

Jinshan Hospital, Fudan University, 16 Jun 2004

Laparoscopic Surgery for Rectal Cancer



R Sim

Centre for Advanced

Laparoscopic Surgery, TTSH



The feasibility of an operation
is not the best indication
for its performance

Henry Cohen 1900-1977

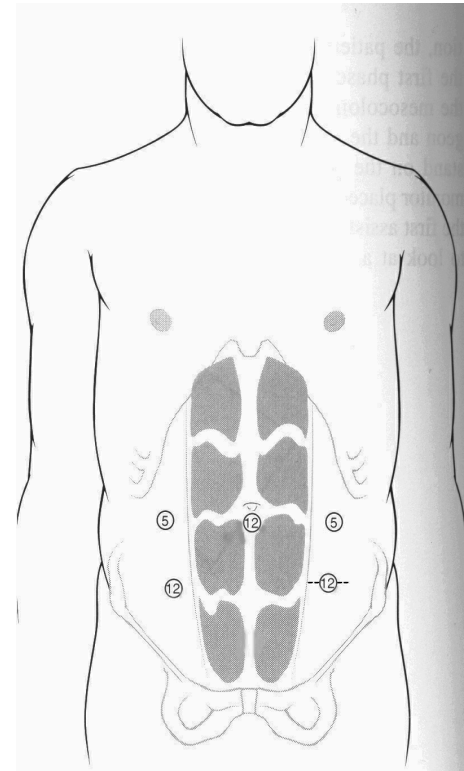


The Issues

- Feasibility and safety
- Adequacy - same radical surgery as open op.
- Efficacy - short term benefits and long term oncologic results
- Time and Cost - is it worth the effort?
- Training and certification - who can be accredited?

Laparoscopic Colorectal Resection

- Cancer, complicated diverticular disease, inflammatory bowel disease, functional
- Multiple quadrants
- Retract small bowel
- Expose and dissect large planes
- Remove large, bacteria-laden organ
- Malignancy, port site mets
- Perform bowel anastomosis





Curative Oncologic Resection (I)

- proximal lymphovascular ligation and complete lymphadenectomy with
- wide en bloc resection of tumor-bearing bowel segment with adjacent soft tissue and mesentery,
- resection of suitable margins of the normal bowel proximal and distal to the cancer, and
- occlusion of the bowel above and below the tumor to minimize the possibility of intraluminal tumor spread.



Curative Oncologic Resection (II)

- minimal manipulation of the tumor-bearing segment
- rectal washout with tumoricidal solution for rectosigmoid cancers
- placement of the specimen as soon as possible into an impermeable bag prior to delivery through the abdominal wall



Curative Oncologic Resection (III)

- protection of the peritoneal cavity from contamination
- assessment of the liver and peritoneal cavity for metastatic disease
- assessment of conditions which allow an anastomosis or a stoma to be safely performed.



Rectal Cancer Surgery (I)

Anatomic definition of the rectum is highly variable

Cure, avoid local failure and maintain quality of life, including bowel, bladder and sexual function

Total mesorectal excision (TME) with Autonomic nerve preservation (ANP)

Distal rectal transection

Extended resection and lateral pelvic nodes



Rectal Cancer Surgery (II)

The surgeon as a prognostic factor after the introduction of total mesorectal excision in the treatment of rectal cancer.

Martling A, et al. Br J Surg. 2002;89:1008-13

Adjuvant therapy for rectal cancer cannot be based on the results of other surgeons

F Seow-Choen, Br J Surg 2002; 89: 946-947

Pathologic Evaluation of TME Operation



Intact
Mesorectum

Quirke, et al

Lancet 1986; 2:996-999

Short-term Quality-of-Life Outcomes Following Laparoscopic-Assisted Colectomy vs Open Colectomy for Colon Cancer

A Randomized Trial

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for the Clinical Outcomes of Surgical Therapy (COST) Study Group

ALTHOUGH LAPAROSCOPIC TECHNIQUES were first described in 1901,¹ only in the past few years have newer optics and instrumentation allowed for the safe application of laparoscopic resection procedures. The first report of a successful laparoscopic cholecystectomy in 1987 was followed by rapid widespread adoption of the procedure.²⁻⁶ In recent years, laparoscopic procedures for a number of other nonmalignant abdominal diseases, including appendicitis, inguinal hernia, gastroesophageal reflux disease, hiatal hernia, and nonmalignant uterine conditions, have become routine. The interest in laparoscopic approaches for these conditions has been driven by the theoretical benefits, including reduced postoperative pain, shortened length of stay, and earlier return to work, and perhaps by the technological imperative.^{5,6}

Improvements in both technology and surgeons' comfort and skill with laparoscopic techniques have led to an inter-

Context Laparoscopic-assisted colectomy (LAC) has emerged as the preferred minimally invasive surgical strategy for diseases of the colon. The safety and efficacy of LAC for colon cancer are unknown, and the nature and magnitude of any quality-of-life (QOL) benefit resulting from LAC for colon cancer is also unknown.

Objective To compare short-term QOL outcomes after LAC vs open colectomy for colon cancer.

Design, Setting, and Participants Multicenter, randomized controlled trial (Clinical Outcomes of Surgical Therapy [COST]). Between September 1994 and February 1999, 37 of 48 centers provided data for the QOL component of the trial for 449 consecutive patients with clinically resectable colon cancer.

Main Outcome Measures Scores on the Symptoms Distress Scale (SDS), Quality of Life Index, and a single-item global rating scale at 2 days, 2 weeks, and 2 months postoperative; duration of postoperative in-hospital analgesic use; and length of stay.

Results Of 449 patients, 428 provided QOL data. In an intention-to-treat analysis comparing SDS pain intensity, SDS summary, QOL Index summary, and global rating scale scores at each time point, the only statistically significant difference observed between groups was the global rating scale score for 2 weeks postsurgery. The mean (median) global rating scale scores for 2 weeks postsurgery were 76.9 (80) for LAC vs 74.4 (75) for open colectomy ($P=.009$). While in the hospital, patients assigned to LAC required fewer days of both parenteral analgesics compared with patients assigned to open colectomy (mean [median], 3.2 [3] vs 4.0 [4] days; $P<.001$) and oral analgesics (mean [median], 1.9 [1] vs 2.2 [2] days; $P=.03$).

Conclusion Only minimal short-term QOL benefits were found with LAC for colon cancer compared with standard open colectomy. Until ongoing trials establish that LAC is as effective as open colectomy in preventing recurrence and death from colon cancer, this procedure should not be offered to patients with colon cancer.

JAMA. 2002;287:321-328

www.jama.com

est in extending the indications for laparoscopic surgery to include curative resection of colon cancer. In laparoscopic-assisted colectomy (LAC), mobilization of the bowel is conducted laparoscopically and then the bowel is externalized for resection and anastomosis. Laparoscopic-assisted colectomy has emerged as the preferred minimally invasive strategy for colonic

Conclusion Only minimal short-term QOL benefits were found with LAC for colon cancer compared with standard open colectomy. Until ongoing trials establish that LAC is as effective as open colectomy in preventing recurrence and death from colon cancer, this procedure should not be offered to patients with colon cancer.

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See also p 377 and Patient Page.

ORIGINAL ARTICLE

A Comparison of Laparoscopically Assisted and Open Colectomy for Colon Cancer

The Clinical Outcomes of Surgical Therapy Study Group*

ABSTRACT

BACKGROUND

The preparation of this article was overseen by the writing committee of the Clinical Outcomes of Surgical Therapy Study Group of the Laparoscopic Colectomy Trial (Heidi Nelson, M.D., Daniel J. Sargent, Ph.D., H. Sam Wexner, Ph.D., James Fleshman, M.D., Mehran Arora, M.D., Steven J. Stykes, M.D., Robert W. Beart, Jr., M.D., Michael Hollinger, M.D., Richard Flanagan, Jr., M.D., Walter Peters, M.D., and David Ots, M.D.), who assume responsibility for the overall content and integrity of the article. Address reprint requests to Dr. Heidi Nelson at the Division of Colon and Rectal Surgery, Mayo Clinic, 200 First St. SW, Rochester, MN 55905.

*Participating members of the Clinical Outcomes of Surgical Therapy Study Group are listed in the Appendix.

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Minimally invasive, laparoscopically assisted surgery was first considered in 1990 for patients undergoing colectomy for cancer. Concern that this approach would compromise survival by failing to achieve a proper oncologic resection or a adequate staging or by altering patterns of recurrence (based on frequent reports of tumor recurrences within surgical wounds) prompted a controlled trial evaluation.

METHODS

We conducted a noninferiority trial at 48 institutions and randomly assigned 872 patients with adenocarcinoma of the colon to undergo open or laparoscopically assisted colectomy performed by credentialed surgeons. The median follow-up was 4.4 years. The primary end point was the time to tumor recurrence.

RESULTS

At three years, the rates of recurrence were similar in the two groups — 16 percent among patients in the group that underwent laparoscopically assisted surgery and 18 percent among patients in the open-colectomy group (two-sided $P=0.32$; hazard ratio for recurrence, 0.86; 95 percent confidence interval, 0.63 to 1.17). Recurrence rates in surgical wounds were less than 1 percent in both groups ($P=0.50$). The overall survival rate at three years was also very similar in the two groups (86 percent in the laparoscopic-surgery group and 85 percent in the open-colectomy group; $P=0.51$; hazard ratio for death in the laparoscopic-surgery group, 0.91; 95 percent confidence interval, 0.68 to 1.21), with no significant difference between groups in the time to recurrence or overall survival for patients with any stage of cancer. Perioperative recovery was faster in the laparoscopic-surgery group than in the open-colectomy group, as reflected by a shorter median hospital stay (five days vs. six days, $P<0.001$) and briefer use of parenteral narcotics (three days vs. four days, $P<0.001$) and oral analgesics (one day vs. two days, $P=0.02$). The rates of intraoperative complications, 30-day postoperative mortality, complications at discharge and 60 days, hospital readmission, and reoperation were very similar between groups.

CONCLUSIONS

In this multi-institutional study, the rates of recurrent cancer were similar after laparoscopically assisted colectomy and open colectomy, suggesting that the laparoscopic approach is an acceptable alternative to open surgery for colon cancer.

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Laparoscopy-assisted colectomy versus open colectomy for treatment of non-metastatic colon cancer: a randomised trial

Antonio M Lacy, Juan C García-Valdecasas, Salvadora Delgado, Antoni Castells, Pilar Taurá, Josep M Piqué, Josep Visa

Summary

Background Although early reports on laparoscopy-assisted colectomy (LAC) in patients with colon cancer suggested that it reduces perioperative morbidity, its influence on long-term results is unknown. Our study aimed to compare efficacy of LAC and open colectomy (OC) for treatment of non-metastatic colon cancer in terms of tumour recurrence and survival.

Methods From November, 1993, to July, 1998, all patients with adenocarcinoma of the colon were assessed for entry in this randomised trial. Adjuvant therapy and postoperative follow-up were the same in both groups. The main endpoint was cancer-related survival. Data were analysed according to the intention-to-treat principle.

Findings 219 patients took part in the study (111 LAC group, 108 OC group). Patients in the LAC group recovered faster than those in the OC group, with shorter peristalsis-detection ($p=0.001$) and oral-intake times ($p=0.001$), and shorter hospital stays ($p=0.005$). Morbidity was lower in the LAC group ($p=0.001$), although LAC did not influence perioperative mortality. Probability of cancer-related survival was higher in the LAC group ($p=0.02$). The Cox model showed that LAC was independently associated with reduced risk of tumour relapse (hazard ratio 0.39, 95% CI 0.19–0.82), death from any cause (0.48, 0.23–1.01), and death from a cancer-related cause (0.38, 0.16–0.91) compared with OC. This superiority of LAC was due to differences in patients with stage III tumours ($p=0.04$, $p=0.02$, and $p=0.006$, respectively).

Interpretation LAC is more effective than OC for treatment of colon cancer in terms of morbidity, hospital stay, tumour recurrence, and cancer-related survival.

Lancet 2002; **359**: 2224–29

Departments of Surgery (A M Lacy MD, J C García-Valdecasas MD, S Delgado MD, J Visa MD), **Gastroenterology** (A Castells MD, J M Piqué MD), and **Anaesthesia** (P Taurá MD), **Institut de Malalties Digestives, Hospital Clínic, Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), University of Barcelona, 08036 Barcelona, Spain**

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Introduction

Colorectal cancer is the second leading cause of cancer-related death in Western countries. Prognosis associated with this disease has improved due to early diagnosis and changes in medical therapy. Adjuvant chemotherapy in colon cancer, radiotherapy, and introduction of the total mesorectal excision technique in rectal cancer have increased survival, especially in patients with stage III tumours. Moreover, oxaliplatin and irinotecan have improved the prognosis associated with metastatic colorectal cancer.¹

Laparoscopic surgery has led to great progress in the treatment of many gastrointestinal diseases.² Early reports on laparoscopy-assisted colectomy (LAC) in patients with colon cancer suggest that it lowers surgical trauma, decreases perioperative complications, and leads to more rapid recovery.^{3–6} However, development of port-site metastases in some cases showed that this approach was questionable.^{7,8}

Few preliminary data that compare LAC with open colectomy (OC) in colon cancer have been reported. They suggest that LAC is associated with reduced perioperative morbidity and very low risk of wound metastasis.^{4,6,9,10} However, there are no studies that compare LAC and OC in terms of tumour recurrence and survival.

In this article we report the results of a randomised trial in patients with non-metastatic colon cancer. The aim of the trial was to assess whether there are differences in cancer-related survival between LAC and OC.

Methods

Patients

From November, 1993, to July, 1998, all patients admitted to our unit with adenocarcinoma of the colon, 15 cm above the anal verge, were assessed. Exclusion criteria were: cancer located at the transverse colon, distant metastasis, adjacent organ invasion, intestinal obstruction, past colonic surgery, and no consent to participate in the study.

Randomisation was done the day before surgery. Patients were stratified in two groups according to tumour location (right or left side, with respect to the splenic flexure), and subsequently assigned to LAC or OC by means of sealed opaque envelopes containing computer-generated random numbers. To prevent selection bias, random numbers were generated by an investigator (AC) who was not involved in enrolment of participants.

Due to the limited evidence about LAC at the beginning of the study, interim analyses that assessed early morbidity, tumour recurrence, and port-site metastasis were planned during the first period.^{9,10} The study was approved by the institutional ethics of research committee and oral consent was obtained from each patient.

Interpretation LAC is more effective than OC for treatment of colon cancer in terms of morbidity, hospital stay, tumour recurrence, and cancer-related survival.

This superiority of LAC was due to differences in patients with stage III tumours



Laparoscopic total mesorectal excision with autonomic nerve preservation. Weiser et al. Semin Surg Oncol. 2000;19:396-403.

Cadaver model - laparoscopic rectal resection with TME and autonomic nerve preservation.

After proving feasibility in the cadaver model, a clinical study was performed on patients with mid to low rectal cancers. Acceptable morbidity with this minimally invasive technique of rectal resection and TME/ANP.

There is growing evidence that laparoscopic methods can be applied to patients with rectal cancer.



Laparoscopic-assisted total mesorectal excision and colonic J pouch reconstruction in the treatment of rectal cancer. Chung et al. Surg Endosc. 2001;15:1098-101.

N=5

CONCLUSION:

To the best of our knowledge, this is the first published series of such an operation. With good patient selection, laparoscopic-assisted TME and colonic J pouch-anal anastomosis is **safe and feasible**.



Laparoscopic resection of rectosigmoid carcinoma: prospective randomised trial. Leung et al. Lancet 2004; 363: 1187–92

N=403

Patients in the laparoscopic group had a higher probability of 5-year survival than those who had open resection, but this difference was not significant. Those in the open resection group had a higher probability of being disease free at 5 years than those who had laparoscopy, but this difference was also not significant.



Laparoscopic resection of rectosigmoid carcinoma: prospective randomised trial. Leung et al. Lancet 2004; 363: 1187–92

N=403

CONCLUSION:

Laparoscopic resection of rectosigmoid carcinoma does not jeopardise survival and disease control of patients. The justification for adoption of laparoscopic technique would depend on the perceived value of its effectiveness in improving short-term post-operative outcomes



Prospective Evaluation of Laparoscopic Surgery for Rectosigmoidal and Rectal Carcinoma.

Yamamoto et al. DCR 2002;45:1648-1654

N=70

CONCLUSION:

The findings of the present study demonstrate the **feasibility and safety** of laparoscopic surgery for selected patients with rectal carcinoma. Morbidity and mortality rates and **oncologic outcome** appear to be comparable with conventional surgery.



Laparoscopic total mesorectal excision: a consecutive series of 100 patients.

Morino et al. Ann Surg. 2003;237:335-42

CONCLUSION:

Laparoscopic TME is a **feasible** but technically demanding procedure (12% conversion rate). This series confirms the safety of the procedure, while **oncologic results** are at present comparable to the open published series with the limitation of a short follow-up period. **Further studies** and possibly randomized series will be necessary to evaluate long-term clinical outcome in cancer patients.



Technical and oncological feasibility of
laparoscopic total mesorectal excision with
pouch coloanal anastomosis for rectal cancer.

Bretagnol et al. Colorectal Dis. 2003;5:451-3

N=50

CONCLUSION:

This study confirms our **preliminary** results of **oncological feasibility** of laparoscopic TME with sphincter preservation for mid and low rectal cancer, and showed that morbidity can be decreased by using a standardized surgical procedure.



Laparoscopic intersphincteric resection with coloplasty and coloanal anastomosis for mid and low rectal cancer. Rullier et al. Br J Surg. 2003; 90: 445-51.

N=32

CONCLUSION:

A laparoscopic approach can be considered in most patients with mid or low rectal cancer.



Total mesorectal excision: assessment of the laparoscopic approach. Hartley et al. Dis Colon Rectum. 2001;44:315-21.

N=42

CONCLUSION:

Totally laparoscopic excision of the mesorectum is **feasible** in 50 percent of patients and where possible yields histologic parameters comparable to open surgery. **Early survival and recurrence** figures also appear to be comparable.



Outcome of laparoscopic surgery for rectal cancer in 101 patients. Anthuber et al. Dis Colon Rectum. 2003;46:1047-53

CONCLUSION:

Intraop and early postop, laparoscopic resection of rectal cancer in a selected cohort compares favorably with the open technique. **Preliminary** data appear to suggest that rectal cancer resection can be performed by laparoscopy in accordance with established principles of cancer therapy and that port-site metastases are not a relevant clinical problem. **Prospective, randomized trials are required.**



Common message

- Safe, feasible, equivalent operation
- Operative time longer
- Smaller incisions, less blood loss
- Postoperative recovery better
- But higher cost
- And more trials needed



Bladder and sexual dysfunction following laparoscopically assisted and conventional open mesorectal resection for cancer. Quah et al. Br J Surg. 2002;89:1551-6.

N=40

CONCLUSION:

Laparoscopically assisted rectal resection is associated with a higher rate of male sexual dysfunction, but not bladder dysfunction, compared with the open approach. This has implications, particularly for sexually active males with bulky or low rectal cancers, when deciding the best operative approach.



Randomised controlled trials

MRC Conventional versus laparoscopic-assisted surgery in colorectal cancer (MRC-CLASICC)

COST Study Group

Advances in Instrumentation



Exposure of pelvic operative field

Positioning

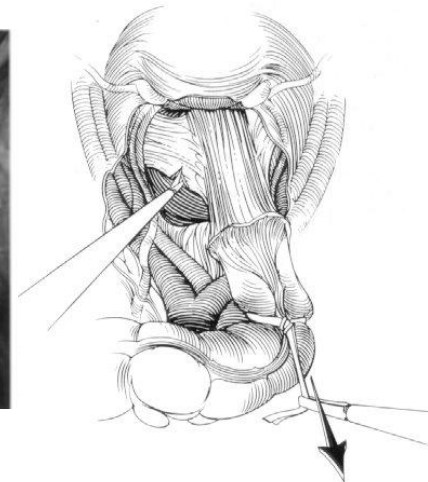
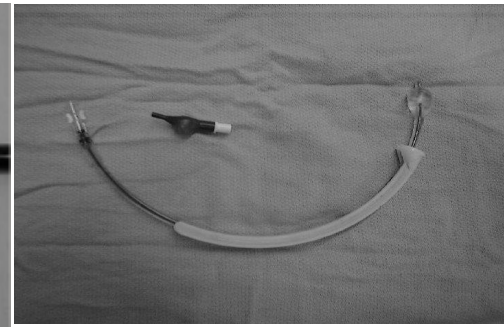
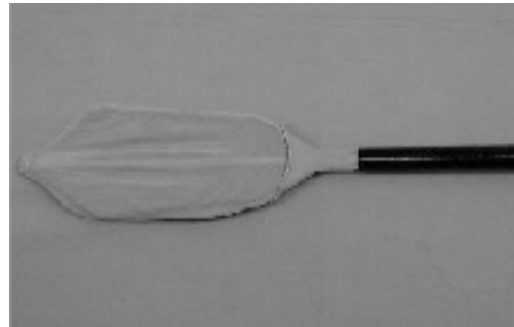
EndoPaddle retractor

Intravaginal retractor

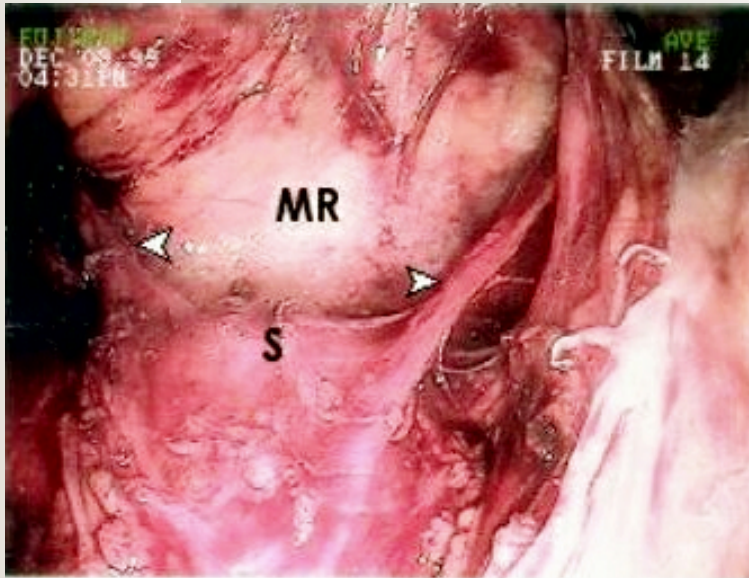
Uterine suspension

Cotton tape encirclement

Perineal pressure

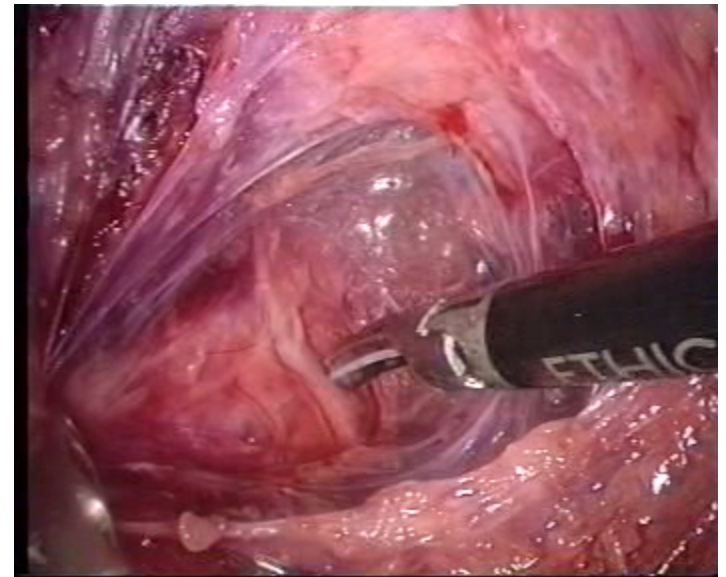






Hypogastric nerves

Nervi erigentes





Laparoscopic Surgery for Rectal Cancer – Should we be doing it?

Laparoscopic Surgery for Rectal Cancer – Who should be doing it?



Conclusion

We have to work harder
so that patients heal better