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clinical practice

Laparoscopic versus open total mesorectal excision for stage I-III mid and low rectal cancer: a retrospective 5 years analysis

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SUMMARY: **Laparoscopic versus open total mesorectal excision for stage I-III mid and low rectal cancer: a retrospective 5 years analysis.**

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Introduction. *Total mesorectal excision (TME) is the cornerstone of a correct surgical therapy for extraperitoneal rectal cancer. Aim of the study is to evaluate our 5 years experience confronting retrospectively laparoscopic (lap) TME in respect to its laparotomic (open) counterpart.*

Patients and Methods. *30 patients were treated laparoscopically for stage I-III extraperitoneal rectal cancer and retrospectively compared to a homogeneous group, stratified for sex, age, comorbidities and stage of disease.*

Results. *30 days mortality was zero for both groups, while morbidity was 20% for the lap group and 36.6% for the open group. Mean lymph nodes harvested was 24 ± 12 for the lap group, 26 ± 14 for the open group (p > 0.05). Five years overall and disease free survival was respectively 82.2% and 81.4% in the lap group, 79.9% and 79.6% in the open group, without statistical significance (p>0.05).*

Discussion. *Minimally invasive TME resulted a safe, effective and oncologically adequate procedure when retrospectively compared to its laparotomic counterpart, with 5 years overall survival and disease free survival reaching no statistical significance compared to the open approach, but with all the advantages of the laparoscopy such as less pain and blood loss, faster recovery, less morbidity and better cosmetics.*

Conclusions. *Our study has retrospectively demonstrated that laparoscopic TME is feasible and oncologically effective, even if it remains a complex minimally invasive procedure, requiring adequate skill. More prospective, randomized studies are necessary to define such a procedure as the new gold standard in treatment of stage I-III extraperitoneal rectal cancer.*

KEY WORDS: Extraperitoneal rectal cancer - Laparoscopy - Oncologic outcome.

Introduction

Total mesorectal excision (TME) represents the cornerstone for a correct oncological surgical treatment for rectal cancer. Firstly introduced by Heald et al (1) in 1982, this technique guarantees an incidence of local recurrence of about 4% at 5 and 10 years in R0 resections, with a mean of 78% of disease free survival at 5 years (2). In the past decade many reports have demonstrated that this procedure may be performed by a minimally invasive approach, with brilliant short and long term results compared to the classical laparotomic access (3-12). Yet, so far only retrospective studies have been performed to confront the long term oncologic outcome for these two procedures, with only few prospective randomized studies (13-20).

Aim of the present study is to retrospectively compare laparoscopic to open total mesorectal excision, evaluating the short and long term outcome.

Patients and methods

From January 2004 to January 2010, 30 patients with middle and low rectal cancer were treated by laparoscopic approach and retrospectively confronted to a homogenous group of 30 patients, stratified for age, sex, comorbidities and stage of disease, treated by laparotomic approach.

Exclusion criteria for minimally invasive approach were cancers infiltrating contiguous organs (T4) and counterindications to the pneumoperitoneum.

Preoperative study was based on locoregional staging by transanal ultrasonography and by contrast enhanced CT scan of the thorax, abdomen and pelvis. Patients with locally advanced rectal carcinomas (T3N0 and all N+ patients) were preoperatively treated by

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neoadjuvant chemoradiation: 25 fractions of 45 Gy in 5 weeks with concomitant continous infusion of 5-FU. All patients treated with preoperative chemoradiation were operated on after 6 to 8 weeks after completing their neoadjuvant treatment.

Data are expressed as a mean ± standard deviation. The t Student test was used to analyze quantitative variables, while the chi-squared test was used for the qualitative ones. Survival curves were calculated according to the Kaplan-Mayer method and the statistic differences were confronted by the log-rank test. A $p<0.05$ was considered statistically significant. All statistical analysis were performed using a dedicated software (Med-Calc®) on Windows Vista®.

Surgical technique for laparoscopic TME

Laparoscopic TME must be carried out according to the key principles of a correct oncologic surgical procedure, including *en-bloc* resection, *no-touch* technique and removal of corresponding lymphatic drainage. After division of the inferior mesenteric artery and vein, the left colon is completely mobilized up to the middle transverse colon.

The Douglas peritoneal reflection is incised, developing the avascular retrorectal plane, along the Waldeyer fascia, identifying and preserving the superior hypogastric plexus and the hypogastric nerves.

The dissection is performed anteriorly and laterally, preserving the integrity of the mesorectal fascia, down to the levator ani. In case of low or ultra-low anterior resection, the rectus is divided at the level of the levator ani muscle and a termino-terminal Knight-Griffen anastomosis is fashioned; in case of abdominoperineal resection, the operation is finished with perineal extraction of the specimen, direct closure of the perineal wound, and fashion of a permanent stoma in the left iliac fossa.

Results

Mean age of patients treated by laparoscopy (lap group) was 64 ± 7.3, while those treated by laparotomy (open group) was 65 ± 8.5. There were no statistically significant differences between the two groups about sex, age and stage of disease (Table 1).

Mean operative length for the lap group was 215 ± 43 minutes, 195 ± 29 minutes for the open group ($p>0.05$). Intraoperative blood loss was 263 ± 166 cc for the lap group, 505 ± 205 cc for the open group, so statistically different ($p<0.05$) (Table 2). There was 1 (3.3%)

TABLE 1 - DEMOGRAPHIC AND PATHOLOGIC DATA: LAP VS OPEN GROUP.

Parameters	Lap group	Open group	p
Mean age, years	64 ± 7.3	65 ± 8.5	> 0.05
Gender, n (%)			
Males	20 (66%)	19 (63%)	> 0.05
Females	10 (34%)	11 (28%)	> 0.05
Stage, n (%)			
Stage I	7 (23.3%)	6 (20%)	> 0.05
Stage II	8 (26.6%)	8 (26.6%)	> 0.05
Stage IIIA	7 (23.3%)	6 (20%)	> 0.05
Stage IIIB	5 (16.6%)	7 (23.3%)	> 0.05
Stage IIIC	3 (10%)	3 (10%)	> 0.05

TABLE 2 - PERIOPERATIVE RESULTS.

Parameters	Lap group	Open group	p
Operation length	215 ± 43 min	195 ± 29 min	> 0.05
Blood loss	263 ± 166 cc	505 ± 205 cc	< 0.05
Passage of flatus	2.3 ± 0.8 days	4.6 ± 1.9 days	< 0.05
Hospital stay	11.3 ± 1.8 days	15.8 ± 4.3 days	< 0.05
Morbidity	6 patients (20%)	11 patients (36.6%)	< 0.05
Mortality (30 days)	0	0	> 0.05

laparotomic conversion, due to dense pelvic adhesion.

In the lap group, 12 patients had neoplasia localized in the distal third of the rectum (40%), 18 in the middle third (60%), while in the open group, 13 patients had tumor localized in the distal third (43.3%), 17 in the middle third (56.6%).

Stage of disease was: for the lap group, 7 cases stage I (23.3%), 8 cases stage II (26.6%), 7 cases stage IIIA (23.3%), 5 cases stage IIIB (16.6%) and 3 cases stage IIIC (10%); for the open group, 6 cases stage I (20%), 8 cases stage II (26.6%), 6 cases stage IIIA (20%), 7 cases stage IIIB (23.3%) and 3 cases stage IIIC (10%).

30 days mortality was zero for both groups, while morbidity was 20% for the lap group (6 cases: 1 patients with anastomotic fistula, 2 patient with pneumonia, 1 patient with pleural effusion, 2 patient with urinary tract infection) and 36.6% for the open group (11 cases: 1 anastomotic fistula, 5 wound infections, 2 pneumonia, 1 pleural effusion, 2 deep venous thrombosis of the lower limb), with statistical difference ($p<0.05$) (Table 2).

Flatus passage and hospital stay were both statistically shorter for the lap group (respectively 2.3 ± 0.8 days vs 4.6 ± 1.9 days and 11.3 ± 1.8 days vs 15.8 ± 4.3 days; $p<0.05$) (Table 2).

Mean follow-up was 38.3 months for the lap group, 37.9 months for the open group ($p>0.05$). Mean lymph nodes harvested was 24 ± 12 for the lap group, 26 ± 14 for the open group ($p > 0.05$). During our follow-up, no port site metastatic implantation occurred. Five years overall and disease free survival was respectively 82.2% and 81.4% in the lap group, 79.9% and 79.6% in the open group (Figs.1, 2), without statistical significance ($p>0.05$) (Table 3).

Discussion

Total mesorectal excision represents today the golden standard in treating surgically extraperitoneal rectal can-

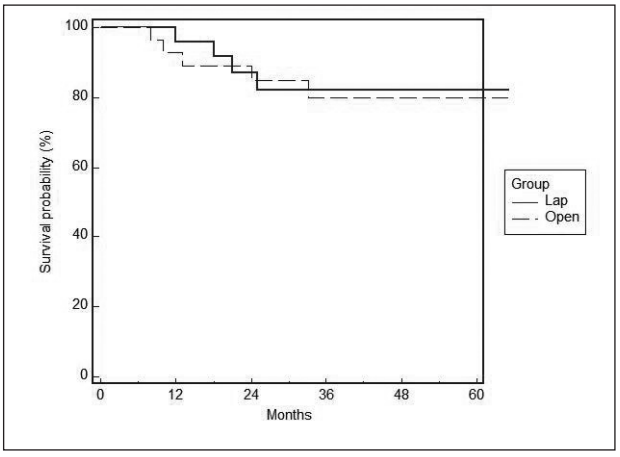

Fig. 1 - Overall 5 years survival.

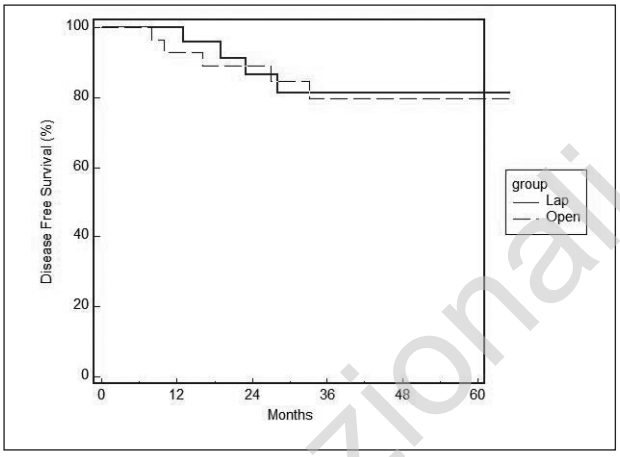

Fig. 2 - Overall 5 years disease free survival.

cer, with brilliant oncologic outcome, especially when combined to neoadjuvant chemoradiation (2). It was natural evolution to apply TME principles and technique to the minimally invasive surgery, which has been showing to be safe and oncologically correct, with results absolutely overlapping those of the laparotomic approach (3-12), and with all the advantages of the laparoscopy. Many authors have underlined that the magnified vision of the 30 degree scope allows a better identification of all delicate pelvic anatomic structures, which can be spared more efficiently, without any compromise about the oncologic principles, but allowing a normal bladder voiding and preserved sexual function (21-24); yet, few authors didn't report such a brilliant results, with bladder and sexual function similar to those of the open approach (25,26).

Our experience confirmed that minimally invasive TME is a safe, effective and oncologically adequate procedure when retrospectively compared to its laparotomic counterpart: we had no 30 days mortality in both groups, and morbidity was statistically less in the laparoscopic group (20% vs 36.6%; $p < 0.05$); we experienced 1 anastomotic leakage in both groups (3.3% for each group), and it is important to stress that we do not fashion a protective ileostomy in any case, unless there is doubt about the safety of the anastomosis itself; the incidence of our anastomotic leakage is absolutely comparable to that of the major international experiences, which ranges between 0.5% and 27% (27, 28). Our conversion rate was quite low, with an incidence of 4% (1 patients, because of dense pelvic adhesions), and so less than reported in literature (5, 29-32). Mean operation time for the lap group was 215 ±43, longer than the open group (195 ± 29), but not reaching statistical significance ($p > 0.05$). Blood loss, passage of flatus and hospital stay were all significantly lower for the laparoscopic approach. We didn't experience urinary or sexual dysfunction in both groups.

TABLE 3 - ONCOLOGIC OUTCOME.

Parameters	Lap group	Open group	p
Mean follow-up	38.3 months	37.9 months	> 0.05
Distal clearance	2.4 ± 0.7 cm	2.4 ± 0.9 cm	> 0.05
Lymphnodes harvested, n	24 ± 12	26 ± 14	> 0.05
5-years overall survival	82.2%	79.9%	> 0.05
5-year disease free survival	81.4%	79.6%	> 0.05

The primary end-point of this study was anyway the oncologic outcome: the circumferential resection margins, which we analyzed in the last 18 laparoscopic and 19 laparotomic cases, were all negative, and the mean "distal clearance" was 2.4cm ± 0.7 in the lap group, while it was 2.4cm ± 0.9 in the open group, without statistical significance ($p > 0.05$). Mean lymph nodes harvested was 24 ± 12 for the laparoscopic group, and 26 ± 14 for the open group, without any statistical significance ($p > 0.05$). Mean follow-up was 38.3 months for the lap group and 37.9 months for the open group ($p > 0.05$); the 5-years overall survival and disease free survival was 82.2% and 81.4% for the lap group, 79.9% and 79.6% for the open group, without any statistical significance ($p > 0.05$), and absolutely comparable to those of the major experiences in literature (9,10, 12-14, 31,32). Local recurrence were 2 (6.6%) for the lap group, and 3 for the open group (10%); all recurrences had a positive lymph nodes status (1 stage IIIA, 2 stage IIIB and 2 stage IIIC).

Few prospective studies (13-16, 18-20) and only 2

RCTs (17,33) have been published in literature so far; only the RCT of Lujan et al. (33) reports on the long term oncologic outcome for mid and low rectal cancer, whilst the RCT by Zhou et al. (17) considers just the short term outcome in terms of morbimortality and 30 days results. Yet, two large scale, multi institutional phase III RCTs are ongoing: the COLOR II (34) and the Korean trial which has just published the short term outcome (35).

Our results shows that laparoscopic TME is a safe, feasible and oncologically adequate surgical procedure, absolutely comparable to its laparotomic counterpart, but with all the advantages of the minimally invasive approach. It is anyway a complex surgical procedure, requiring a long learning curve and adequate colorectal laparoscopic skill, both for minimizing the risk of intraoperative injuries, and for maximize the efficacy and adequacy in removing intact the moserectum and preserving the delicate nervous structures.

Conclusions

Based on our experience, we can state that laparoscopic TME is a safe, effective and oncologically correct surgical procedure, especially about the middle and long term outcome, as demonstrated by the absence of statistically significant difference in the 5 years disease free and overall survival in respect to the laparotomic counterpart, but with all the advantages of the minimally invasive approach.

Yet, it remains a complex advanced surgical laparoscopic procedure, requiring an adequate learning curve, so that it should be performed by experienced laparoscopic colorectal surgeons.

Further studies, possibly multicentric, prospective and randomized, are needed to define the role of laparoscopy as the gold standard for the radical treatment of extraperitoneal rectal cancer.

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