LAPAROSCOPIC COLORECTAL CANCER SURGERY

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INTRODUCTION

Laparoscopic techniques have been introduced into the colorectal field since the beginning of the last decade of the last millennium. The main purpose of this minimally invasive approach is to minimise the trauma of access associated with a large abdominal incision in colorectal resection. The less traumatic approach to surgery hopefully would lead to less wound pain, hasten return of intestinal function and hence result in earlier patient recovery and shorter hospital stay. But all these advantages have to be realised without the compromise of the safety and radicality of the colorectal resection, especially for colorectal cancers. These purposes of laparoscopic colorectal resections have largely been achieved and shown by the results of large series in a few centers in the world. However, due to the technical barrier of difficulty in attaining proficiency in the skills required, generalization of this minimal invasive approach is still not achieved yet. In the last few years, newer techniques, such as the hand-assist approach and other hybrid laparoscopic-open approach have been designed to overcome some of the technical difficulties. On the other hand, more complicated and advanced laparoscopic operations such as total mesorectal excisions for mid and low rectal cancer have been attempted and initial success has been reported.

DEVELOPMENT OF LAPAROSCOPIC COLORECTAL SURGERY

In the course of the development of the laparoscopic approach in colorectal operations, four fundamental questions or issues have to be addressed. They are 1) feasibility; 2) efficacy; 3) oncological considerations; and 4) advantages over conventional surgery. Feasibility is mainly a technicality issue. Over the years of development, the techniques required of laparoscopic colorectal resection have been largely worked out. All types of colorectal operations are feasible with the laparoscopic approach and have been reported in the literature. In order to show it to be efficacious, the technique has to be shown to be safe and adequate in resection just like that of open surgery. The procedure is said to be effective only when long-term results of morbidity and survival involving multiple centers are available and comparable to that of the open surgery. However, even though the effectiveness of laparoscopic surgery is shown to be equivalent to the open counterpart, there must also be evidence of additional advantages of laparoscopic approach before it may be generalised.

POSSIBLE BENEFITS OF LAPAROSCOPIC COLORECTAL SURGERY

The potential benefits relating to laparoscopic surgery that have been looked into in the literature included early return of intestinal function, less postoperative pain, less pulmonary complications, shortening of hospital stay and better preservation of host immune function.

Animal studies have shown that myoelectric activities of the bowel returns earlier in laparoscopic colectomies than open surgery. Clinically, this early recovery is reflected by early mobilisation of the patients and shorter hospital stay after the operations. However, time to return of oral diet was not shortened in our studies. This is explained by the fact that diet prescription is often arbitrary and not based on return of bowel functions.

Many benefits of laparoscopic surgery were demonstrated in the area of post-operative recovery and in the lessening of post-operative complications. These were all well shown by many published series and in some randomised studies. However, it is not known whether these clinical benefits can be translated into economic benefits and there is not enough data on the analysis of cost effectiveness of this minimally invasive approach. The difficulty lies in the intrinsic differences of economic implication of clinical benefits and costing structure in different economic zones of the world.

Laparoscopic surgery has been shown to better preserved immune functions in various animal models ranging from cholecystectomy to colectomy. This advantage has important implication especially in cancer surgery. However, the message of this advantageous effect in laparoscopic resection when applied to the treatment of colorectal cancer in the clinical setting is less clear. Our initial randomised study to look at the profiles of IL6, lymphocyte subsets and HLA-DR expression in laparoscopic and open colectomy for rectosigmoid carcinoma, the changes at the postoperative period is the same in both the study and the control groups. This was a small study consisting of 16 patients and it may be too small to show a marginal difference. However, a larger randomized study consisting of 34 patients of rectosigmoid carcinoma conducted by the same group showed a difference in systemic cytokine response in favour of the laparoscopic group. However, a Singapore study consisting of 161 patients did not show a difference in immune response.

CONCERNS AND CONTROVERSIES

The initial concerns of applying laparoscopic method in resecting colorectal cancer lie naturally in its efficacy in clearing tumours as radical as the well-proven open operative approach to the problem. Others would concern about the potential for disseminating tumour cells during the procedure and hence a higher recurrence and lower survival rates. These are understandable worries when a new operation approach such as the laparoscopic approach that involves totally new techniques and instrumentation is introduced to treat cancer. This worry is over-exaggerated when a few reports about the occurrence of port-site recurrences came out. This is said to be a new kind of recurrence of unknown etiology and it can occur even in early cancers. A lot of studies both in animals and human have been conducted to clarify this unpleasant issue and many possible mechanisms of tumour spread have been postulated. However, there are clinical studies concluding that there is no increased risk of intraperitoneal cancer cell spillage and no increased cell dissemination in the blood stream. The current feeling is that the occurrence of port site recurrence has a strong technical element. It might occur in a surgeon's early experience and when technical details relating to the minimization of the chance of tumour cell spread were not adhered to.

RELATIONSHIP BETWEEN EXPERIENCE AND OUTCOME

There is a definite learning curve associated with laparoscopic colectomy. It is recommended that the technique may be reasonably mastered only after 20 to 30 cases. High volume surgeons (those who performed more than 40 cases) have been shown to have much lower complication rates than low volume surgeons (less than 40 cases). In our experience, the complication and conversion rates are lower for the later cases (after the first 30 cases) than the earlier cases (first 30 cases). This demonstrates that the learning curve is significant for laparoscopic colectomy and adequate training and practice is important in achieving good performance.

In a large multicenter study in Germany, the surgical results of 1658 patients were analysed according to the surgical experience of the institutions and surgeons. A tendency to perform more rectal cases as compared to colonic, less mortality and morbidity and lower conversion rates were found to be associated with institutions of an experience of more than 100 cases. This reflects a significant learning curve for laparoscopic colorectal surgery and importance of proper training and graduated approach in selecting patients according to one's competency.

EVIDENCE FOR LAPAROSCOPIC COLECTOMY

Recently there are some case control studies and randomised control studies in laparoscopic colorectal operations comparing early post-operative results and adequacy of the operation in terms of clearance of tumour and lymph nodes. Our case control and randomised studies in rectosigmoid resections, like some other studies have shown advantages in minimising pain, early recovery and shortened hospital stay. Lymph node excision and safety margins were found to be adequate. We also found comparable morbidity rate, recurrence rate and survival rate for both the study and control groups.
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POTENTIAL BENEFITS OF LAPAROSCOPIC SURGERY

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Early series and some control or randomized clinical studies have basically shown that the radicality of the laparoscopic approach in dealing with colorectal cancer is adequate and similar to the open counterpart. People have looked at the number of lymph nodes removed, mesenteric length and margins of resection and found no significant differences in most types of laparoscopic resections including right hemicolectomy, sigmoid colectomy, anterior resection and abdominoperineal resection for rectal cancer.

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LAPAROSCOPIC TOTAL MESORECTAL EXCISION

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Short term benefits such as reduced postoperative pain and respiratory complication, earlier return of bowel function and earlier ambulation are evident from studies in laparoscopic colorectal surgery.1,2 Oncological clearance and port site metastasis remain the main controversies that are hovering the application of laparoscopic surgery in colorectal cancer.3,4 However, a number of recent prospective studies have revealed encouraging figures in terms of early survival and recurrence.4,5,6,7,8

PATIENT SELECTION

Although the operation is slightly easier in the female pelvis, male gender is by no means a contraindication to the laparoscopic approach. When we started off the operation in 1999 we excluded patients with previous abdominal surgery and those with a high body mass index.9 As our experience accumulated, we realized that adhesions need not be contraindication to laparoscopic approach, and we have subsequently included patients with previous abdominal surgery and those with obese body-build into our study.

On the other hand, patients with locally advanced tumour should be evaluated and selected with caution. In these cases not only oncological safety might be compromised by the laparoscopic approach but also many at times palpation is necessary to guide the correct plane of cleavage. Thus we include endorectal ultrasound10,11 or CT scan (if the tumour is stenotic) in the assessment of patients with mid or low rectal carcinoma, and those with possible perirectal involvement.

THE OPERATION

We have previously reported our technique and initial results.1,2 Mobilization of the Sigmoid Colon and Rectum

The lateral peritoneal attachment of the sigmoid is first divided. After the sigmoid colon has been mobilized, two mesenteric windows are created at the sigmoid mesentery, one at the level of the rectosigmoid junction and the other at mid-sigmoid level. Two other long, thin laparoscopic instruments, a much better dissection is possible in the deep, angled pelvis under a magnified view. Low rectal transection is made more feasible with the new generation of articulated endo-staplers. The same view is not easily obtained even with a long midline incision in open surgery.

References


Further Developments

Due to the maturation and increased experience of laparoscopic colectomy in some centers, some surgeons have pushed the limit of the approach to technically more difficult operations such as total mesorectal excision for rectal cancer. It is found that in experience hands, the operation is not just feasible, it can achieve more accurate dissection leveraging on the advantage of laparoscopic vision. However, there are other approaches to solving the technical problems in dealing with low rectal cancer such as the hybrid open-laparoscopic approach, laparoscopic and transanal approach and the hand assisted laparoscopic approach.

Hand assisted laparoscopic operations have been taken up in a big way in order to alleviate some technical problems faced by pure laparoscopic surgery, especially for highly complicated operations such as liver, pancreatic, stomach and kidney resections. This approach has also been used in colorectal resections. Our center has started investigating with this approach for colectomies, excluding sigmoid and rectal excisions, and we have found good results in terms of shortening operating time and cost savings. It might also have a role in the process of training for laparoscopic surgery for beginners because it can be thought of as a mid way procedure to bridge open and laparoscopic operations.

Conclusions

Laparoscopic colectomy is both feasible and safe. There is good evidence showing the advantages of the laparoscopic approach especially in the early postoperative results. There is also evidence of adequate clearance of tumour and lymph nodes in laparoscopic cancer surgery. However, long-term effectiveness in terms of survival and recurrence rates awaits results of large-scale randomised studies.

References