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Lymph node assessment in colorectal cancer surgery: laparoscopic versus open techniques

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SUMMARY: Lymph node assessment in colorectal cancer surgery: laparoscopic versus open techniques.

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Aim. The aim of our study is to compare the outcomes of laparoscopic resection (LR) and open resection (OR) for colorectal cancer surgery evaluating lymph node assessment. It may be important to remove and examine an adequate number of lymph nodes because a more extensive nodal resection has been associated to higher survival rate and lower recurrences.

Patients and Methods. 150 patients (74 females and 76 males) with colorectal cancer were enrolled and analyzed from January 2006 to

March 2010 in our Unit. 100 procedures were performed with traditional laparotomy and 50 procedures laparoscopically. A strict follow-up was scheduled every 1-3-6 months after surgery and, therefore, every year.

Results. Laparoscopic techniques require a longer operating time. 2484 total lymph nodes examined with a mean of 16,56 removed per resection in all procedures. 1632 lymph nodes were removed during open procedures and 852 removed during laparoscopy. The scheduled follow-up demonstrated that local recurrence and distant metastasis presented with no significant differences between two groups and overall survival and disease-free survival were assessed over 5 year in 80% of patients.

Conclusions. According to our experience, laparoscopic colorectal surgery is safe and feasible, with better short-term outcomes and oncological adequacy comparable to open approach.

KEY WORDS: Lymph node assessment - Colorectal cancer - Long-term outcome.

Introduction

Colorectal cancer remains the third most common cancer diagnosed and the third most common cause of cancer death in both sexes in industrialized countries (1, 2). Jacob et al. first reported his successful laparoscopic colectomy in 1991 (3). The advantages of laparoscopic procedure in colorectal cancers have been well documented: reduced requirements for analgesics, a lower incidence of wound infection, earlier resumption of a regular diet, faster canalization and earlier return to normal daily activities and a shorter hospital stay (4-6). However, this technique presents also the potential disadvantage of a long operating time compared to open approach. Lymph node status is considered as the

strongest pathologic predictor of patient outcome for what concerns an accurate cancer staging and it represents a quality indicator for cancer care. Sufficient lymph node staging (TNM) is really essential to determine prognosis and to plan further treatment. It may be important to remove and examine an adequate number of lymph nodes because a more extensive nodal resection has been associated with higher survival rate and lower recurrences (7). The quality of surgical procedure represents a key point to retrieve an optimal number of lymph nodes, established at 12 to ensure an adequate sampling (8).

Patients and methods

The aim of our retrospective observational study is to compare the outcomes of laparoscopic resection (LR) and open resection (OR) for colorectal cancer surgery evaluating lymph node yields. From January 2006 to March 2010, we enrolled in our Unit 150 patients (74 females and 76 males) with colorectal cancer who needed to be treated surgically. We excluded 10 patients because of surgeon's learning curve.

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67,6 years (\pm SD) was the mean age (female range 38-88ys; male range 42-84ys). 100 procedures were performed with traditional laparotomy (66,7%) and 50 procedures laparoscopically (33,3%). Type of operation: 41 right hemicolectomies; 42 left hemicolectomies; 25 total colectomies; 20 Hartmann's procedure; 18 anterior resection of rectum; 4 Abdominal perineal resection.

Exclusion criteria were: urgent procedures for colorectal cancer perforation, failure of the self-expanding stent insertion in patients with obstruction, metastatic colorectal cancers, ASA IV-V score and TNM 3. The protocol was approved by the Ethical Committee and it was clearly explained to all participants. Written informed consent was obtained from all patients. Patients' characteristics regarding age and sex and pathological and perioperative data regarding type of surgical technique are summarized in Table 1. Intravenous Cefazolin and Metronidazole was administered before surgery, and thereafter every 12 hours until 24-72 hours after surgery and prolonged if there was any sign of infection. Intravenous fluid therapy was included until liquid diet was supplied. Foley catheter was removed as early as possible except for patients with lower rectal tumors. Enrolled patients were managed postoperatively by the same surgeons' staff. A strict follow-up was scheduled every 1-3-6 months after surgery with physical examination, laboratory data, US and CT abdomen scan. Therefore, total colonoscopy was performed every year. In all patients we evaluated five-year overall survival and disease-free survival rate.

Surgical technique

For what concerns laparoscopic technique, pneumoperitoneum was created through a 12-mm camera trocar at the umbilicus with the addition of four trocars (two 12-mm and two 5-mm) to access the abdominal cavity. Regarding right-sided tumors (proximal to the middle of the transverse colon), after proximal ligation of the tumor-feeding vessels (the ileocolic, right colic, and/or right branch of the middle colic vessels), mobilization of the right colon and takedown of the hepatic flexure were performed intracorporeally together with dissection of the draining lymph nodes from a medial-to-lateral direction. Mobilization was completed by cutting the peritoneum from the lateral side.

Regarding left-sided tumors (distal to the middle of the transverse colon and descending colon), the left colon and splenic flexure were mobilized after ligation of the left colic (and the left branches of the middle colic) vessels, similar to right-sided lesions.

Regarding sigmoid colon and rectosigmoid lesions, the left colon was mobilized from a medial-to-lateral direction and intracorporeal high ligation was performed

TABLE 1 - PATIENTS CHARACTERISTICS 2006-2010.

	LAPAROSCOPIC GROUP	OPEN GROUP
MEAN AGE, yrs	65,3	67,5
SEX		
Male	43	33
Female	34	40
SURGICAL PROCEDURES, n		
Rt-sided hemicolectomies	11	30
Lt-sided hemicolectomies	28	14
Total colectomies		25
Hartmann's procedure		20
Anterior resection of rectum	11	7
Abdominal perineal resection		4

TABLE 2 - RESULTS.

	LAPAROSCOPIC GROUP	OPEN GROUP
Operative duration mean, min		
Rt-sided hemicolectomies	130	90
Lt-sided hemicolectomies	180	120
Anterior resection of rectum	180	130
Abdominal perineal resection	240	150
Number of LN harvested (median), n		
Right-sided colon cancer	27	29
Left-sided colon cancer	25	28
Rectal cancer	14	17

at or near the roots of the inferior mesenteric vessels. The inferior mesenteric artery was ligated under the level of the bifurcation of the left colic artery for rectal lesions. After rectal mobilization in the layer targeted for total mesorectal excision with autonomic nerve preservation, the bowel distal to the cancer was transected intracorporeally by linear staplers.

Ileocolostomy and colocolostomy were extracorporeally achieved by stapled side-to-end or functional end-to-end anastomosis. In coloproctostomy, we placed the anvil of a circular stapler in the proximal sigmoid, and the mini-incision was then covered to re-establish pneumoperitoneum. An anastomosis was intracorporeally performed using the double stapling technique under laparoscopic visualization.

In open surgery, a middle to lower midline incision was made dependently on the locations of CRCs. The mobilization of colonic segments was conducted from a lateral-to-medial direction. Mobilization of the rectum and mesorectum, the ligation of tumor-feeding vessels,

and anastomoses were performed similarly to the laparoscopic approach.

Results

From January 2006 to March 2010, 150 patients (74 females and 76 males) underwent 100 procedures with traditional laparotomy (66,7%) and 50 procedures laparoscopically (33,3 %). The mean operative time for laparoscopy was 140-250 minutes (\pm SD), significantly longer than open operating time (120-175 minutes \pm SD). 2484 total lymph nodes examined with a mean of 16,56 removed per resection (range 10-55) in all procedures. 1632 lymph nodes were removed during open procedures, mean 17,03 per surgery (range 10-55), and 852 removed during laparoscopy with a mean of 15,08 (range 10-48). The number of retrieved lymph nodes for each anatomic site and operative time can be appreciated in Table 2.

Surgical margins were negative for cancer in all examined patients. There was no significant differences between the two groups for what concerns age sex and other characteristics.

Therefore, one patient of the laparoscopic group developed port - site recurrence and one patient in the open group wound - site recurrence. The scheduled follow-up demonstrated that local recurrence and distant metastasis presented with no significant differences between two groups and overall survival and disease-free survival were assessed over 5 year in 80% of patients.

Discussion

It has been well documented in literature that laparoscopy allows short-term and equivalent long-term outcomes as open procedures for colorectal cancers. Laparoscopic procedure has been associated to shorter hospital stay, faster canalization, reducing post-operative analgesic therapy, earlier return to normal daily activities and good integrity of abdominal wall (3, 5, 6). To maximize lymph nodes yields is essential to perform a surgical procedure that comprehends extended lymphadenectomy, extra-mesenteric lymph node dissection, high arterial ligation and complete mesocolic excision (9). In

fact an accurate dissection is essential to assess lymph node status especially in nonmetastatic colorectal cancer patients and it is crucial for prognosis and further management. It is a key factor of long-term outcome: a poor lymph node evaluation is associated to worse outcome in terms of tumor recurrence and survival (7). The analysis of our data highlights that oncological safety for colorectal cancers can be reached also performing laparoscopic approach and that long-term outcomes can be definitely overlapped to open technique's results. In fact, the mean number of resected lymph nodes was 17,03 and 15,08 (open versus laparoscopic surgery), consequently it has been confirmed that there was no significant difference for what concerns excised lymph nodes between the two groups also considering that in 100 open procedures it was possible to harvest a higher number of lymph nodes. In our study, overall survival and disease-free survival rates were established at 5 years and more in 80% of patients according to literature in contrast with 30-60% of survival rate in nodal metastatic patients (10, 4). Several studies support that lymph nodes status (minimum 12 lymph nodes) is the strongest predictor for cancer treatment because it is associated to a higher survival rate. It is essential to perform strict oncologic resections and for pathologists a meticulous evaluation of specimens (8).

Conclusions

According to our experience, laparoscopic colorectal surgery is safe and feasible, with better short-term outcomes and oncological adequacy comparable to open approach. Despite of those data, open surgery is still frequently performed, so we believe that it is important to share own experiences and results on laparoscopic colorectal surgery. Several studies demonstrate that laparoscopic procedure is convenient and less invasive and could be the first surgical approach in colorectal cancers. In our hospital daily management, laparoscopic mean operating time represents a disadvantage; however, we think that this might be improved. Nodal metastatic disease plays a key role through cancer care, consequent management and therapy and its study needs to be improved with a multidisciplinary approach integrating pathologist and surgical competences (9).

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