Laparoscopic Colorectal Surgery, How Does It Work?

Dr. Samuel PY Kwok
MBBS(Hons), FRCS(Edin), FRACS, FCSSH, FHKAM(Surgery)
Director, Minimally Invasive and Endoscopic Surgery Centre
Hong Kong Sanatorium & Hospital

Introduction

To a lot of non-surgical doctors and to some surgeons alike, laparoscopic surgery works only in small-scale operations with a view that the small size access wounds would not allow anything major to be performed inside the body cavity. But in fact laparoscopic surgery in the modern day deals with not only major operations but also some very complex operations. Major surgeries such as liver resection and donor nephrectomy have been shown to be not only feasible but also advantageous if the operations are performed laparoscopically.

This discrepancy between common perception and what can be achieved realistically nowadays with laparoscopic surgery is due to the rapid advancement of the medical technology in the last decade and the enthusiasm of the laparoscopic surgeons in applying the available technology to push it to its limit to the benefit of the patients. Surgeons have used the laparoscopic techniques and technologies in colorectal surgery since the early 1990’s and much experience has been accumulated across the world as well as in Hong Kong in resecting colorectal cancer laparoscopically.

The advantages of laparoscopic surgery

The hallmarks of a good operation irrespective of whether it is an operation with a large incision or a laparoscopic operation through small holes are ‘good exposure, good lighting, easy access to the operative field, gentle handling of tissue, precise cutting and coagulation and accurate placement of sutures’. Common sense would tell us that if we can achieve all the above points in an operation, it would be a good operation. And if measures can be done to provide the above conditions in a difficult operation, the operation will become easy for the surgeon and good outcomes will be more guaranteed. With the advent of laparoscopic surgery, operations can be performed in a completely different setting in favour of good operations as defined above.

The advantage of the laparoscopic surgery in comparison to the open surgery is that the laparoscope brings in the light into the abdominal cavity to the site of operation. The operative field is captured and the image of the operative field is magnified and transmitted onto a monitor for the operating team to visualize and operate. With an angled laparoscope, the anatomy of the operative region can be visualized from different angles and even from behind the structure such as in the case of low rectal surgery. This superiority of visual advantage has facilitated many operations especially in those where the operative sites are quite inaccessible even in open laparotomy procedures.

The use of long and thin instruments in laparoscopic surgery allows the organs and tissues to be manipulated very precisely and accurately even in deep recesses of the body cavity. This kind of minimal touch techniques is particularly useful in cancer operations because it could minimize the chance of disseminating tumour cells during the operation. In colorectal cancer operations, the bowel is manipulated with an atraumatic cotton tape or with thin bowel clamps. The tumour is usually seen but not touched. This is in stark contrast with the open operation where the bowel and the tumour are frequently touched or manipulated with the surgeon’s hand.

The objective of laparoscopic surgery is exactly the same as its laparotomy counterpart in resection and reconstruction. In the case of curative colorectal cancer resection, the methods and extend of the colonic or rectal excision, radical lymphadenectomy, and reconstruction of the colorectum is carried the same way in laparoscopic as in the open operation. The only difference is the approach through holes in the abdominal wall using a different set of instruments and employing totally different surgical skills. As the approach is minimally invasive, the associated trauma of laparoscopic surgery is much less and the patient can recover from the operation very quickly. Also because the surgical skills involved in laparoscopic colorectal surgery is new to the general surgeons who were trained in open methods, all surgeons have to acquire the laparoscopic skills through properly conducted training programmes before an adequate level of proficiency can be attained. Only then can the real benefits of laparoscopic surgery be materialized.

Evidence for laparoscopic colorectal cancer resection

Laparoscopic colorectal surgery started very early in Hong Kong in the early 1990’s. It has been applied in colorectal cancer of all stages and at all locations in the bowel. It is contraindicated when the tumour is too large where the incision to take the tumour out is equivalent to an open operation. It is also not suitable when there is extensive loco-regional infiltration in which case multiple organs have to be removed. Otherwise, laparoscopic resection should be the first line approach to colorectal cancer resection. Three large randomized controlled studies are of special importance in providing up-to-date and good evidence to support the role of laparoscopic colorectal cancer resection. One of these trials is a Hong Kong study.
The first randomized controlled study on laparoscopic versus open colon cancer resection was from Spain and published in 2002. It was a study comparing 111 laparoscopic colectomy versus 108 open colectomy. The authors were able to show that in non-metastatic colon cancer, laparoscopic resection was better than the open operation in lesser amount of blood loss, earlier post-operative oral intake and shorter hospital stay. The number of complications were less in laparoscopy (12 vs 31). For the cancer related results, the tumour recurrence was less in laparoscopy (17% vs 27%) and cancer-related mortality was less in favour of laparoscopy (9% vs 21%).

The first randomized study to include rectal cancer was our Hong Kong study published in April 2004. This is a study conducted in two centres, namely the Prince of Wales Hospital and the United Christian Hospital. I personally started this study in September 1993 in PWH and the same study protocol was used in the UCH when I moved to that hospital for work and the whole trial ended in October 2002. 403 patients with rectosigmoid carcinoma were recruited into the study, 203 into the laparoscopic group and 200 into the open group. The two groups are comparable in terms of demographic data and tumour stage distribution. The main benefits shown in favour of the laparoscopic group are lesser amount of blood loss (169 vs 238ml), lesser analgesic requirement (4.5 vs 6.9 doses), pain score on day one on a scale of 1 to 10 (4.6 vs 5.4), time to first flatus (2.4 vs 3.1 days), time to first bowel motion (4.0 vs 4.6 days), time to resume normal diet (4.2 vs 4.9 days), time to walk independently (3.5 vs 4.5 days), shorter hospital stay (8.2 vs 8.7 days) and time to resume household activity (32.2 vs 43.7 days).

It is important that the benefits in the postoperative recovery period in laparoscopic surgery are gained not in the expense of tumour clearance and overall survival rates. Our study was able to show that 5-year survival rates (76.1% vs 72.9%) and 5-year disease free rates (75.3% vs 78.3%) are very similar and there was no significant difference on statistical testing.

The latest study of note is the American national study carried out in 48 institutions on 872 patients. This is a study published by the Clinical Outcomes of Surgical Therapy Study Group in May 2004. This multi-centre study again was able to show benefits in the post-operative recovery in favour of laparoscopic group while the recurrence rates at 3-year (16% vs 18%) and survival rates at 3-year (86% vs 85%) are not different statistically.

**Conclusion**

Laparoscopic colorectal surgery has been developed very quickly in the last decade or so. A large body of literature has been written on it and recent high level evidence in terms of randomized studies has proved that it is superior to conventional open colorectal resection mainly in better and quicker post-operative recovery. Most studies have shown that the oncological efficacy of laparoscopic surgery is the same as open surgery and perhaps it is even better than open surgery in certain selected groups of patients. However, in order to achieve the benefits that the minimally invasive approach can offer, the operating surgeon has to be proven to be proficient in this new technique through adequate training.

**References**