of the sacral promontory, the hypogastric nerve is clearly visible when it splits itself in the two lateral branches that lay on a plane immediately adjacent to the endopelvic fascia and easily separable from the mesorectal one[17-19].

In our patients treated with only TME without preaortic lymphadenectomy, retrograde ejaculation disorders goes to 0.

TME, preserving the integrity of the mesorectal fascia and obtaining negative circular margins of section, is the assumption to minimize the risk of a pelvic recurrence. Even with the total mesorectal resection, it is possible to save the autonomic innervation when a plane of cleavage is accurately performed between the endopelvic fascia and the mesorectal one (fascia propria), cutting in almost completely bloodless plane. This plane represents an important landmark, since it contains structures of the pelvic plexus that if excessively stretched, tending them upwards or medially, may cause a nervous damage[20-22].

At this level, the damage results to be mixed since it involves both sympathetic and parasympathetic structures. In other words, avoiding to "hooking" both the middle rectal artery and the lateral ligament of the rectum, the possibility of complications may be reduced.

Every time the tumor site and extension allow it, the plane of excision to be followed, has to be the one behind the Denonvillier's fascia. In this way, it is almost certain not to include the nerves in the section. The Denonvillier's fascia has a variable thickness but sometimes the thickness is such that it can cover the prostate and the seminal vesicles with a layer of tissues so dense not to make these organs visible.

Our experience for what concerns only the erectile dysfunctions shows a trend in reducing (from the 15% to the 5%), even if the difference was non statistically significative because of the size of the sample.

Nonetheless, it is to notice that in the second period the coupled erectile and ejaculation disorders stay high (15%) and are similar to the ones in the first period. This leads us to consider that the lateral dissection of the pelvic cavity is the time in which the lesion of plexus has more likely happened. Indeed analyzing the sexual disorders in the ileoanal pouches, that in our experience do not exceed the 1.5%, we observe that the technical difference fundamentally consists in the fact that in the pouches the lateral excision of the rectum is extended beyond the levator ani muscles floor, along a plane close to the organ.

One of the most striking findings in our experience was that, in contrast to conventional rectal cancer surgery, TME completely avoided the problem of retrograde ejaculation. Apparently, the hypogastric nerve descending on both sides from the preaortic superior hypogastric plexus is at high risk of damage during conventional blunt dissection of the rectum. Furthermore, if the surgeon is not familiar with the TME technique there may a some difficulty entering the correct plane at the pelvic brim and preserving a thin layer of preaortic connective tissue that contains the superior hypogastric plexus and hypogastric nerves. Lateral lymph node dissection is an important factor involved in sexual dysfunction and was the only surgical factor that influenced postoperative sexual function in patients.

Introduction of the well-defined and standardized technique of TME led to a significant reduction in sexual dysfunction in men compared with the results obtained with the conventional technique.

Particularly 5 anatomical danger zones should be considered in TME with respect to functional postoperative results: I) protection of the superior hypogastric plexus, II) protection of the hypogastric nerves, III) protection of the inferior hypogastric plexus on both sides in the area of so-called T-junction, IV) preparation behind Denonvillier's fascia without violation of the capsule of the vesicles to avoid urogenital malfunction, V) protection of the dorsolateral region of sacral nerves S2-S4.

The exact preparation within the visceral and parietal fascia is essential to protect the structures of the autonomous nerves to avoid postoperative dysfunction.

TABLE 1. Characteristics of the 85 patients eligible for follow-up≥ 3 years assessed in relation to sexual function (85/139).

N patients	**1995-1999 (65)**	**2000-2011 (20)**
Median F-up ± SD (years)	*11±5*	*8±4*
Mean Age (range)	64,4 years (22-85)	59,1 years (40-76)
Type of Resection:		
High ARR	16 (24, 6%)	4 (20%)
Low and Ultralow ARR	36 (55, 4%)	9 (45%)
Coloanal ARR	13 (20%)	7 (35%)
Tumor Stage (T):		
T0- T2	24 (36, 9%)	7(35%)
T3	40 (61, 6%)	10 (50%)
T4	1 (1, 5%)	3 (15%)
Septic complications in the pelvis	8 (12, 3%)	3 (15%)
Chemo /Radiation Therapy	25 (38, 4%)	12 (60%)

ARR= anterior rectal resection

TABLE 2. Sexual dysfunction: comparison between the two periods examined.

	1995-1999 (20 pts)	**2000-2011 (20 pts)**	
Median Follow-up years (range)	10,5 (18-12)	8,0 (14-3)	
Mean Age years (range)	56.5 (40-70)	59 (49-70)	
erectile dysfunction	**3 (15%)**	**1 (5%)**	**P=n.s.**
Ultralow and Coloanal ARR	3	1	
Stage: T3-T4	0	1	
Septic Complications in the pelvis	0	0	
Chemo and Radiation Therapy	0	1	
ejaculation disorders	**2 (10%)**	**0**	**P=n.s.**
-Ultralow and Coloanal ARR	1	0	
- Stage: T3-T4	0	0	
- Septic Complications in the pelvis	1	0	
- Chemo / Radiation Therapy	0	0	
both erectile and ejaculation disorders	**2 (10%)**	**3 (15%)**	**P=n.s.**
- Ultralow and Coloanal ARR	2	1	
- Stage: T3-T4	2	2	
- Septic Complications in the pelvis	0	0	
- Chemo / Radiation Therapy	1	3	

ARR= anterior rectal resection

The main goal in the rectal surgery, on the other side, remains the oncologic radicalism with specific regard to the local recurrence. The reported incidence of pelvic recurrence is an average of 30%, between 14% and 35% performing the traditional surgery (not TME). In patients that undergo a TME that incidence is drastically cut with values between 1.6% and 9,8%[9, 22-30].

In almost all the patients, since the first half of the 80's, our excision technique has included the TME. This fact has allowed us to obtain a very low incidence of pelvic recurrence that remain similar in the two periods examined (5.8% vs 5%).

From the analysis of our data it emerges that in the surgery for the cure of rectal cancer, the usage of a technique particularly focused on the preservation of the nerves has reduced the % of isolated disorders of the ejaculation that are related to a lesion of the hypogastric plexus during the lymphadenectomy.

Particular attention has to be paid also to this type of problem because the surgeon nowadays has to try to guarantee also the maintenance of a good sexual activity that is considered – at all ages – an important area of the quality of life.

Nonetheless, in the 15% of the patients coupled disorders of ejaculation and erection remain as inevitable because related to a lesion of the pelvic plexus determined by reasons of oncologic radicalism in presence of locally advanced tumors.

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Multidisciplinary Uro-Gyne-Procto Editorial Comment

To improve the integration among the three segments of the pelvic floor, some of the articles published in Pelviperineology are commented on by **Urologists, Gynecologists, Proctologists/Colo Rectal Surgeons** or **other Specialists**, with their critical opinion and a teaching purpose. Differences, similarities and possible relationships between the data presented and what is known in the three fields of competence are stressed, or the absence of any analogy is indicated. The discussion is not a peer review, it concerns concepts, ideas, theories, not the methodology of the presentation.

Procto… An interesting point of view in rectal surgical oncology is related to QoL. Particularly attention must be cared to sexual and urinary disorders in male. As well as reported in this paper, there are many factors that may have effect on this aspect: 1) first of all the neo-adjuvant treatment (radiotherapy, in particular, has negative influence on both, urinary and sexual function, immediately and in the middle-long term). A functional recovery is very difficult. 2) Extension of rectal excision (related, of course, to the stage and subsequent radical procedure). 3) Total Mesorectal Excision (TME). 4) Nerve Sparing Technique (NST). TME and NST, when correctly performed, have significant influence on QoL. There are a lot of recent trials, also reported in the attached references, that demonstrate better results in the F.U. of patients treated, also related to "function". The surgeons need to choose and perform a correct radical procedure before but, not secondary, must observe particular attention to preserve a long-term QoL.

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Every patient knows whether his sexuality is experienced with joy, confidence and pleasure or rather with fear, consuetude, duty or even pain. As therapists, do we know it? Are we aware of the basic characteristics of the sexual life of our patients, or our team only deals with biological data? The WHO's definition of sexual health considers also the relational, emotional, and psychic aspects of sexual life. Those aspects existing well prior to the inner earthquake suffered when a cancer is diagnosed, shake the individual from the foundations of his being, and a scream awakens his ancestral instinct for self-preservation. Each component of his sexuality and personality that we didactically split, becomes altered, damaged and mixed with fear of death, primum movens of all biochemical storms that unhinge us and fling us into those stress mechanisms that also undermine sexual life. Let's not forget that this fear has also a strong relational component, as well as sexuality: the fear of facing a tumor is not only of disappearing, but also that death ends every emotional relationship, all tenderness, every mutual nurturance. For this reason it is very important to remember the role of the sex therapist in supporting and rebuilding a happy sex life, beyond the biological symptom. This task should be carried out starting from the maximum stress represented by facing death, followed by an activity predominantly parasympathetic which is biologically managed by a number of chemical mediators, but humanly by skin contact, emotion, sharing of themselves and their fears. It's a fascinating endeavour, but difficult, in which the patient has an absolute need not to be left alone.

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