

Overview of the role of laparoscopic surgery in cancer management

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Introduction

"If the only tool you have is a hammer, you tend to see every problem as a nail."

Abraham Maslow, American philosopher and psychologist

Laparoscopy provided the surgeon with a new way of entering and examining the abdomen and performing surgical procedures.

The development of endoscopic/laparoscopic surgery was facilitated by a series of technological advances that allowed true video surgery. Despite the immediate success of laparoscopy in gallbladder disease or gastro-oesophageal reflux disease surgeons were slow to adopt laparoscopic resection to treat cancer. Laparoscopic cancer resection surgery is usually a multi-quadrant procedure and this requires position changes of instruments and monitors to gain access to these quadrants. In complex resection procedures vascular control and ligation is important and instruments have been developed in recent years for this purpose (Harmonic scalpel, LigaSure®, stapling devices). Specimen retrieval is also important; sometimes trocar sites can be enlarged, or a formal, albeit "small" incision is necessary, unless the anus or the perineum can be used as the exit route. Not only is tumour resection important, but defects have to be closed and circumferentially intact anastomoses have to be made, and for this purpose new instruments and techniques also had to be developed.

Laparoscopic resection surgery in surgical oncology

The most important question for laparoscopy in surgical oncology is without doubt whether similar short-term and long-term outcomes for cancer are achievable compared with conventional open surgery. It was only after publication of the article: "The Clinical Outcomes of Surgical therapy Study Group (COST): A Comparison of Laparoscopically Assisted and Open Colectomy for Colon Cancer" in the *New England Journal of Medicine* in 2004 [1] that the

American Society of Colon and Rectal Surgeons issued a statement on laparoscopic colectomy for curable cancer. They stated that the laparoscopic approach resulted in similar cancer-related survival compared with open surgery when performed by experienced surgeons. They also stated that adherence to standard cancer resection techniques with complete exploration of the abdomen, adequate proximal and distal margins, ligation of the major vessels at their origins, containment and careful tissue handling, and en bloc resection with negative tumour margins will result in acceptable outcomes using the laparoscopic approach. They also gave recommendations on pre-requisite experience based on the COST trial.

For nearly every abdominal procedure a laparoscopic approach is possible. For most oncological procedures the laparoscopic procedure is feasible with comparable oncological outcome.

Laparoscopic surgery has many advantages over open surgery. There is a significant reduction in post-operative pain and analgesic need and gastro-intestinal function returns back to normal rapidly. There are less wound problems and incisional hernias. The postoperative length of stay is also an important factor in favour of the laparoscopic approach, although with "enhanced recovery after surgery (ERAS)" protocols there are no significant differences in length of stay after surgery between laparoscopy and laparotomy. Reduction of immune suppression, better "preoperative" staging and application of chemo- and brachytherapy are important benefits of minimal access techniques in cancer management. Adhesion formation with resultant small bowel obstruction is one of the major long-term complications in open surgery. In laparoscopy there is a decrease in postoperative adhesion formation.

There are also, however, potential drawbacks to these laparoscopic techniques: increased abdominal wound recurrence, increased coagulability due to vasopressin effect, increased potential of deep venous thrombosis secondary to pneumoperitoneum and reduced capability of intraoperative abdominal inspection [2,3].

There are unique problems with laparoscopic surgery, e.g. loss of tactile sensation: soft polyps or small tumours in the bowel can be missed and therefore preoperative marking with Indian ink is important. Certain anatomical structures such as the ureter are more difficult to identify and the placement of a ureteral stent may help [2,3].

Port-site metastases are of concern and although the origin is probably multi-factorial, many techniques for prevention exist, but poor surgical technique with improper tumour handling is a frequent factor over which the surgeon has most control [2,3].

Conversion from laparoscopic to open surgery is sometimes necessary. The main reasons for conversion are bleeding from a major vessel, or a procedure that is too difficult or dangerous to proceed with using laparoscopy. A further reason may be the failure of the patient to tolerate the laparoscopic procedure because of low cardiorespiratory reserves. In a recent meta-analysis a conversion rate of 21% (0–46%, 421/2027 patients) was found for laparoscopic colorectal cancer surgery. Converted patients suffered from higher blood loss, longer length of stay and tumour recurrence appeared to be greater than that observed for patients who were successfully managed according to their treatment allocation [4]. The postoperative course after conversion is associated with appreciably poorer results in terms of morbidity and mortality. It also seems to affect survival [5]. Many conversions are associated with locally invasive and bulky tumours. It is therefore important to improve patient selection for a laparoscopic approach in an oncological setting. More accurate clinical staging by CT, MRI and PET/CT may provide information on the localisation and the extent of the tumour and the invasion of the surrounding structures.

Laparoscopy in the diagnostic and palliative setting

Laparoscopy can be used in the diagnostic setting: biopsy, evaluation of resectability and operability (widespread peritoneal metastasis). A pre-laparotomy laparoscopy will exclude a number of patients with carcinoma of the pancreas from formal laparotomy. In the treatment of low rectal cancer neo-adjuvant radiochemotherapy is used for locally advanced tumours. If this tumour is obstructive the patient will need a diverting colostomy or ileostomy before the start of this treatment. This stoma can be created easily

laparoscopically. At the same time the abdominal cavity can be inspected for disseminated disease. Laparoscopic procedures such as gastric bypass in patients with duodenal obstruction, placement of feeding tubes or diverting stoma may be helpful in palliation.

Conclusion

Laparoscopy and minimally invasive surgery definitely have a place in cancer management. For many procedures the feasibility and a comparable oncological (long-term) outcome are demonstrated. We now need to focus on the selection of patients for the laparoscopic approach in order to minimise the need for conversion to an open procedure, and on standardisation of the surgical procedures and extent of the resection in an oncological setting. Even with this continuous evolution and increasing possibilities the following statement remains quintessential in the treatment of the oncological patient [6]:

“Successful treatment depends upon three main factors: a sound knowledge of the disease, a wise selection of the method of the treatment and accurate and skilful technique.”

Sir Stanford Cade, Consultant Surgeon,
Westminster Hospital, 1940

Conflict of interest statement

P. Willemsen has no conflicts of interest or financial ties to disclose.

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