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ORIGINAL ARTICLE

Quality of life after rectal cancer surgery. Comparison of functional results in open, laparoscopic and robotic surgery

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ABSTRACT

Introduction: *The evaluation of the results in rectal cancer surgery has traditionally focused on the oncological response. However, in young patients affected by this condition, the results of urogenital function are becoming increasingly important. The purpose of this study is to compare the quality of life in terms of bowel, urinary and sexual function of patients operated by conventional, laparoscopic and robotic approaches.*

Population and methods: *Cross-sectional study, based on a prospective database of the Coloproctology Service of the Churruca-Visca Hospital, through a telephone survey on the EORTC - QLQC30/C29 questionnaires and LARS score, during May 2016 and September 2019. Of 81 operated patients, 62 met the inclusion criteria and, of these, 47 answered the questionnaire.*

Results: *The 47 patients (25 men and 22 women) were divided into three groups according to the type of surgery: 16 conventional surgery, 13 laparoscopic surgery, 18 robotic surgery. There were no statistically significant differences in the different groups in terms of age, sex, ASA and tumor height. A statistically significant difference was observed in the robotic group in terms of received neoadjuvant chemoradiation therapy (p=0.023) and in the sexual domain (p= 0.01). In this group, a better trend was also observed in the LARS score, although without reaching statistical significance.*

Conclusion: *The overall quality of life is comparable in the three groups. The key could be personalized surgery, where the best technique is chosen according to the case and the experience of the surgeon.*

Keywords: *Rectal Cancer; Urogenital and Bowel Function; Robotic Surgery*

INTRODUCTION

Evaluation of outcomes after rectal cancer surgery has traditionally focused on oncologic response and complication rates. However, with the increasing number of young patients affected by this condition, the results of urinary and sexual function take on greater prominence and become increasingly important.

Sexual and urinary dysfunctions continue to be serious complications of rectal surgery and represent the factors that most influence both the physical health and the quality of life of these patients. A distortion of bowel function known as "low anterior resection syndrome" is also associated with rectal cancer surgery.

In the last three decades, with total mesorectal excision (TME), we have witnessed great advances in rectal cancer surgery. A marked decrease in the rate of complications is observed and, in the area of oncological response, the reduction in the recurrence rate and the prolongation of survival and disease-free period.

In the 1990s, the first experiences with colorectal laparoscopic surgery were published, generating great expectations in improving functional results given the greater amplification in visualization of the surgical field.

Despite being technically more difficult, laparoscopy was gaining more and more followers over conventional surgery, following the principles of Heald of the TME.[1-3]

Starting in 2004, one of the latest technological advances worldwide has been the introduction of robotic surgery in the treatment of rectal cancer, with potential benefits in terms of better complete MET, lower conversion rate, and lower degree of urogenital dysfunction.[4]

Robotic surgery, developed to overcome the limitations of laparoscopic instruments, raised high expectations for nerve preservation from the start.

Despite all these advances, the different publications have shown great variability in the functional results after TMS when comparing the different techniques. It has been suggested that these results are related to specific factors of the tumor and perioperative treatment, such as: tumor height, neoadjuvant chemoradiation therapy (CRT), type of anastomosis, etc.[3-5]

The objective of this work is to compare the quality of life related to intestinal and urogenital function in our patients operated on for rectal cancer using conventional, laparoscopic, and robotic surgery.

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POPULATION AND METHODS

SA cross-sectional study was carried out, through a telephone survey, of all patients affiliated with the Social Security of the Argentine Federal Police who underwent rectal resection for cancer between May 2016 and September 2019.

For the selection of cases, the prospective database of the Coloproctology Service of the Churruca-Visca Hospital was used. Patients of both sexes were included, with their stoma closed (in those cases in which a protective stoma had been performed), with a minimum follow-up of 2 years.

The exclusion criteria were met by patients who did not answer the phone call after 5 attempts, refused to answer the survey, and had anastomotic leaks, reinterventions, neurological alterations or mortality due to their oncological condition or other unrelated pathologies.

Patients who met the inclusion criteria were subdivided into three groups:

1. Conventional surgery.
2. Laparoscopic surgery.
3. Robotic surgery.

The surveys were carried out by telephone by two members of the Coloproctology Service who were unaware to which subgroup each patient belonged. For this, the EORTC-QLQ_C30, EORTC-QLQ_C29 questionnaires and the low anterior resection syndrome (LARS) score were used. These previously validated questionnaires measure the quality of life of patients after rectal surgery.

EORTC-QLQ_C30: uses five functional scales (physical, role, emotional, cognitive and social), three symptom scales (fatigue, pain, nausea), a global scale of health status/quality of life, several individual items that assess other symptoms commonly reported by cancer patients (dyspnea, loss of appetite, insomnia, constipation, and diarrhea) and the perceived financial impact of the disease.

The questionnaire has 4-point scales for all items, except for global health status, which has a 7-point scale. We have converted these raw scores into scale scores ranging from 0 to 100 following the recommendations in the EORTC scoring manual.[6-8]

EORTC-QLQ_C29: is an add-on module to EORTC QLQ-C30 designed for use in patients with colorectal cancer. The questionnaire consists of 29 items, 10 items on four scales (body image, urinary frequency, blood and mucus in stool, stool frequency) and 19 individual items.[9]

A high score for a functional scale represents a satisfactory level of functioning. In contrast, a high score for a symptom item represents a high level of symptom presence.

LARS score: This scoring system is a simple tool for the evaluation of anorectal function. The scoring system is validated and measures flatus and stool incontinence, stool frequency, stool fragmentation, and evacuation urgency. Three score ranges are obtained that determine the existence and severity of LARS: no LARS (0-20), minor LARS (21-29), and major LARS (30-42).[6]

Statistical analysis was performed with the statistical program SPSS version 24.0 (SPSS 24.0; SPSS Inc., Chicago, IL, USA).

Baseline characteristics are presented by categories and data as means. Categorical variables were compared using Pearson's chi-square test or Fisher's exact test, when appropriate. Continuous variables were compared using the one-factor Anova test, as in the comparison of quality of life scales (after checking the homogeneity of variances using Levene's test). A $p < 0.05$ was considered as significant value.

RESULTS

Between May 2016 and September 2019, 81 patients were operated on for rectal cancer. Fig. 1 details its morbidity and mortality. Fifteen (18.5%) patients could not be contacted by telephone.

Sixty-two patients met the inclusion criteria. Of these, 15 (18.5%) could not be contacted by telephone, leaving 47 (75.8%) who answered the questionnaire completely and satisfactorily. This high number of responses could be due to the fact that they form part of the closed community population, thus facilitating their contact and follow-up. There were 25 men and 22 women with a mean age of 65.6 (62–68) years, who were divided into three groups: 16 open surgery patients, 13 laparoscopic surgery patients and 18 robotic surgery patients (Fig. 1). The demographic and oncological characteristics are described in Table 1.

We found no significant differences in the different groups regarding age, sex, body mass index (BMI), ASA score, and tumor height. We did observe a statistically significant difference in the application of neoadjuvant chemoradiation therapy: 81% in open surgery, 84% in laparoscopic surgery, and 44% in robotic surgery. This could be due to the fact that a greater number of T1/T2 tumors were operated on with robotic surgery during the learning curve stage of this technique.

Regarding the pathological results, we have not found significant differences in the three groups in relation to the circumferential margin, positive nodes and distant metastases.

Questionnaires

EORTC QLQ-C30

The global quality of life status is comparable in the three

TABLE 1: DEMOGRAPHIC AND TUMOR CHARACTERISTICS

	Conventional Surgery n = 16	Laparoscopic Surgery n = 13	Robotic Surgery n = 18	p
Age				
(Median ± SD)	68.5 ± 10.8	62 ± 14	67.5 ± 10	0.072
Sex (n)				
Femenine	8	6	8	0.947
Masculine	8	7	10	
BMI				
(Median ± SD)	26 ± 2.6	25 ± 3.6	25 ± 4	0.174
Asa (n)				
ASA 1	2	4	6	0.283
ASA 2	14	8	12	
ASA 3	0	1	0	
Tumor Height				
(Median ± SD)	10.3 ± 3.9	10.3 ± 3.7	11.5 ± 3.8	0.617
<7cm From Am (n)	6	5	6	0.949
>7cm From Am (n)	10	8	12	
Neoadjuvant CRT (n. %)				
TNM	13 (81.2)	11 (84.6)	8 (44.4)	0.023
T1 (n)				
T2 (n)				
T3 (n)	2	0	4	0.109
T4 (n)	1	2	6	
N0 (n)	10	9	8	
N1 (n)	3	2	0	
N2 (n)				
M0 (n)	8	6	12	0.596
M1 (n)	6	4	5	
N2	2	3	1	
M				
M0	16	12	16	0.406
M1	0	1	2	
+ Circumferential Margin				
(n.%)	1 (6.3)	0	1(5.6)	0.667

groups; although no significant differences were found in the social psychological and cognitive functional scale, a better trend was observed in the laparoscopic and robotic surgery groups compared to open surgery. The difference in terms of economic stability is also greater, which could be due to a quick recovery with robotic and laparoscopic surgery and therefore to reintegration into the workplace (Table 2).

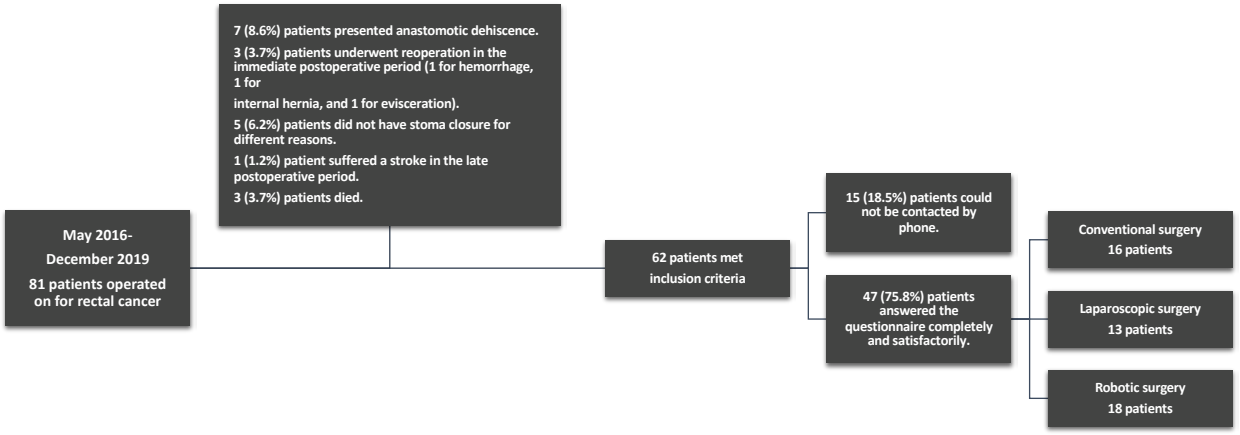

Figure 1: Flowchart of patients.

TABLE 2: RESULTS OF THE QUALITY OF LIFE SURVEY (EORTC QLQ-C30)

	Conventional surgery	Laparoscopic surgery	Robotic surgery	p
Overall quality of life	73.7	81	82.8	435
Social functioning	75	85.3	86	371
Cognitive functioning	86.2	93.7	92.3	644
Role functioning	85.9	88.9	89.1	142
Emotional functioning	81.2	87.4	88.2	152
Physical functioning	74.5	75.8	77.3	787
Fatigue	45.6	44.4	42.6	965
Pain	10.7	09.08	09.05	680
Nausea/vomiting	03.05	02.05	02.01	479
Dyspnea	03.07	02.07	02.04	256
Insomnia	05.02	04.01	03.01	432
Appetite loss	07.02	05.03	06.01	629
Constipation	09.25	05.04	04.08	930
Diarrhea	12.2	10.1	08.02	214
Finantial difficulties	03.03	01.	01.07	100

EORTC QLQ-CR29

Table 3 shows that the best results are found mainly in frequency and urinary incontinence in the robotic surgery group, surpassing laparoscopy and open surgery, although they do not have a statistically significant impact in this series. In contrast, the outcome related to sexual impotence was clearly better in the robotic group compared to the other two groups ($p < 0.01$), in agreement with the world series of robotic surgery.

The results of the LARS score are presented in Table 4. Anorectal dysfunction was reported in all three groups with no statistically significant difference with respect to the total score. All mean scores were unfavorable first for the open surgery group, although without statistical significance. However, the robotic surgery group did not have major LARS and there were only 3 patients with minor LARS.

DISCUSSION

Almost two decades have passed since the introduction of robotic technology in colorectal surgery and four decades since laparoscopy. Thousands of patients have been operated on with these minimally invasive surgery methods. Despite this, knowledge of the potential impact on quality of life, and the anorectal and urogenital function is limited.[10]

In this study, we compared the results obtained in three groups: open, laparoscopic and robotic surgery using the EORTC QLQC30 quality of life questionnaire and its

TABLE 3: EORTC QLQ-C29 RESULTS

	Conventional surgery	Laparoscopic surgery	Robotic surgery	p
Body image	67.5	77.	78.1	184
Anxiety	68.7	84.2	83.8	234
Weight	81	85.3	88.5	500
Sexual interest	61.2	68.7	68.9	230
Urinary frequency	8.7	5.3	4.4	149
Blood and mucus in stool	0	0	0	
Evacuation frequency	26.2	23.8	22.5	53
Urinary incontinence	4.2	03.07	02.08	387
Dysuria	01.02	01.07	01.08	488
Abdominal pain	08.09	08.04	08.05	251
Anal pain	12.07	10.07	09.08	177
Abdominal distension	15.06	12	11.05	668
Dry mouth	1.2	0.4	0.7	324
Hair loss	2.3	1.2	01.01	452
Taste/flavor	03.07	2.3	02.06	238
Flatus	35.7	32.4	31.8	154
Fecal incontinence	20.2	17.4	15.5	433
Skin pain	5..7	4.7	4	285
Shame	10.2	8.7	6.1	132
Sexual impotence	32.7	29.3	20.6	10
Dyspareunia	2.5	0	0	

complementary module QLQ-CR29, specific for colorectal cancer.

When interpreting the differences, it should be noted that only 6 (33.3%) out of 18 patients in the robotic group underwent TME, while the remaining 12 (66.66%) underwent partial excision (PME). This fact, added to the short follow-up period, could explain some favorable results of the LARS scale in this group, so these data should be interpreted with caution.

It is well known that LARS occurs in a significant percentage of patients operated on with TME. The data registry from the Netherlands showed 46% of LARS in patients with TME surgery, both in open, laparoscopic and robotic approaches. Bowel dysfunction was shown to be the biggest problem after mesorectal resection, with a significant impact on quality of life.[5,11,12] However, in our series the results of the LARS score do not show a statistically significant difference between the three groups. Now, if we look closely, there is a trend in favor of robotic surgery in which LARS was not observed in 15 patients, compared to 9 and 10 patients in open and laparoscopic surgery, respectively. This could be due to the fact that a higher number of PMEs were performed in the robotic group and also to the small sample size.

The deleterious effect generated by radiotherapy on the functionality of the rectum must be taken into account, which directly affects the quality of life.[13,14] In our series, the proportion of laparoscopic and open surgery patients who received neoadjuvant treatment was significantly higher compared to the robotic surgery group (p = 0.023). However, this did not have a negative impact on overall quality of life.

Another challenge in rectal cancer surgery today is trying to preserve postoperative urogenital function. The identification and preservation of the inferior hypogastric plexus in tumors of the mid and inferior rectum is considered the first step to perform good quality surgery. On the other hand, emotional, psychological and social factors can also contribute to postoperative urogenital dysfunction (0-15% urinary, 10-35% sexual), although neurovascular injury is usually considered to be the main cause after TME surgery.[15,16]

In this context, laparoscopy and robotics offer potential tools that help to obtain a better preservation of the nerve plexuses and, consequently, better functional results in the postoperative period.[4,16,17]

TABLE 4: LOW ANTERIOR RESECTION SYNDROME (LARS)

	Conventional Surgery (n= 16)	Laparoscopic Surgery (n= 13)	Robotic Surgery (n= 18)	p
Incontinence to flatus				
Never	12	11	16	4.11
Once a week	1	1	2	
More than once a week	3	1	0	
Incontinence to liquid stool				
Never	10	11	15	0.293
Once a week	4	2	3	
More than once a week	2	0	0	
Evacuation frequency				
Less than once per day	2	2	3	0.979
1-3 Times per day	10	8	12	
4-7 Times per day	4	3	3	
More than 7 times per day	0	0	0	
Explosive stool				
Never	5	8	11	0.410
Once a week	7	3	5	
More than once a week	4	2	2	
Fecal urgency				
Never	11	8	14	0.579
Once a week	3	4	4	
More than once a week	2	1	0	
Lars category				
No lars	9	10	15	0.301
Minor lars	4	2	3	
Major lars	3	1	0	
Lars total (Median ± SD)				
(Mediana ± DE)	18 ± 10.8	15 ± 6.7	11.5 ± 9.4	0.152

That said, a detailed analysis of the COLOR II[13] trial compared open surgery with laparoscopy and showed no significant differences in sexual and urinary dysfunction. The same appears to be true for robotic surgery. High magnifications and technological benefits do not appear to offer better urinary and sexual outcomes than conventional laparoscopic surgery. This was expressed in the ROLLAR trial with respect to the functional score (I-PSS, IIFEF AND FSFI).[12,18]

Kim et al.[17] retrospectively compared two groups of 130 patients, each undergoing laparoscopic and robotic surgery, according to age, sex, BMI, tumor height, and neoadjuvant treatment, with follow-up at 3, 6 and 12 months postoperatively. Quality of life surveys were performed and urinary and sexual function were evaluated, concluding that after TME, the robotic surgery group presented less damage to sexual and urinary function and to global quality of life compared to the laparoscopic group. In our series, a statistically significant difference was observed ($p < 0.01$) only in the sexual domain. Therefore, we must be very cautious when interpreting the results of the world literature, since it is currently controversial on this point.

Our study has limitations to obtain a statistical impact, such as the small number of cases, based on an initial series. Another is the linear design, in which the scales in

the tables are unweighted and are added assuming that each item is equally appropriate. However, the simple integer numbers punctuation proposed by Cox is likely to be sufficient for many purposes.[18,19]

Although the information was collected from our prospective database, since robotic surgery is a new procedure in our institution, the results were only evaluated in the postoperative period, so we do not have preoperative functional data.

In the future, it would be convenient to carry out a questionnaire that covers rectal and urogenital function both preoperatively and postoperatively, adding anorectal manometry, with the aim of improving the limitations of this study.

CONCLUSION

In resection surgery for rectal cancer, overall quality of life is comparable after conventional, laparoscopic, and robotic approaches.

Both technological advances and new surgical procedures, together with in-depth knowledge of pelvic anatomy and oncological principles, help the specialist surgeon to seek the best cancer treatment, without giving up the possibility of preserving postoperative functionality.

The key to achieving a better quality of life in the postoperative period for rectal cancer could be custom surgery, where the best technique is chosen according to the case and the experience of the surgeon.

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