Long-term results of laparoscopic treatment for advanced rectal cancer

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INTRODUCTION

The crude incidence of rectal cancer in the European Union is 35% of the total colorectal cancer incidence (15–25/100000 per year), with a mortality of 4–10/100000 per year with the lower figures valid for females, the higher for males.

The first years of the 21st century are seeing a revolution in the management of advanced rectal cancer (stage II-III). The disease has changed into a multidisciplinary treatment model. The need for a multidisciplinary management of patients is obvious, and the team approach, prior to any therapeutic intervention, is mandatory for this. There are four major goals in the treatment of a patient with advanced rectal cancer: (1) local control; (2) long-term survival; (3) preservation of anal sphincter, bladder, and sexual function; and (4) maintenance or improvement in quality of life.

In this study, we report our experience about multimodal treatment of advanced rectal cancer; in particularly about preoperative investigation, medical preoperative oncological treatment, the eventual use of endoscopic stent (to resolve malignant obstruction) and minimal invasive treatment.

About Preoperative Treatment, the current evidence suggests that the optimal treatment for rectal cancer is surgery alone with selective use of preoperative therapy. Although postoperative therapy for stage II and III remain an therapeutic option, many centres have adopted neoadjuvant chemo-radiation protocols.

About surgical treatment, loco regional cancer control in rectal (cancer) surgery has improved significantly over the last 15 years after the introduction of total mesorectal excision (TME). Laparoscopic resection of the rectum has not gained the same international acceptance. While randomized trials have established laparoscopic colectomy as an accepted procedure for colon cancer, only limited randomized data are available for patients with rectal cancer.
Although several prospective randomized multicenter studies in different countries are looking at the issue of the oncologic safety of laparoscopic colectomy, patients with rectal cancer have generally been excluded from these trials because of the complexity of the techniques required in both open and laparoscopic procedures to achieve TME with sphincter preservation. Several investigators have shown the feasibility and safety of the laparoscopic surgery for the treatment of rectal cancer, with or without sphincter preservation. About strategy of rectal surgery for the treatment of rectal cancer, with or without sphincter preservation has been reported. To address these issues, we report the operative data, some short-term results, but especially, long-term oncologic outcomes of our multimodal approach to advanced and obstructed rectal cancer.

**MATERIAL AND METHODS**

At the Surgical Department of Monfalcone (Italy) Hospital, 46 nonrandomized consecutive patients underwent laparoscopic rectal resections between January 2001 and December 2004. This study included all patients who underwent anterior resection with restoration of the bowel continuity (n = 38) and abdominoperineal resection (n = 8). The patients had histologically proven adenocarcinoma of the rectum; only one case was a malignant melanoma. Neoplasms located in the low and middle rectum were treated by laparoscopic total mesorectal excision (TME) and in proximal rectum were treated by laparoscopic partial mesorectal excision (PME). The site of rectal neoplasm was defined according to the International Guidelines for Cancer Registrars: 7 cm or less from the anal verge; low rectum; 7 to 12 cm, middle rectum and 12 to 15 cm, high rectum. In the absence of specific contraindication to laparoscopy, patients were selected for laparoscopic TME or PME based on the following criteria: elective surgery, American Society of Anaesthesiologists (ASA) status I to III. Neither morbid obesity nor prior pelvic surgery was considered a contraindication to laparoscopic anterior rectal resection or abdominoperineal resection. Patients preoperatively staged T3 or T4 without distant metastases were treated by preoperative radio chemotherapy (45 Gy during 4 weeks together with systemic 5-fluorouracil intravenous infusion). All the patients (n = 4) with malignant midline or high rectal obstruction were sent for endoscopic stenting with Self Expanding Metallic Stent (SEMS). After complete remission of the obstruction, radiological staging was completed with a total body C. scan and Endoscopic Rectal Ultrasound evaluation (ERUS) to assessing the need of preoperative radio chemotherapy. After preoperative radio chemotherapy in all this patients were performed an anterior laparoscopic resection. Analysis of patient characteristics included age and gender. Operative variables examined included length of operative procedure (from skin incision to the application of dressings). Pathologic examination included stage of disease (TNM classification). Parameters recorded included number of lymph nodes harvested. Long-term outcomes included overall and by stage survival for rectal cancer. Statistical analysis was performed using SPSS for Windows. Data were expressed as meanSD. The survival rate was evaluated using Kaplan-Meier statistical analysis.

**RESULTS**

Between January 2001 and December 2004, 46 neoplasms located in the rectum underwent surgical treatment. Indications for laparoscopic procedures were 1 malignant melanoma and 45 adenocarcinomas. There were 30 men and 16 women with mean age 71.4 (range 52–87) years. The ASA status of the patients were 5 ASA I, 23 ASA II, and 18 ASA III. Mean operative time was 220± 25.2 (range 135–370) minutes.

Concerning short-term outcome, the mean postoperative stay was 14.1±8.2 (range 4–65) days. The 30-day mortality was 2.2%: one case of acute pancreatitis in an elderly patient. The median length of the specimen was cm29.9±6.2 SD (range 20-50). There was no case of cancer involvement of the distal margin; in two cases (adenocarcinoma), the distal margin was less than 2 cm (0.5cm). One patient is disease-free at 46 postoperative months; the second is alive at 49 postoperative months with local recurrence. Median number of lymph nodes harvested was 12.3 (range 4–22).

Of 45 adenocarcinoma, 4 cases were obstructed. The site of tumor location was high (n=2) or middle (n=2) rectum. Successful stent positioning was obtained in all patients without complications. All these patients were radiologically staged and treated with radiochemotherapy before laparoscopic resection.

The stage of rectal cancer according to the TNM classification was stage I in 12 patients, stage II in 10, stage III in 15, and stage IV in 8.

Concerning long-term oncologic results, we evaluated 41 (89.1%) patients with a median follow-up of 47.1±26.4SD (range 1–89) months. 3 procedures for recurrence (2 abdominoperineal resection and 1 anterior rectal resection) and 1 anterior rectal resection for malignant melanoma were excluded. The survival rate was evaluated using Kaplan-Meier statistical analysis (fig.1 and 2). The 5-year global survival rate (with stage IV) was 62.2%. The 5-year survival rate for stage I was 90.9%, stage II 77.9%, and stage III 53.8%; no patient with stage IV disease was alive after 16 postoperative months.

**DISCUSSION**

Historically, the major step that has been made in the last two decades in the treatment of rectal cancer was the establishment of multimodality approach. There are four major goals in the treatment of a patient with advanced rectal cancer: (1) local control; (2) long-term survival; (3) preservation of anal sphincter, bladder, and sexual function; and (4) maintenance or improvement in quality of life.
So it has been necessary to create a multidisciplinary team with different skills (radiological, oncological, endoscopic, and surgical).

First of all, preoperative investigations will help the surgeon and his multidisciplinary team to determine: (1) Health condition and comorbidities; (2) Rectal cancer stage; and (3) Best treatment planning.

In the last decades, assumed much importance in the staging of rectal cancer the use of Endoscopic Rectal Ultrasound (ERUS).

According to currently available data, ERUS is 62% to 92% accurate for T-staging and 64% to 88% accurate for N-staging.

Our protocols provide to perform to all patients with advanced rectal cancer for first an abdominopelvic Computed Tomography (CT) to identify intra-abdominal metastatic disease prior to a curative or radical resection and after an ERUS. However, the role of CT in the preoperative loco-regional staging is much more limited. The accuracy of CT for T-stage (53% to 94%) and N-stage (54% to 70%) is lower overall than that of ERUS.

About Preoperative Treatment, the current evidence suggests that the optimal treatment for rectal cancer is surgery alone with selective use of preoperative therapy.

The use of perioperative chemoradiation therapy for rectal cancer continues to evolve. Based on the results of two multicenter trials, the 1990 NIH Consensus Conference on rectal cancer recommended postoperative chemoradiation for patients with stage II/III rectal cancer. In the last decades, many centres have adopted the use of preoperative chemoradiation therapy (PCRT). The benefits include cancer regression and down staging associated with increased resectability and a higher rate of sphincter preservation. Moreover, complete pathologic response rates up to 10% to 25% can be achieved. The German Rectal Cancer Study Group recently completed a prospective randomized trial that compared preoperative versus postoperative chemoradiation in clinical stage II and III rectal cancer. They concluded that, although there was no difference in overall survival between the two groups, in the preoperative group there was a significant reduction in local recurrence rate (6% vs. 13%, P = 0.006) and toxicity. The quality of life may transiently decrease. This finding is counterbalanced by the potential for improved oncologic outcome in properly selected patients.

MSKCC report evaluating treatment outcomes patients with a complete or near complete response to neoadjuvant chemo-radiation has demonstrated improved survival compared to partial responders or no responders.

About surgical treatment, loco regional tumour control in rectal cancer surgery has improved significantly over the last 15 years after the introduction of total mesorectal excision (TME). Overall local recurrence (LR) rates 10% should lead to concerns about the surgical quality. A large international retrospective study reported a local recurrence rate of 32% to 35% following conventional surgery compared with 4% to 9% following TME. The study also reported a 30% absolute increase in the overall survival and cancer-specific survival in the TME group.

Similar findings were noted by the Dutch Colorectal Cancer Group when they analyzed data from two prospective randomized studies. The introduction of TME decreased the local recurrence rate from 16% to 9%, and TME was an independent predictor of overall survival.

TME emphasizes the achievement of negative CRM and distal margins, thus optimizing the oncologic outcome for the patient. TME has been shown to achieve a negative CRM in up to 96% of resected specimens.

Most importantly, large series from surgical teams worldwide using TME techniques have reported low failure rates as low as 3% and overall 5-year survival from 64% to 80%. In fact, in studies comparing rectal resection according to the principles of TME to historical controls of standard, blunt mesorectal dissection, the patients treated with TME consistently have lower local recurrence rates.

Development of centre of excellence could also help improve the quality of all aspects of rectal cancer treatment. In the Swedish TME project, the outcome was significantly better in patients treated by high-volume surgeons, with LR rates of 4% vs. 10% and rates of rectal cancer deaths of 11% compared with 18% in the low-volume group. Further evidence for the beneficial effect of the practice of TME, has recently been published by the Dutch and Norwegian Rectal Cancer Study Groups. Thus the evidence suggests that high-volume Multidisciplinary Teams (MDTs) should manage rectal cancer.

About mini-invasive surgery, laparoscopic resection of the rectum has not gained the same international acceptance as colon surgery. However, it has proven to be technically feasible and safe with no more or perhaps fewer complications than after open rectal surgery. Low anterior resection (LAR) technically performed as laparoscopic TME or Partial Mesorectal Excision has the same oncological outcome when compared to traditional open rectal surgery. For patients, laparoscopic surgery gives benefits regarding reduced postoperative pain, shortened postoperative ileus with faster bowel recovery after surgery, improved abdominal cosmesis, fewer wound infections, less postoperative small bowel obstruction and ventral hernias. For the health care providers the benefits are shorter hospital stay and reduced overall costs and thereby more effective use of health care resources. While randomized trials have established laparoscopic colectomy as an accepted procedure for colon cancer, only limited randomized data are available for patients with rectal cancer. The only large randomized trial that has included patients with rectal cancer is the English CLASICC trial, comparing the conventional versus laparoscopic assisted surgery in colorectal cancer. The trial showed equivalent length of bowel resection, equivalent lymph node harvest, and equivalent complication rates. A significant concern is the high rate of positive surgical margins among all patients, and in particular in those patients treated by laparoscopic low anterior resection (12%) compared with open low anterior resection (6%). Additional randomized trials are needed to docu-
ment safety, efficacy, and benefit to patients. Because of the technical challenges of laparoscopic pelvic surgery, a standardization of the technique is important to reduce the rate of conversion and improve the operating team performance.

In our study the 5-year global survival rate (with stage IV) was 62.2%. The 5-year survival rate for stage I was 90.9%, stage II 77.9%, and stage III 53.8%; no patient with stage IV disease was alive after 16 postoperative months. These results are very similar to the results of Morino et al.54

In this report the 5-year survival rate for stage I was 92%, stage II 79%, and stage III 67%; no patient with stage IV disease was alive after 34 postoperative months (P<0.01, log-rank test).

In the same way, the prospective evaluation of Law et Al. [55], the 5-year overall survival and cancer-specific survival rated, after open anterior resection, were 66.5% and 74.5%, respectively.

About colorectal carcinoma presenting with acute colonic obstruction, the strategy still is controversial. Many of these patients (7–30%) require emergent surgery20-24. Several surgical options are available including intraoperative lavage and resection of the bowel segment involved with primary anastomoses, subtotal colectomy with primary anastomoses, colostomy followed by resection, and Hartmann’s procedure. However, these procedures are associated with an operative mortality reaching 23% and a reduced quality of life21,24,25. Recently, endoscopic stent insertion for obstructed colorectal cancer has been reported. Stent insertion may decompress the obstructed rectum, allowing optimal colonic cleansing and subsequent resection. After colorectal decompression, laparoscopic resection also has been reported21.

First described by Dohomoto26, this stenting application, by combining radiologic and endoscopic techniques, is feasible with the exception of the lower rectum because of pain and tenesmus.

It is also not contraindicated, in literature, with an elective laparoscopic colorectal resection.

About this, in a study published in 2002 by Morino et al.21, 28 patients were treated with stenting and open surgery, then compared with 4 patients who after stenting had laparoscopic approach. They reported 100% successful stent insertion without morbidity and mortality in the laparoscopic group.

In the same way, in 2004, Balague et al.20, reported one complication, a perianastomotic abscess treated with percutaneous drainage.

In a recent study by Dulucq27, 14 patients with malignant colonic obstruction underwent endoscopic stenting, with a 93% success rate (1 perforation in 14 cases). Of these, 11 patients underwent laparoscopic resection without conversions or intraoperative complications.

Binkert et al.28 showed that SEMS placement can reduce the cost due to a shorter hospital stay and a lower complication rate.

Preoperative stent insertion for obstructive colorectal cancer can result in satisfactory postoperative outcome with good prognoses29. Perforation is the most severe complication of SEMS placement. The incidence was 2% (12/493) in the non-balloon dilatation group and 10% (10/105) in the dilatation group, suggesting that balloon dilation should not be recommended30.

Some minor SEMS-placement-related complications including stent migration, mild bleeding, pain, and reobstruction may occur.
Also in the study of Stipa \cite{31}, the presence of a colonic and rectal stent does not compromise the laparoscopic approach. The complications were fewer (open 20% vs. laparoscopic 0%) and the postoperative stay was shorter (laparoscopic 7 days vs. open 13 days).

Obviously we performed few endoscopic procedure to resolve an malignant rectal cancer obstruction. On the basis of good results in colon malignant obstructions, we considered to be useful in the treatment of high and middle rectal obstruction. So we think that the presence of endoluminal stent does not prevent a laparoscopic approach and endo-laparoscopy is a less invasive alternative to a multistage open operations.

In conclusion, the results of our study suggest that the standards for the rectal resection of cancer can be met with laparoscopic approach.

Although the ideal study would include multicentric comparison with the results of open series for the validation of the data, and thus require the performance of a randomized controlled trial, this study nonetheless indicates that laparoscopic surgery for rectal cancer resection is safe and feasible in expert hands, also with good long-term results.

**SUMMARY**

**REZULTATI DUGOROČNOG LAPAROSKOPSKOG TRETAMAMA NAPREDNOG CARCINOMA REKTUMA**


**REFERENCES**


