

Laparoscopic Total Mesorectum Excision

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ABSTRACT

The main controversy of colon-rectal laparoscopic surgery comes from its use as a cancer treatment. Two points deserve special attention: the incidence of port-site tumor implantation and the possibility of performing radical cancer surgery, such as total mesorectum excision.

Once these points are addressed, the laparoscopic approach will be used routinely to treat rectal cancer. To clarify these points, 32 patients with cancer of the lower rectum participated in a special protocol that included preoperative radiotherapy and laparoscopic total mesorectum excision. All data were recorded. At the same time, all data recorded from the experience of a multicenter laparoscopic group (Brazilian Colorectal Laparoscopic Surgeons – 130 patients with tumor of the lower rectum) were analyzed and compared with the data provided by our patients. Analysis of the results suggests that a laparoscopic approach allows the same effective resection as that of conventional surgery and that preoperative irradiation does not influence the incidence of intraoperative complications. The extent of lymph nodal excision is similar to that obtained with open surgery, with an average of 12.3 lymph nodes dissected per specimen. The rate of local recurrence was 3.12%. No port site implantation of tumor was noted in this series of patients with cancer of the lower rectum.

Key Words: Laparoscopy, Laparoscopic mesorectum excision.

INTRODUCTION

Although some pessimism about the treatment of cancer of the lower rectum still exists, the last two decades of the 20th century have provided some encouraging results principally as to the decreased incidence of local recurrence and the improvement in long-term survival rates.¹⁻¹³

First of all, it was recognized that peri-rectal fat (mesorectum) is important as a site of neoplastic involvement, essentially of lymph node invasion, and that a wide lateral margin resection is necessary to decrease cancer recurrence. As a matter of fact, several reports¹⁻³ emphasize that the so-called technique of total mesorectum excision certainly decreased the incidence of local recurrence.

At the same time, quite a number of reports^{5,6,8-13} demonstrate that the use of preoperative radiotherapy not only decreases the incidence of local recurrence but also actually increases the long-term survival rate. A large number of studies make this assertion.¹²⁻²³ The association of both methods proved to increase effectiveness.^{3,11,12,17,22}

In the last 10 years, the emergence of colorectal laparoscopic surgery in benign diseases has made evident the benefits of this particular technique as to postoperative recovery.^{14,16-18,20-22} However, a laparoscopic approach to colorectal cancer has been the subject of controversy, mainly due to the possibility of cancer implantation at the port site.¹⁵ Nevertheless, numerous authors, particularly those working at well-structured colorectal centers with experience in cancer and laparoscopic surgery, have shown that a laparoscopic approach could provide the same oncological results as that of conventional surgery.^{13,14,17,22}

Rectal or pelvic surgery by laparoscopic methods has several advantages: (1) better anatomical recognition of nerves, arteries, and fascia; (2) easy removal of the specimen through the perineum; (3) less postoperative discomfort; (4) early feeding; (5) better cosmesis; and (6) a shorter hospitalization.

Nonetheless, laparoscopic removal of a rectal cancer deserves some special considerations: (1) Is it possible to perform a total mesorectum excision laparoscopically?

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(2) Does preoperative radiotherapy render the laparoscopic surgery more difficult and increase intra- and post-operative complications?

Once these questions are answered, the use of a laparoscopic approach to treat cancer of the lower rectum will provide benefits for the patient such as (1) a decrease in the incidence of local recurrence due to the association of preoperative radiotherapy and the total mesorectum excision surgical technique; (2) improvement in long-term survival rates, because of preoperative radiotherapy; and (3) better postoperative recovery as a result of the laparoscopic approach.

To elucidate these points, all patients with cancer of the lower rectum admitted to our department between 1993 and 1998 participated in the special protocol. At the same time, all data recorded from the experience of a multi-center laparoscopic group (Brazilian Laparoscopic Colorectal Surgeons – National Consensus)²² were analyzed, which permitted a larger number of patients and a wider spectrum of results to be included in the study.

METHODS

Only patients with adenocarcinoma of the lower rectum (from the pectinate line to 4 cm above it) with tumors classified as T1, T2, and T3 were admitted to the study. A total of 32 of our patients and 130 patients from the National Consensus were included in this trial. No distinction was made as to gender or race. Volume, size, and fixation of the tumor were registered by means of digital examination and proctoscopy. Biopsy was performed not only to confirm the diagnosis of adenocarcinoma but also to establish the cellular differentiation of the tumor. Carcinoembryonal antigen (CEA) dosage was measured before radiotherapy. Colonoscopy, abdominal ultrasound, abdominal and pelvic computerized tomography, and preoperative radiotherapy were also performed. Reexamination and reevaluation of patients was performed when the irradiation treatment was completed (again by digital examination and proctoscopy).

RESULTS

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Of the 32 patients, 16 were males (50%), 16 were females (50%), and 93.75% were white. Of the 32 tumors, 8 (25%) were classified as T3, the great majority of them occupying

the posterior hemi-circumference of the rectum (6 patients in 8); 23 (71.8%) tumors were classified as T2 and only 1 (3.2%) as T1.

The cellular differentiation of the tumors, before radiotherapy and surgery, was as follows: 4 (12.5%) tumors were considered highly differentiated, 11 (34.4%) tumors were classified as moderately differentiated, and 17 (53.1%) tumors were poorly differentiated.

Twenty-four (68.75%) patients had a CEA level greater than 8 ng, 7 (21.8%) had CEA between 7 and 8 ng, 2 (6.25%) had CEA level between 6 and 7 ng, and only 1 (3.1%) had a CEA level considered normal.

No synchronous tumors were found, but 3 (9.4%) of them had associated polyps. No liver metastasis was diagnosed. The pelvic tomography confirmed the previous clinical diagnosis of T3, T2, and T1 tumors.

The total dosage of preoperative radiotherapy was 4,000 cGy, with a daily dosage of 200 cGy, in the pelvic and perineal fields (Linear Accelerator of 25 MEV). All patients completed the irradiation therapy without major complications. Two (6.25%) had perineal dermatitis and one (3.1%) had actinic cystitis.

The main purpose of the reevaluation was to determine the effect of irradiation on the tumor. All tumors showed a variable degree of involution: 31.25% of the patients had a tumoral involution greater than 70% of the previous volume and area. Of these, 2 patients (6.25%) had an involution greater than 90%. Of the 8 tumors classified as T3 tumors before the radiotherapy, 4 of them were considered as T2 and 1 as T1 after irradiation. Of the 23 tumors previously considered T2, 8 of them were considered as T1; and all T2 tumors decreased in volume and area after the irradiation (**Figure 1**).

The average number of lymph nodes resected per specimen was 12.3, with a minimum of 8 and a maximum of 18. Positive lymph nodes (metastatic ones) were found in 34.3% of the patients.

Surgery was performed 10 to 18 days after the end of the irradiation treatment depending on the patients' condition. The minimum time between the completion of irradiation and surgical intervention was 10 days.

All intraoperative complications and conversions to conventional surgery were recorded. No complications due to the effects of radiotherapy (fibrosis or hemorrhage) were

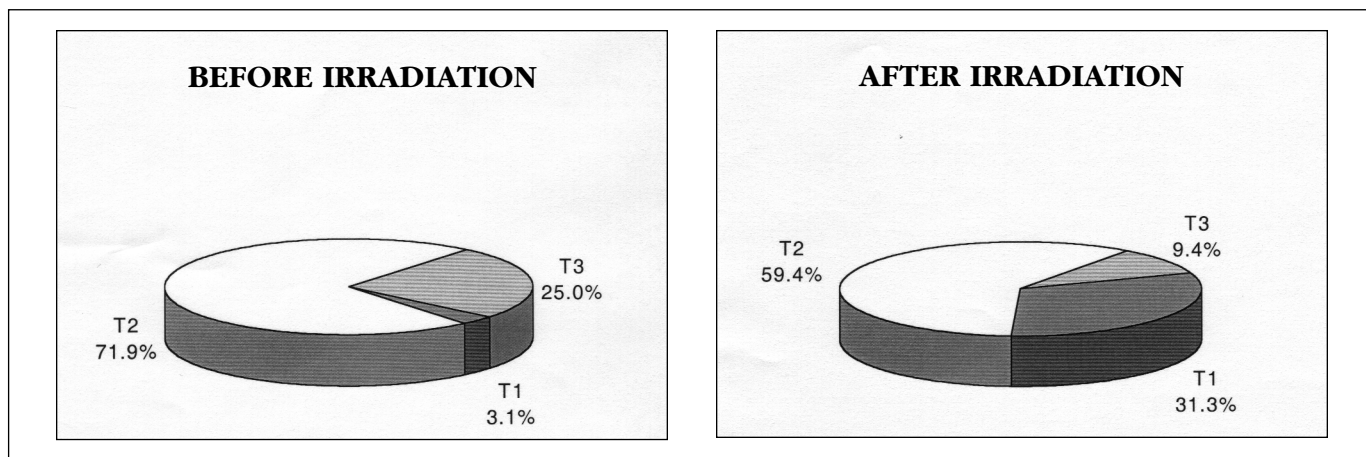


Figure 1. Tumoral evaluation before and after radiotherapy.

observed. Obesity and a narrow pelvis were the greatest difficulties encountered in performing the total mesorectum excision.

Conversion occurred in just 1 (3.1%) patient due to fixation of the tumor to the sacrum.

Each specimen was analyzed to confirm completion of a total mesorectum excision. The lateral margin and the integrity of the pelvic fascia and peri-rectal tissue were evaluated at the same time that the distal margin was measured. All 31 patients that had the rectum excised by laparoscopy showed a complete removal of the mesorectum (total mesorectum excision). Distal margin varied from 0.5 cm to 3 cm.

Cellular differentiation of the tumor was compared with that obtained on initial biopsy. After irradiation was completed, evaluation of cellular differentiation showed that the incidence of 12.5% of high-grade differentiation recorded at initial diagnosis changed to 28.1% after the completion of radiotherapy. The incidence of 34.4% of moderate grade of differentiation observed at initial diagnosis changed to 53.1% after the completion of radiotherapy. The incidence of 53.1% of low grade of cellular differentiation observed at the initial diagnosis changed to 18.8% after the completion of radiotherapy (**Figure 2**).

Bowel function, feeding, ability to ambulate, and time of hospitalization were recorded. Bowel function returned in less than 24 hours in 90.6% of the patients. Every

patient was fed during the first 36 hours. Even the older patients began walking in the first 24 hours. Hospital stay varied from 4 to 7 days, with an average of 5.12 days. All patients were followed-up every 3 months for the first 2 years and every 4 to 6 months after 2 years; development of recurrence was recorded, either local or widespread recurrence. Local recurrence was observed in one

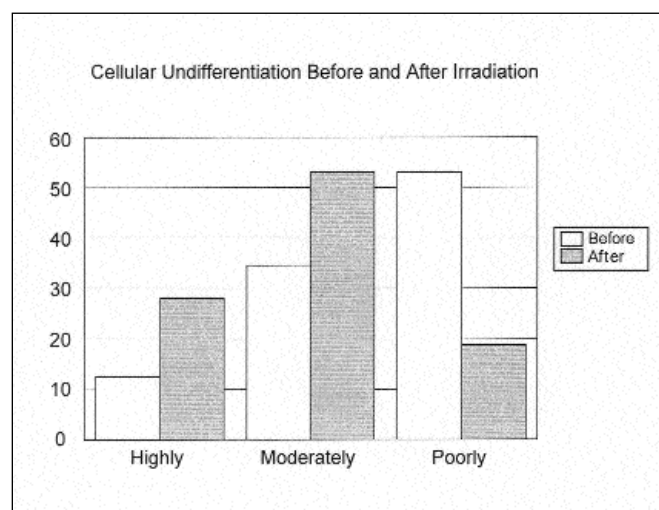


Figure 2. Evaluation of the cellular differentiation of the tumor, comparing the results obtained before the irradiation and after completion of the radiotherapy (the specimen excised by surgery).

(3.12%) patient 14 months after surgery. Two (6.3%) patients showed diffuse disease (hepatic metastasis): both with T3 tumors, poorly differentiated, that did not decrease with irradiation were considered as T3N2M0 at the initial surgery. No port site implantation was registered.

National Consensus

Only 78 (60%) of the 130 patients underwent preoperative irradiation, and the results showed involution on tumor size and volume. However, a consensus about the total tumor dose did not exist. No consensus existed about the interval between the completion of irradiation and surgery. The conversion rate to open surgery was 6.25%. Total mesorectum excision was accomplished in all patients. The average number of lymph nodes per specimen was 11.5. No port site implantation (metastasis) was recorded.

DISCUSSION

The “revolution” of laparoscopic surgery after centuries of conventional surgery gave rise to a series of discussions and controversies. The main controversy, however, came from the use of this method for the treatment of cancer. Several points deserve special discussion: (1) the incidence of port-site tumor implantation and (2) the possibility of performing radical cancer surgery.

As regards the concept of radical surgery, Heald's¹ comments sound very appropriate: “Without an adequate training and an adequate anatomic understanding the total mesorectum excision is practically impossible.” These words are more than adequate; in fact they are fundamental for the practice of colorectal laparoscopic surgery. Training of the surgeon, both in conventional colorectal and laparoscopic surgery, is required to obtain rational results. But when dealing with cancer, other important and indispensable elements should be added: oncological surgery requires precise anatomic-pathological knowledge and the ability to perform radical surgery. The surgeon must be well trained and experienced. Margins and extension of resection for malignancy are different from those for benign disease and this implies totally different training. Extensive knowledge of pelvic and rectal anatomy is necessary to achieve good results in conventional surgery for benign disease. This knowledge is even more important for a laparoscopic approach, especially rectal cancer. Although it is easier to

recognize anatomic structures with the optical view of laparoscopy, it is more difficult to obtain a panoramic view of the pelvis. At the same time, in laparoscopic surgery, the surgeon loses a “hands-on” ability to recognize structures and define limits.

So, considering the short period of time that has elapsed since the beginning of laparoscopic surgery for colorectal diseases, it is reasonable that the great majority of surgeons do not yet have enough experience to evaluate a laparoscopic approach. This is the reason why this procedure should, initially, be done at special centers with surgeons trained in colorectal, laparoscopic, and oncological surgeries. Only in this way can results be expected to compare with those of conventional surgery.

Perhaps a more controversial point is the use of preoperative radiotherapy for colorectal malignancy. Although several reports have demonstrated that preoperative irradiation is effective in controlling local recurrence, no consensus exists about the effectiveness of the treatment on long-term survival rates.

Two main issues were evaluated in our series: the capability to excise the total mesorectum by laparoscopic means and the incidence of complications due to preoperative irradiation. Analysis of our results suggests that a laparoscopic approach allows the same effective resection as conventional surgery and that preoperative irradiation does not influence the incidence of intraoperative complications. Anatomic examination of the specimens excised by laparoscopy led to the conclusion that a total mesorectum excision (total peri-rectal excision) was achieved in all patients. Preoperative radiotherapy did not create an intraoperative hazard or change the surgical procedure. None of the patients had an intraoperative rupture of the tumor or overt spillage of carcinomatous cells. The extension of lymph nodal excision was similar to that obtained by open surgery, with an average of 12.3 lymph nodes dissected per specimen, with positive lymph nodes in 34.4% of patients. The rate of local recurrence observed after abdomino-perineal excision of the rectum by the laparoscopic approach with total mesorectum excision (total peri-rectal excision) in patients previously irradiated was 3.12% (T3N2M0), statistically similar to that observed in conventional surgery. No portal implant of tumors was reported in this series of patients. But, study of the postoperative recovery showed: the patient was able to move and eat precociously, bowel habits returned early, and that patients were able to return to their normal social activities sooner.

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