Editorial

The Impact of Minimally Invasive Techniques in Colorectal Surgery

Over the last 17 years thousands of colon and rectal resections have been carried out worldwide, but the use of minimally invasive techniques in colorectal surgery has not developed at the same pace as in other areas of general surgery, partly due to the complexity of these types of operations which require a highly specialised surgical team.1

Any colorectal disease can be treated with laparoscopy. However, carrying out a laparoscopy basically depends on the type of patient and the surgical team (their experience, the surgeons' skills, and the techniques used), rather than on the diagnosis.2

The indications for laparoscopic procedures in benign and malignant colorectal diseases have increased. Amongst the benign diseases we find diverticular disease, stoma formation due to faecal incontinence, polyps and polyposis of the colon, restoration of intestinal continuity following a Hartmann-type intervention, inflammatory intestinal disease, ischemic colitis, and colonic volvulus. However, the low acceptance of this type of surgery in the treatment of malignant diseases has been attributed to the lack of availability of prospective and randomised studies which confirm the long term oncological safety and the efficacy of laparoscopy surgery in colorectal cancer.3 Nevertheless, over the past few years a change has been seen in the acceptance of this procedure for the treatment of malignant colon diseases, based on the results of these studies.4

Colonic diverticular disease is very common, especially in the western world. Up to 25% of patients with diverticulosis go on to develop diverticulitis. Treatment of diverticulitis is based on the severity of the disease, the standard treatment for patients with acute diverticulitis being elective laparoscopic resection of the left colon with primary anastomosis. Twelve per cent postoperative morbidity has been observed with this procedure as compared to 35% after an open surgical procedure.4 However, this technical option is less accepted in patients with complicated diverticulitis and peritonitis.5 Diverse studies have shown that laparoscopy causes less inflammation, less trauma, and less tissue injury than laparotomy. Using the laparoscopic approach for this disease, a Hartmann procedure can be carried out in 2 steps or a resection can be carried out in 1, with primary anastomosis. The postoperative benefits include a decrease in morbidity and hospital stay, as well as reduced pain and less incidence of readmission due to intestinal obstruction.6

Intestinal inflammatory disease is common in the young, under-nourished and steroid-dependent. Laparoscopic procedures include: formation of a terminal or loop ileostomy, segment resection of the small or large intestine, total colectomy, complete proctocolectomy with or without the formation of an ileoanal pouch, strictureplasty, drainage of abscesses, or gastric bypass by duodenal obstruction in Crohn's disease. It has been shown that video-laparoscopic surgery is feasible and safe in the treatment of inflammatory diseases and it is considered to be better than conventional surgery, with similar results produced to those published in less complex laparoscopic procedures.7,8

As previously mentioned, laparoscopic colectomy is a safe procedure for treating cancer. It has been confirmed that long-term survival rate with this procedure is similar to that of patients undergoing conventional open surgery. It also achieves better results in the short term and a similar recurrence rate, approximately 20% in the first 3 years.9 In accordance with the meta-analysis published by the Transatlantic Laparoscopically Assisted Versus Open Colectomy Trial Study Group (Barcelona, COST, COLOR, and CLASICC), laparoscopic colectomy is an oncologically safe therapeutic method in cancer patients.10 This study included 1765 patients, 229 of whom were excluded; 796 patients underwent a laparoscopic intervention and 740 patients had open surgery. With regards the disease-free survival rate at 3 years, no differences were noted between the laparoscopic and the open surgery groups (75% and 75.3% respectively). The results of the disease-free survival and overall survival analysis based on the treatment received did not differ from the results observed in the 3 prospective and randomised studies. Adjuvant chemotherapy improves survival in patients with colon cancer, but the only curative treatment is resection of the malignant tumour. Egermont et al11 proved the significance of surgical trauma reduction in cancer surgery as they showed that tumour recurrence rate was proportional to the size of the operative wound made during laparotomy.

Sargent et al12 have developed the largest study of population data. They assessed nearly 21 000 patients with colon cancer and they compared long term results of laparoscopic colectomy and open surgery. The correlation between 3 years of disease-free survival and 5 years of overall survival was 0.89. This means that confidence intervals between both groups were tight, which allows us to conclude that laparoscopic colectomy for cancer is safe.

In rectal cancer surgery the main aim is to carry out an oncological resection of the tumour and thereby decrease the local recurrence and prolong survival. For this purpose, we need precise preoperative staging, suitable neoadjuvant therapy, and appropriate surgical techniques, including total excision of the mesorectum.12

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One of the most important advantages of laparoscopic surgery over open surgery is reduced tissue trauma when accessing the peritoneal cavity with small incisions. Another advantage is that laparoscopic surgery does not require manual retraction of the intestines and there is minimum blood loss for meticulous dissections; both of them are facilitated by video-laparoscopic magnification. Other advantages include reduced postoperative pain, reduced hospital stay, and the patient’s more rapid return to their daily activities. An additional advantage is that the aesthetic result is also preferable, especially for young patients with inflammatory intestinal disease. Also advantageous is the faster recuperation of social life and of sexual function, and potentially, the reduction in the formation of adhesions.\(^6\) Equally, there is a favourable effect of cell-mediated immunity which decreases the surgical wound infection rate.\(^1\)

Despite the benefits, laparoscopic procedures present certain technical disadvantages. Various randomised studies have shown that this type of procedure entails a higher cost in relation tooperative time, the steep, necessary learning curve during new-surgeon training, and the use of disposable instruments. Braga et al.\(^{13}\) indicated that the reduction of hospital stay and postoperative morbidity following a laparoscopic colectomy almost balances out the extra cost for surgical time.

Although there has been a significant increase in the acceptance of laparoscopic colorectal surgery in the treatment of benign and malignant diseases, contraindications still exist. The following are all possible contraindications: 14\): serious cardiovascular or pulmonary insufficiency, severe or unstable chronic obstructive pulmonary disease, heart diseases, coagulopathy, morbid obesity, pregnancy, tumor invasion of adjacent structures, peritoneal contamination secondary to an intestinal perforation, acute inflammatory intestinal disease, enteric or enterocutaneous fistula, multiple abdominal surgery and intestinal obstruction with abdominal distension. At the same time, 20%-30% of patients with colorectal cancer are in stage IV at the time of diagnosis. For this unfortunate group of patients, the indication of palliative, reductive laparoscopic surgery with stoma formation is the ideal.\(^{15}\)

As colorectal surgery advances, as does surgeons’ training. This training will entail an increase in the indications for the handling of complex situations using minimally invasive techniques.\(^6\)\) At the same time, diverse educational instruments which are well assessed, such as FLS (Fundamentals in Laparoscopic Surgery), developed by SAGES (Society of American Gastrointestinal Endoscopic Surgeons), and surgical simulators will contribute to increasing patient safety, improving surgeons’ training and the assessment of their surgical skills.

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References