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LAPAROSCOPIC VERSUS OPEN SURGERY FORCOLORECTAL CANCER TREATMENT

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Abstract:

Because of the initial case study results suggesting high recurrence rates at port sites, Adoption of the laparoscopic approach for colorectal cancer treatment wasslow .surgical resection remains the cornerstone and most important facet in management of colon cancer. The use of minimally invasive approach in colorectal surgery has been reported by several authors in the literature.some difficults about the use of laparoscopic surgery for colorectal cancer still raises, particularly with the technique's complexity, learning curve and longer duration.Scientific literature published from January 2010 to April 2020 was reviewed. Phase III randomized clinical trials were included.Analysis of the scientific literatures confirmed that for the curative treatment of colon and rectal cancer, laparoscopy is not inferior to open surgery with respect to overall survival, disease-free survival and rate of recurrence.

Laparoscopic resection can be considered an option for the curative treatment of colon and rectal cancer; But must take into consideration surgeon experience, tumour stage and potential contraindications; and that laparoscopic resection for rectal cancer be performed only by appropriately trained surgeons .

Key words :

colorectal cancer , laparoscopic surgery , traditional surgery ,oncologic outcomes.

Introduction

Colorectal cancer is an important public health problem; nearly one million new cases of colorectal cancer are diagnosed worldwide each year **[1].** Around 30%-40% of colorectal cancer is defined to arise from the rectum which is defined as the distal margin of tumor within 15 cm of the anal verge**[2].**

Symptoms of colorectal cancer differ according to the location of tumor in the bowel, and and more symptoms add in the presence of distant metastasis, symptoms can be vague symptoms as fatigue, weakness, shortness of breath or GIT symptoms as change in bowel habits, diarrhea or constipation, red or dark blood in stool, weight loss, abdominal pain, cramps, or bloating **[2].**

Adequate examination of the entire colon and rectum is mandatory prior to surgery. Diagnostic measures must be of effectiveness and sensitivity to differentiate between adenomas and malignant diseases. They must also have high specificity. These include colonoscopy and pathological biopsy, barium enema, and to lesser extent CT colonography**[3].**

Pathological staging now is the cornor stone in detecting outcomes. **(Dukes')** staging system depend on the depth of disease invasion through the bowel wall and the extent of regional lymph-node .The tumor–node– metastasis **(TNM)** system of the American Joint Committee on Cancer **(AJCC)** is widely used and more applicable system for staging colorectal cancer and both short and long term follow up **[4]**

Jacobs et al.was the first to use laparoscopic colectomy, and it became more acceptable good prognostic factor reported . **[5].**There is some oncologic concerns related to minimally invasive surgery (MIS) to malignant colorectal disease. **[6].**

The fact that laparoscopic procedure became more common that itneed just aminimal abdominal incision, no postoperative pain approximately , the time to return to work and normal activity became faster. Several studies have reported a reduced hospital stay following laparoscopic colonic resection; **[7].**

The need for a high degree of laparoscopic skills, expensive equipment, and a long operating time make the laparoscopic learning curve steep. And as regard tumor spillage, early recurrence and adequacy of resection it seem to be questionable **[8].** But still when compared to open technique, laparoscopic colectomy

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has the upper hand as regard decreasing postoperative pain, faster return of bowel function, earlier resumption of oral intake, shorter hospital stay, lower complications rate and better cosmoses **[9].**

Colorectal Cancer defined as aslowly growing mass on the inner lining of the rectum or colon**[10].**

It rank third among all cancersand the second leading cause of cancer related deaths in the westernworld; with 1.65 million new cases and 835,000 case of death in 2017**[11].**

Resection of the tumor is the only curative therapy**[12].** Curative surgery must include resection of bohthe primary tumour with negative margins and draining lymph nodes enblock**.**

According to the American Joint Committee on Cancer, at least 12 lymph nodes should be retrieved in surgical specimens to achieve the radicality in treatment **[13].**The resected colonic segment is affected by tumour stage and localization. Generally, 6 types of resection can be performed: right hemicolectomy, left hemicolectomy, extended right hemicolectomy, extended left hemicolectomy, anterior resection of the sigmoid , or abdominoperineal resection. Now a days laparoscopic approach had taken the upper hand over the open one after the great success that had been achieved in laparoscopic cholecystectomy and later laparoscopic hernioplasty.**[14].**

Laparoscopic resection to achieve the oncological safety must resect the tumor and the draining lymph nodes as much as the open one .severalmanovers can be performed take the varity of being entirely by laparoscopy, be laparoscopy-assisted (anastomosis is then performed extra corporally) or be hand- assisted (in which case a sufficiently long incision is made to allow the surgeon's hand to enter the abdominal cavity). For all 3 strategies, the abdominal wall incision should be protected to prevent tumour dissemination**[14].**

Main text

Published clinical trials comparing open and laparoscopic surgery in colon and rectal cancer treatment were retrieved using the previously mentioned keywords. only trials
involving more than 200 patients were retained. The period covered was from January 2010 to April 2020, inclusively. Trials with metastatic disease of the colon or rectum and trials which mention chemotherapy- or radiotherapy- as a neo adjuvant or adjuvant treatments were excluded.

Buunen and colleagues **[15].**presented the long-term results of the Colon cancer Laparoscopic or Open Resection (COLOR). The primary outcome was 3-year disease-free survival, which was 74.2% with the laparoscopic procedure and 76.2% with open surgery. And with 7% difference between the 2 techniques and at a level of significance of p =0.025.

The long-term results of the Clinical Outcomes of Surgical Therapy (COST) noninferiority trial**[16]**were presented. The laparoscopic procedure was stated as inferior to open surgery regarding time to recurrence at 3 years with alow difference rate of 1.23 and $p \geq 0.41$. Because of these criteria, the laparoscopic procedure was not inferior to open surgery (p = 0.83). The recurrencerate did not significantly differ between the 2 procedures (p = 0.32). And neither overall survival (p = 0.51) nor disease-free survival (p = 0.70) as well .

Jayne and colleagues **[17]** presented the long-term results of the Conventional versus Laparoscopic-Assisted Surgery in Colorectal Cancer (CLASICC) trial. The main purpose of the trial was to assess overall survival, disease-free survival and local recurrence at 3 years in patients with colon or rectal cancer treated with laparoscopic or open surgery. The local recurrence rates were 7.3% with laparoscopy and 6% with open surgery (p = 0.68). Differences between the 2 proceduresas regard 3-years
overall survival (p = 0.51) and disease-free survival (p =0.75) show no significance.

Lacy and colleagues**[18]** presented long-term follow up of 3.5 and 8 years.The primary outcome was cancer-related mortality which was 9% with laparoscopy and 21% with open surgery (p = 0.03) after 3.5 years and the rate was 16% and 27%, respectively, (p = 0.07) after 8 years. Recurrence rates were 18% with laparoscopy and 28% with open surgery (p = 0.07).

Liang and colleagues **[19]** published results of a randomized trial. recurrence rate after colon surgery show no significantly difference between the laparoscopic and open procedure (p = 0.36). The recurrence rate was 17% with laparoscopy and 21.6% with open surgery.

In 6 trials, [**14,16,20,21,22,23**] In these studies recurrence rates at wound or port sites were not different between the groups (1.3% v. 0.4%, p = 0.09;10 0.9% v. 0.5%, p = 0.43;17 0.9% v. 0%, p value not available;23 and 0.7% v. 0.7%, p value not available)for both the laparoscopic and open procedures, respectively).

As regard short term outcomes ,thirteen trials presented data on the duration of surgery for colon and rectal cancer .In all but 1 study, longer duration observed for laparoscopic than for open surgery. The COLOR trial

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investigators showed that differences in operative time tended to be smaller in centres with high volumes (0.027). **[24]**

Liang and colleagues**[25**useda visual analogue scale of 0–10 to measure post operative pain. And Less p was noticed after laparoscopy than open surgery for colon cancer (median 3.5 v. 8.6, $p < 0.001$). In the COREAN trial, mean postoperative pain was less after laparoscopy than open surgery ($p < 0.05$). **[26]**Ng and colleagues**[27]** reported no difference in pain ($p = 0.41$). In 2 trials, there was less pain after laparoscopy than open surgery for colon cancer. In the COLOR trial, patients who needed analgesics in the first 3 days after laparoscopy than open surgery were 8%–14% fewer($p < 0.001$ to $p = 0.008$)**[28].** In the COST trial, this difference corresponded only to a median of 1 day less needing analgesics. **[29].**

As regard length of hospital stay, seven trials presented data on length of hospital stay after colon cancer surgery. In all cases, hospital stay was shorter with patients treated with laparoscopy than patients treated with open surgery. **[30].**

Overall complication evaluation done in 4 trials.Only in the Barcelona trial the complication rate was lower for laparoscopy than open Surgery(11% v. 29%, $p = 0.001$) **[31].**whereas no significant difference after laparoscopic or open procedures in COLOR**[32],** LAFA-study**[33]** and the study by Liang and colleagues**[34]** ($p = 0.88$, $p = 0.20$ and $p = 0.15$, respectively). Intraoperative complications include cardiac or pulmonary insufficiency, haemorrhage and injury of bowel or adjacent organs.

None of the trials included in this review showed any difference between open and laparoscopic procedures regarding recurrence rates at wound and port sites. Only in the COLOR trial there were more recurrences in the abdominal wall following laparoscopy than open surgery for colon cancer**.[32]**

All but 1 trial studying colon cancer concluded that laparoscopy is non-inferior to open surgery in terms of overall survival, disease-free survival and recurrence rate.

Some short-term benefits of laparoscopy compared with open colorectal cancer resection reported in some selected trials. These benefits include reduced need for analgesics, less postoperative pain, faster recovery of intestinal function and shorter hospital stay.

Laparoscopy requires longer operative time than open surgery. Mean operative times for colon cancer resection varied between 95 and 184 minutes for open surgery and

between 142 and 224 minutes for laparoscopy. The difference in duration for the 2 procedures thus ranges between 24 and 55 minutes**.[34]**

conclusion

Analysis of the scientific literature confirmed that laparoscopy is not inferior to open surgery for thecurative treatment of colon and rectal cancer, as regard to overall survival, disease-free survival and rate of recurrence. In addition, laparoscopic surgery take the upper hand over open surgery, as concerning to a shorter hospital stay, less pain , faster recovery of intestinal function, and an earlier return to activities of daily life. In the other hand laparoscopic surgery requires a longer operative time. Considering the evidence currently available, we recommends that laparoscopic resection can be considered an option for the curative treatment of colon and rectal cancer but we must take into consideration the surgeon's experience, tumour stage, potential contraindications .

Declarations .

Availability of data and materials :

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Competing interest

The authors declare that they have no competing interests.

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