

Functional results of surgical treatment of low-ultralow rectal cancer



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Functional results of surgical treatment of low-ultralow rectal cancer

INTRODUCTION: *The improvement of surgical procedures and oncological outcomes in the treatment of low-ultralow rectal cancer, made important the evaluation of functional results. The aim of this study is to evaluate the functional results after open and laparoscopic approach.*

PATIENTS AND METHODS: *From our global experience, over the period 2000/2018, within the patients surgically treated for rectal cancer, we have gathered and studied 37 patients with low-ultralow site of lesion, submitted to sphincter-preserving surgery, subdivided based on the approach: 20 open, 17 laparoscopic, of which 8 robotic. For each type of procedure, as low and ultralow anterior resection, intersphincteric resection, abdominoperineal resection, were investigated functional outcomes, as bowel continence, urinary functions, male and female sexual functions, based on the following tests: Wexner Incontinence Score, International Prostatic Symptom Score, International Index of Erectile Function-5, Female Sexual Function Index. The controls were performed before surgery and 3-6-12 months postoperatively. Statistical analysis: χ^2 -test, impaired and paired t-test two tailed, Bonferroni post-hoc test.*

RESULTS: *The immediate surgical results and pathological features of the tumor are reported and evaluated. The evaluation of fecal continence in all patients submitted to rectal resection and primary anastomosis showed function compromise without differences statistically significant between the laparo and open approach. In the comparison between specific surgical procedures, the damage of continence function were more severe after intersphincteric resection matched with low-ultralow rectal resection. The rehabilitation therapies continued for several months after surgery showed clear improvement. The urinary continence, in male and female patients, did not show statistically significant alterations in the pre and postoperative comparison in relation to the approach and the type of resective intervention. The sexual function in male patients has had impairment after all type of surgical resection but the damage was more severe after intersphincteric resection. The female sexual function had not significant changes between pre and postoperative evaluation.*

CONCLUSION: *Bowel continence damage, urinary and sexual dysfunctions after surgical treatment for low-ultralow rectal cancer are frequent and form the low anterior resection syndrome. The severity of the syndrome is connected with the site of anastomosis. The rehabilitation therapies can play an important role in achieving the appreciable improvements of the functional alterations.*

KEY WORDS: Laparoscopic surgery, Rectal cancer

Background

Several keypoints are in evidence in the treatment of rectal cancer: important progress regarding the integra-

tion between many disciplines, as surgery, chemotherapy, radiotherapy, etc., total mesorectal excision as standard mode of surgical resection, anatomical and functional preservation of the sphincter apparatus (without compromising oncological outcomes). Oncological perspective in laparoscopic/robot assisted approach are widely defined; perspective randomized studies have demonstrated that the long-term results of surgical treatment of rectal cancer are comparable between laparoscopic/robotic and open approach¹⁻⁸.

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Introduction

Worldwide diffusion of surgical restorative treatments of low-ultralow rectal cancer by minimally invasive or open approach stresses the assessment of functional results besides oncological outcomes. Preliminarily it needs to define synthetically the functional alterations which can follow the sphincter-preserving surgical resection in the treatment of low-ultralow rectal cancer. In particular could be useful to characterize the low anterior resection syndrome (LARS) that encompasses the more evident and frequent symptoms following the low anterior rectal resections. The global occurrence of LARS, reported in the literature ranges from 50% to 75% of the patients ^{9,10}. The clinical appearances of LARS are characterized by a blend of disorders: great bowel frequency in day, urgency, multiple intestinal movements in the restricted time period and finally fecal incontinence. Usually the immediate evaluation of functional results following the low rectal resection shows a severe alteration of the intestinal functions. In many cases, in the following months, can be appreciated a considerable improvement of these symptoms. In a large part of these patients the functional reintegration of the bowel conti-

nence is not complete. Consequently it's necessary to quantify the severity of intestinal functional impairment ^{11,12}. The correct time to evaluate the degree of alterations of bowel continence in these patients is six months ¹³. The intestinal functional alteration is not the only functional impairment after low-ultralow rectal resections. There are others possible functional damage, as urinary functions, erectile functions in the man and female sexual functions. The aim of this study was to evaluate 37 patients, treated for low-ultralow rectal cancer and have been compared the mini-invasive/robot assisted versus open approach, regarding to postoperative immediate results and functional outcomes ^{14,15}.

Patients and Methods

From our global experience, in the General Surgery of University of Foggia, over the period from 2000 to 2018, within the patients submitted to the surgical treatment of rectal cancer, we have collected and examined 37 patients with low-ultralow rectal cancer, treated by surgical procedures, subdivided based on laparoscopic or open approach ; the neoplastic lesions were localized

TABLE I - Patients preoperative data (x2-test and the unpaired t-test two-tailed)

	Laparoscopic	Open	P value
Male	11 (64.7)	10(50%)	0.368
Female	6 (35.3)	10(50%)	
Age Media(SD) Range	68 (7.4) / 55-82	72 (11.2) / 44-86	0.264
BMI Media(SD) Range	27.2 (4.1) / 22.6-36.4	26.8(3.4) / 23.2-35.6	0.969
Previous NO	10 (58.8%)	11(55%)	0.594
Abdominale I	5(29.4%)	7(35%)	
Intervention +1	2(11.8%)	2(10%)	
ASA Score I	1(5.9%)	3(15%)	
II	9(52.9%)	11(55%)	
III	7(41,2%)	6(30%)	

TABLE II - Surgical Procedure

17 Laparoscopic approach (8 Robot assisted)	Low/ultralow anterior resection 10 Intersphincteric resection 7
20 Open approach	Low/ultralow anterior resection 11 Intersphincteric resection 2 Abdominoperineal resection 7
Ileostomy	14 Laparo group (82.4%) 14 Open group (70%) P value 0.383

TABLE III - Primary Surgical Results (x2-test and the unpaired t-test two-tailed)

	Laparoscopic	Open	P value
Time of surgery (min)Media (SD) Range	217 (33)/170-300	189 (30)/160-260	0.011
Blood Loss (ml) Media(SD) Range	161 (93)/90-500	260(137)/130-800	0.017
Resumption gut activity (days)Media(SD) Range	3(2)/2-6	5(2)/3-13	0.003
Dospital stay (days)Media (SD) Range	8(3)/6-15	13(3)/8-21	0.006
Coverversion rate	1/17 (5.19%)	—	—

within five centimeters from anal verge. We have compared and evaluated the surgical results, in particular in the oncological perspective and the functional outcomes, regarding the low-ultralow rectal resections in the group of 20 patients treated with open procedures and in the group of 17 patients submitted to laparoscopic approach. The statistical analysis has been performed using, in the comparison open/laparoscopic procedures, the χ^2 -test and the unpaired t-test two-tailed. For the temporal analysis of functional scores have been employed the paired t-test two-tailed and for the analysis of variance (one-way ANOVA) the Bonferroni post. hoc test. The collection and analysis of data have been performed by software SPSS Statistic, version 21.0 (SPSS, IBM, USA). The functional results have been evaluated, after the preoperative assessment, by the use of the following scores: Wexner Incontinence Score for fecal incontinence ¹⁶, International Prostatic Symptoms Score (IPSS) for urinary incontinence ^{17,18}, International Index of Erectile Function (IIEF) for male erectile dysfunction ¹⁹, Female Sexual Function Index (FSFI) for female sexual function ²⁰.

Results

In this group of patients we have recorded the demographic data and preoperative data, as BMI, previous abdominal interventions, ASA score (Table I). Preoperatively cTNM has also been assessed and, in the patients submitted to neochemoradiotherapy, the yc TNM.

The preoperative oncologic evaluation shows in both groups the neoplastic invasion of muscularis propria in many patients, with 45% of cases of open group and 64.7% of laparoscopic group in T3 stage. The lymph nodes invasion was present in 75% of patients in the open group and in 58.8% of cases in the laparoscopic group. The metastatic disease has been detected in 5 patients (25%) in open group and in 1 patient (5.9%) in laparoscopic group. The neochemoradiotherapy for the downstaging and the downsizing of neoplasia was indicated and has been performed in 8 patients (47.1%) of laparoscopic group and in 6 patients (30%) of open group. The two groups of patients were homogeneous

in the preoperative oncologic assessment, without significant differences in statistical analysis. In the table II the surgical procedures performed are reported. The comparison of surgical procedures between the two groups shows overlapping technical choices; the use of the robot assistance for pelvic dissection should only be reported in 8 laparoscopic cases. The immediate surgical results and pathological features of the tumor are reported and evaluated.

The immediate surgical results once again highlighted the common differences between the open and laparoscopic approaches, with favorable outcomes for the latter procedures, as less time of intervention, fewer blood loss, faster gut activity resumption, shorter hospital stay, minor postoperative analgesic use; finally there was also very low conversion rate in the laparoscopic interventions (5.9%) (Table III).

The immediate postoperative complications, evaluated by Clavien-Dindo classification ²¹, as anastomotic leakage, wound infections, postoperative bleeding, etc., were few in both groups; the re-intervention rate was not very high in open (20%) and in laparo group (11.8%); no 30 days mortality in both groups. For the management of postoperative complications reoperation was required in two patients of laparoscopic group for anastomotic leakage (1 pt.) and for postoperative bleeding (1 pt.); besides in four patients of open group for wound infections (2 pts.), anastomotic leakage (1pt.) and postoperative bleeding (1 pt.). It must certainly be emphasized that there are not statistically significant differences in the immediate postoperative complications between the laparo and open approach (Table IV).

The accuracy of surgical procedures regarding the excision of neoplastic lesions has been observed in both group of patients, without differences in the statistical study. The evaluation and comparison of number of lymph nodes in specimen (p value 0.242), resection completeness (p value 0.407), total mesorectal excision (p value 0.608) and distal resection margin (p value 0.468) are clearly overlappable.

The postoperative pathological control of oncologic correctness in the evaluation of yp TNM did not show differences statistically significant between the two surgical procedures, regarding the yp T parameter; on the con-

TABLE IV - Primary Surgical Results (χ^2 -test, CD Clavien-Dindo)

	Laparoscopic	Open	P value
Aastomoic Leakage CD3b	1 (5.9%)	1 (5%)	0.906
Wound Infection CD 3b	0	2 (10%)	0.180
Broncopneumotic Infiltrates CD2b	0	2 (10%)	0.180
Thrombotic Complications CD2b	2 (11.8%)	2 (10%)	0.863
Postoperative ileus CD2b	2 (11.8%)	2 (10%)	0.115
Postoperative bleeding CD 3b	2 (11.8%)	2 (10%)	0.115
Reinterventions	2 (11.8%)	4 (20%)	0.49
Mortality 30 Days	—	—	

trary for the yp N parameter the comparison shows differences statistically significant (p value 0,049), due to the more numerous number of yp N0 in the laparoscopic group. The final pathological evaluation of tumor stage between laparoscopic and open group highlights the difference statistically significant (p value 0,012) with 75% of the patients of open group in the III/IV stage. The functional results after surgical treatment of low-ultralow rectal cancer has been evaluated by four surveys, widely validated: Wexner Incontinence Score, International Prostatic Symptoms Score, International Index of Erectile Function-5, Female Sexual function Index. The time of evaluation of each survey followed this sequence: preoperative, three months after surgery, six months after surgery, twelve months after surgery. In

the study of the alteration of functional results the first step concerned, for each function studied, the assessment of the totality of patients divided according to open or laparo approach. The following step affected the evaluation of damage of the each specific function based on the particular surgical procedure, always with the subdivision into open or laparo approach. This choice is justified by the different type of technical surgical maneuver, as pelvic dissections, performed in the every surgical procedure that can be followed by dissimilar degree of alteration of specific function.

The evaluation of damage of fecal continence (Wexner Continence Score) in all the patients submitted to rectal resection and primary anastomosis, with exclusion of 7 patients submitted to abdominoperineal resection,

TABLE V - Functional evaluation: Wexner Incontinence Score

LAR/U-LAR	Laparoscopic 10	Open 11	P value
Pre-surgery			
Media(SD)	1.3 (1)	1.3 (1)	1
Median	1	1	
Range	0-3	0-3	
3 Months			
Media(SD)	8.8(2.8)	8.8(2.8)	0.871
Median	8.5	8.5	
Range	5-13	5-13	
6 Months			
Media(SD)	7.8 (2.1)	7.8 (2.1)	0.835
Median	7.5	7.5	
Range	5-11	5-11	
12 Months			
Media(SD)	5.9 (1.5)	5.9 (1.5)	0.878
Median	5.5	5.5	
Range	4-8	4-8	

TABLE VI - Functional evaluation: Wexner Incontinence Score

ISR	Laparoscopic 7	Open 2	P value
Pre-surgery			
Media(SD)	1.3 (1)	0.5 (0.7)	0.555
Median	1	0.5	
Range	0-3	0-1	
3 Months			
Media(SD)	15.8 (1.7)	15.5 (0.7)	0.859
Median	15.5	15.5	
Range	14-18	15-16	
6 Months			
Media(SD)	12.5 (1.3)	12(0)	0.833
Median	12.5	12	
Range	11-14	12	
12 Months			
Media(SD)	9.5 (2.1)	8.5(0.7)	0.564
Median	9.5	8.5	
Range	7-12	8-9	

TABLE VII - Functional Evaluation: International Prostatic Symtoms Score

LAR/U-LAR	Laparoscopic 10	Open 11	P value
Pre-surgery			
Media(SD)	7.3(5.2)	5.3 (4.2)	0.522
Median	6.5	4.5	
Range	1-19	1-11	
3 Months			
Media(SD)	7.7(5.6)	5.8 (4.3)	0.626
Median	6.5	4.5	
Range	1-20	2-12	
6 Months			
Media(SD)	8.5(5.6)	6.3 (4.6)	0.50
Median	7	4	
Range	2-21	3-13	
12 Months			
Media(SD)	7.9 (5.1)	5.5 (4.4)	0.447
Median	7	4	
Range	1-19	2-12	

TABLE VIII - Functional Evaluation: International Prostatic Symtoms Score

ISR	Laparoscopic 7	Open 2	P value
Pre-surgery			
Media(SD)	7.8 (6.3)	6(5.7)	0.759
Median	7	6	
Range	2-15	2-10	
3 Months			
Media(SD)	8 (6.7)	6(7.1)	0.751
Median	7	6	
Range	2-16	1-11	
6 Months			
Media(SD)	9(6.7)	7 (5.7)	0.738
Median	8	7	
Range	3-17	3-11	
12 Months			
Media(SD)	8.5(6.9)	6.5 (4.9)	0.738
Median	7.5	6.5	
Range	2-17	3-10	

showed, on the first check, evident compromission of continence function, without differences statistically significant regarding the laparo or open procedures

In the second step of our evaluation, with comparison of each specific surgical procedure, the damage of continence function following the intersphincteric resection was more severe matched with low-ultralow rectal resection, but without statistical significance; no difference between laparo or open approach.

In the following control at 6 and 12 months there is clear improvement of the altered function. These outcomes demonstrate the effectiveness of rehabilitation therapies continued for several months after surgery (Tables V, VI).

For the evaluation of urinary continence we have employed the International Prostatic Symptoms Score, that is used in the assessment of male and female urinary dysfunction. The survey has been applied in all 37 patients then in the patients submitted to rectal resection. In this first step of evaluation there are not evident damage of urinary functions and also not differences statistically significant between the two types of surgical approach.

Likewise between the patients subdivided regarding the type of intervention, always with the comparison between laparo or open approach, there are not differences in the alterations of urinary functions (Tables VII, VIII)

TABLE IX - Functional Evaluation: International Index Erectile Function-5

	Pre-surgery	3 Months	P value	6 Months	12 Months	P value
Rectal Resection 21						
Media(SD)	14.9 (4.9)	13.1 (4.7)	0.01	13.6 (4.5)	14.7 (4.9)	Anova 0.564
Median	16	13		14	15	AvsB 1.487
Range	5-21	5-21		5-20	5-21	AvsC 1.738
LAR/U-LAR (12/21-57.1%)						
Media(SD)	14.4 (6.1)	14.2(5.9)	0.347	14(6)	14.4 (6.3)	Anova 0.988
Median	18	17		17	18	AvsB 1.878
Range	5-20	5-21		5-20	5-21	AvsC 1.878
ISR (6/21-28.5%)						
Media(SD)	17.9 (2.4)	17.8 (2.4)	0.01	14.5 (1.3)	17.3 (2.2)	Anova 0.049
Median	17	17		14.5	17	AvsB 1.132
Range	16-21	16-21		13-16	15-20	AvsC 0.043
APR (3/21-14%)						
Media(SD)	15 (5.6)	9.7 (4.5)		12.3 (5)	14.3(5)	Anova 0.030
Range	9-20	5-14		7-17	9-19	AvsC 0.018

TABLE X - Functional evaluation Female Sexual Function Index

	Pre-surgery	3 Months	P value	6 Months	12 Months	P value
Rectal Resection 16						
Media(SD)	19.5 (6.5)	18.6 (6.4)	0.103	19.1(6.4)	19.1(6.5)	Anova 0.939
Median	18.8	17.8		18.3	18.6	AvsB 1.678
Range	10.2-30.3	9.9-29.5		10.2-29.8	10.2-30.1	AvsC 1.451
LAR/U-LAR (9/16-56%)						
Media(SD)	15.1(3.7)	14.1(3.8)	0.058	14.5(3.7)	14.5(3.7)	Anova 0.969
Median	14.9	14.4		14.5	14.9	AvsB 1.832
Range	11.6-18.9	10.2-17.8		10.8-18.1	11.2-18.6	AvsC 1.618
ISR (3/16-18.7%)						
Media(SD)	21.5(1.3)	20.7(1.6)	0.847	21.3(1.3)	21.7(1.6)	Anova 0.804
Median	21.5	20.7		21.3	21.7	AvsB 1.420
Range	20.6-22.4	19.6-21.8		20.4-22.2	20.6-22.8	AvsC 1.089
APR (4/16-25%)						
Media(SD)	20.6 (6.7)	19.7(6.4)		20.1(6.6)	20.5(6.8)	Anova 0.986
Range	12.6-28.6	12.2-27.5		12.2-28.1	12.4-28.6	AvsC 1.744

In summary the study of urinary continence did not show statistically significant alterations in the pre and postoperative comparison in relation to the approach and the type of resective intervention. The damage of sexual function in the 21 male patients has been assayed by International Index of Erectile Function-5 score, instead in 16 female patients by Female Sexual Function Index score. The evaluation of IIEF-5 score and FSFI score for each type of intervention has been made without comparison between open or laparo procedures, because the little number of patients. In the examination of sexual function in male patients we have detected the functional impairment after all type of surgical resection but the damage was more evident and severe after intersphincteric resection (Table IX).

Certainly this results is related to the extent of the pelvic dissection. The same criteria have been followed in the control of sexual dysfunction in the female patients. The outcomes of these appraisal didn't show significant differences between pre and postoperative time, regarding any type of intervention (Table X).

Discussion

The very important problem in the perspective of the therapeutic management of low rectal cancer can be synthesized in this consideration: the data from the literature showed that the correctness of oncological criteria is overlappable between the open surgical procedures and

mini-invasive, laparoscopic/robot assisted interventions; in particular compliance with oncological criteria has been demonstrated with sphincter-preserving surgery (SPS) procedures (ultralow rectal resection, intersphincteric resection) that have largely replaced excision procedures, as abdominoperineal resection. Many studies from the literature largely confirmed the homogeneous results of the both approaches in the treatment of the rectal neoplastic lesions¹⁻⁸. Unanimous opinion on the comparability of these results that emerges from the international literature has established the complete oncological validity of the sphincter-preserving surgery and minimally invasive approaches. Consequently, established the reliability of oncological propriety of the sphincter-preserving surgery interventions and their different approaches (open, laparoscopic, robotic), the evaluation of possible subsequent alterations of anal continence and urogenital functions could be counted among the selection criteria of the more suitable surgical procedure? In others words the expected functional damage with its variable severity degree and impairment of quality of life could be assessed preoperatively and considered among the criteria of choice, besides the pathological, oncological and general evaluation of the patients? To answer this question it is appropriate to emphasize some anatomical and functional features of the surgical site, anal canal, pelvic floor, etc. The surgical anal canal is bounded by anorectal ring and distally by anal verge. The anorectal ring is the site of conjunction of levator ani muscle and external sphincter and corresponds proximally to the end of internal sphincter. The anal verge corresponds to the transitional epithelium. On the contrary the anatomical anal canal is the distal stretch of the surgical anal canal from the dental line to the anal verge. In effect the length of surgical anal canal is on average 4,2 cm and the anatomical 2,1 cm²¹. In this functional-anatomical examination it's useful to enter the proposal subdivision of the variuos types of interventions of sphincter-preserving surgery, that are followed by different severity degree of functional alterations^{22,23}. The opportune, correct surgical procedure for the treatment of the tumor located in the lower rectum is indicated by the exact site of the lesion, that is by the anatomical connection with sphincter apparatus. The classification of the lower rectal cancer, based on its precise position, and appropriate type of sphincter-preserving surgery has been proposed by Rullier²⁴. This classification includes four types of tumor site in the lower rectum with the distinct intervention required. The type I encompasses the lower rectal tumors located >1 cm from the anorectal ring. For these tumors can be performed the very low rectal resection without excision of internal anal sphincter; these procedures are not an intersphincteric resections. In the type II there are the rectal neoplastic lesions located < 1 cm from anorectal ring. The correct surgical procedure for these tumors is the intersphincteric resection with partial excision of the internal anal sphincter. The type

III encompasses the tumors characterized by internal anal sphincter invasion; the surgical treatment requires the intersphincteric resection with total excision of internal anal sphincter. The type IV contains the neoplastic lesions with more invasive local features, which needs to treat with more excisional procedures as intersphincteric resection with total removal of internal anal sphincter and partial resection of external sphincter^{25,26}. In the real words, for the therapeutic management of very low rectal tumors, different for side and invasive features, there are four types of surgical procedures, with increasing excisional character of an anatomical structure with important functions.

The damage of anorectal functions, associated to urogenital functions, is the dreaded aftereffects of the surgical procedures for the treatment of low rectal cancer, grouped in the term of sphincter-preserving surgery. In this group of surgical interventions there are the low and ultralow rectal resections and the intersphincteric resections. The patients submitted to these surgical procedures are most likely exposed to risk of low anterior resection syndrome (LARS), expecially if subjected to preoperative chemoradiotherapy²⁷. The clinical features of LARS as incontinence of flatus and frequently also of faeces, frequent intestinal movements and urgency, with very high probability of its development after low rectal resection or intersphincteric resection, strictly induces to perform temporary intestinal diversion, also to obtain the suspension of colonic transit in the postoperative period. The intersphincteric resections with partial or total resection of internal anal sphincter play a primary role in the occurrence of LARS. Among the risk factors certainly could be added the tumor site, the height, that is the site of the anastomosis and the patients age²⁸⁻³⁶. The main theme in the study, namely the reflexion on the functional effects after surgical treatment of very low rectal cancer is to appraise the relation between the type of sphincter-preserving surgery and the degree of damage of continence and urogenital functions. Among these surgical procedures the difference is the extension of resection of anal sphincters, internal and external. The first comparison, in the perspective of assessment of functional damage is between low-ultralow rectal resections and intersphincteric resections. Then there is the evaluation of the functional results among the different types of sphincter preserving surgery, that is among type II, type III, type IV of the intersphincteric resections. In our experience the comparison between low-ultralow rectal resection and intersphincteric resection showed more severe damage of continence functions in the patients submitted to latter procedure but without statistical significance. It could be assumed that the degree of functional impairment may be related to the extent of resection of the internal anal sphincter and in addition with the partial excision of external sphincter. In this regard the various experiences reported in the literature are not unanimous. Some opinion are negative on the existence

of a direct relationship between the extent of sphincter resection and the severity of the following functional disorders^{30, 37-40}. On the contrary others experiences confirmed the relationship between the extent of the sphincteric resection and the degree of the worsening of fecal continence (12.25). Certainly there are the connections between the functional disorders and the extent of anatomical alterations of surgical procedures, but, as with all complex functions in biology, it's need to consider others factors, effective in this dynamic process, as the age of the patient, its general conditions, previous local radiotherapy, also mostly the time and commitment, dedicated to long-term rehabilitation program, that can significantly improve the results^{41,42}. In some experiences the damage of anal continence following sphincter-preserving surgery could be improved by intestinal reconstruction using a J pouch reservoir. The accomplishment of this surgical procedure needs the protection of a very well blood perfusion and mobilization of the colon with accurate maintenance of Riolo arcade. Therefore the improvement of the continence alterations can manifest shortly, 6 weeks after surgery with reduced urgency and frequency of bowel movements^{43,44}. On the other hand our experience highlights a partial but significant recovery of the anal continence dysfunctions within 6 and more within 12 months after surgery, ultralow rectal resection and intersphincteric resection, following intensive and accurate rehabilitation therapies. In some reports, available in the literature, there are confirmations of these observations and this way of improvement of dysfunctions^{45,46}. Alterations of urinary functions rarely occur after sphincter preserving surgery for rectal cancer. Probably the procedure of total mesorectal excision and correctness of pelvic dissection could have a role to reduce or avoid these dysfunctions⁴⁷. Various experiences, from the literature, reported very few cases, generally with temporary and no serious urinary dysfunctions in these patients⁴⁸. Likewise our results of impairment of urinary functions after surgery did not show damage in the pre and postoperative comparison. We can say that preoperative urinary function remained unchanged afterwards sphincter-preserving surgery in particular also in the comparison between ultralow rectal resection and intersphincteric resection⁴⁹. The alteration of male sexual function have been partially reduced with the current procedure of autonomic nerve preservation besides total mesorectal excision⁴⁹. This functional results is confirmed by the comparison with the standard rectal cancer surgery^{47,48}. In our experience a not severe alteration of sexual function in male patients was recorded. It's in evidence the major sexual dysfunction in the patients submitted to intersphincteric resection. This results can be related to the more extensive pelvic dissection. The evaluation of female sexual function did not manifest, after surgery differences between pre and postoperative time. These results have been reported in our

experience. Some data from the literature confirm the very low impairment of female sexual function following sphincter preserving surgery for rectal cancer⁴⁸.

Conclusion

Sphincter-preserving surgery, besides other therapeutic procedures, as chemotherapy, radiotherapy, etc., has changed the treatment perspective of rectal cancer. Established the oncological correctness of these surgical procedures, the postoperative functional damage of bowel continence and urinary and sexual functions has occupied the clinical attention and activity. This postoperative condition as a whole has been defined LARS. In our experience the intestinal continence after all sphincter-preserving surgery procedures showed evident alterations, but the damage was more evident following intersphincteric resection in the comparison with low-ultralow rectal resection. Long-term controls have presented clear improvements also with rehabilitation therapies performed for several months. The alterations of urinary functions, in male and female patients, were mild and not clinically significant. Some sexual dysfunctions appeared after intersphincteric resection in male patients. On the contrary in female patients the sexual dysfunctions didn't show significant differences between pre and postoperative time regarding any type of intervention.

Riassunto

Il miglioramento delle procedure chirurgiche e dei risultati nel trattamento delle neoplasie del retto basso hanno reso importante la valutazione dei risultati funzionali. Lo scopo di questo studio è valutare i risultati funzionali della terapia chirurgica, sia con approccio laparoscopico che laparotomico (open). Tra tutti i pazienti sottoposti a trattamento chirurgico per neoplasia del retto presso la Chirurgia Generale della Università di Foggia nel periodo 2000/2018, abbiamo raccolto e studiato 37 pazienti con lesione neoplastica localizzata nel retto basso/ultrabasso, sottoposti a procedure chirurgiche "sphincter-preserving" e suddivisi in base al tipo di approccio: open 20 pazienti, laparoscopico 17 pazienti, di cui 8 con assistenza robotica. Per ciascun tipo di intervento chirurgico, come resezione anteriore del retto basso e ultrabasso, resezione intersfinterica, resezione addominoperineale, sono stati valutati. I risultati funzionali, quali la continenza intestinale, le funzioni urinarie e le funzioni sessuali maschili e femminili, per mezzo dei seguenti tests: Wexner Incontinence Score, International Prostatic Symptom Score, International Index of Erectile Function-5, Female Sexual Function Index. I controlli sono stati eseguiti prima del trattamento chirurgico e 3-6-12 mesi nel periodo postoperatorio. Per l'analisi statistica sono stati utilizzati i seguenti tests: X²-test,

impaired and paired t-test two tailed, Bonferroni post-hoc test. Sono stati valutati i risultati chirurgici immediati e le caratteristiche patologiche dei tumori. La valutazione della continenza intestinale in tutti i pazienti sottoposti a resezione rettale e anastomosi primaria ha mostrato compromissione funzionale, senza differenze statisticamente significative tra approccio laparoscopico e open. Nel confronto tra le diverse procedure chirurgiche, l'alterazione della continenza era più grave dopo resezione intersfinterica nel confronto con le resezioni basse e ultrabasse. Le terapie riabilitative prolungate per diversi mesi dopo la chirurgia hanno mostrato evidente miglioramento. La continenza urinaria nei pazienti di ambo i sessi, non ha mostrato alterazioni statisticamente significative nel postoperatorio in relazione all'approccio e al tipo di intervento resettivo. La funzione sessuale maschile ha avuto alterazioni dopo ogni tipo di resezione chirurgica, ma queste erano più gravi dopo resezione intersfinterica. La funzione sessuale femminile non ha mostrato modificazioni nel confronto pre e postoperatorio. L'alterazione della continenza intestinale e le disfunzioni urinarie e sessuali dopo trattamento chirurgico del tumore del retto basso e ultrabasso sono frequenti e costituiscono la "low Anterior Resection Syndrome". La gravità della sindrome è legata alla sede della anastomosi con l'alterazione anatomica dell'apparato sfinteriale. Le terapie riabilitative svolgono un ruolo importante nel conseguire un apprezzabile miglioramento delle alterazioni funzionali.

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