Laparoscopic Surgery in General Surgery: Where are we now?

Thawatchai Akaraviputh, M.D.*, Benjawan Teeratherdtrakul, R.N., Vitoon Chinswangwatanakul, M.D., Ph.D.*, Narong Lert-akayamanee, M.D.***

**Department of Surgery, **Nursing Department, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.*

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Since the introduction of laparoscopic surgery by Georg Kelling in 1901,[1] it was widely accepted and confirmed the potential advantages over traditional surgery. This included minimal aesthetic disability, less pain, and better postoperative respiratory function. The limited operative trauma allows a reduced postoperative hospital stay and more rapid resumption of normal activity. At the Division of General Surgery, Department of Surgery, Faculty of Medicine Siriraj Hospital, we started the first laparoscopic cholecystectomy in 1991 and it has been accepted as a standard procedures. Laparoscopic surgery was also applied into many specialties, including abdominal surgery, thoracic surgery, urology and pediatric surgery. The aim of this article is to review the current situation of laparoscopic surgery in general surgery.

Laparoscopic cholecystectomy

At present, laparoscopic cholecystectomy (LC) is the standard operation for gallstone disease. Compared with open cholecystectomy, the superiority of LC in less postoperative pain, shorter recovery and hospital stay is stated. Operation time was longer in the first years of LC. Focusing on acute cholecystitis, we found benefits in recovery, hospital stay and postoperative pain. The range of conversion is between 5 and 7% in elective cases and increases up to 27% for acute cholecystitis. The common reason for conversion was inability to define anatomy in patients with inflamed contracted gallbladder. Significantly independent predictive factors for conversion were male gender, previous abdominal surgery, acute cholecystitis, thickened gallbladder wall on preoperative ultrasonography, and suspicion of common bile duct stones.[2] With a rate of more than 90% in Europe, the standard procedure for common bile duct stones is "therapeutic splitting" with endoscopy and retrograde cholangiopancreatography preoperatively followed by LC. Laparoscopic bile duct clearance is effective and safe in experienced hands; however, the only proven benefit is a slightly shorter hospital stay. The laparoscopic approach is preferred in elective cholecystectomy and acute cholecystitis. The minimal invasive technique has proven to be effective, gentle and safe.

Laparoscopic colorectal resections

Laparoscopic colorectal resections offer several benefits postoperatively, including minimal impairment of gastrointestinal and pulmonary function, less immunosuppression, shorter hospital stay and improved reconvalescence. Since the introduction of laparoscopic surgery for the therapy of curable colorectal cancer, some concern was voiced in terms of oncologic radicality, the issue of port-site metastases and tumor cell distribution.

The challenge has been to show that this can be done safely and efficiently and that for cancer patients there is no detrimental oncologic effect. The major issues that have been and continue to be addressed are: (1) whether or not an adequate resection can be performed laparoscopically; (2) whether or not there is a high rate of wound or port site recurrence following these operations; and, (3) whether or not. by using these techniques, we are trading short-term benefits for a poor long-term oncologic outcome. To answer these fundamental questions, several prospective randomized trials have been conducted and several more are under way. The results of these trials indicate that, in terms of cancer outcome, there is no difference in overall survival, disease-free survival, and wound recurrences in patients treated using laparoscopic techniques compared with conventional operation. In addition, there are short-term benefits associated with the use of these techniques. It can now be said that from an oncologic standpoint, in experienced hands, laparoscopic colectomy for curable colon cancer is equivalent to conventional therapy, and it is superior to conventional operation regarding short-term outcomes. Laparoscopic colectomy for colon cancer should be offered to appropriately selected patients.

Laparoscopic adrenalectomy

After about 10 years of experience, laparoscopic adrenalectomy has become the gold standard for the treatment of adrenal lesions. All laparoscopic adrenalectomies were performed with the lateral transperitoneal approach. The technique has been modified over the years as experience and equipment have improved. Usually four trocars were used for both right-sided and left-sided procedures. Five-millimeter trocars and the 5-mm harmonic scalpel are now used during the dissection and mobilization of the adrenal gland.

Laparoscopic adrenalectomy for primary malignancies and tumors metastatic to the adrenal is controversial. Most studies demonstrate that results of laparoscopic adrenalectomy for malignant lesions are similar to those of open adrenalectomy, without its morbidity. Selective laparoscopic

TABLE 1. Number of laparoscopic surgical procedures in the year 2005.

Procedures	No.	%
Lap. Cholecystectomy	368	78.63
Lap. Colorectal resection	36	7.69
Diagnostic laparoscopy	25	5.34
Lap. Adrenalectomy	18	3.85
Lap. Hernioplasty	5	1.07
Lap. Unroof hepatic cyst	5	1.07
Lap. Splenectomy	4	0.85
Lap. Appendectomy	4	0.85
Lap. Fundoplication	3	0.64

adrenalectomy for potentially malignant tumors requires seeking signs of local invasion, lymphadenopathy, or distant metastasis; there are no other reliable preoperative criteria of malignancy. Diagnostic laparoscopy may be useful, and in some cases, may establish a diagnosis. Laparoscopic adrenalectomy should be cautiously performed, with the goals of achieving complete tumor resection without disruption of the adrenal capsule[3].

Laparoscopic hernioplasty

Although the laparoscopic totally extraperitoneal (TEP) approach to hernia repair has been associated with less pain and a faster postoperative recovery than traditional open repair; many practicing surgeons have been reluctant to adopt this technique because of the lengthy operative times and the learning curve for this procedure. However, TEP repairs can be performed efficiently and without major complications, even when the learning curve is included.

Laparoscopic splenectomy

Laparoscopic splenectomy has become widely accepted as the approach of choice for the surgical treatment of benign and malignant hematologic diseases. Advances in technology have led to better outcomes for the procedure, and have allowed surgeons to apply the technique to disease processes that were at one time felt to be contraindications to laparoscopic splenectomy. However, challenges still remain. There is a steep learning curve associated with the procedure. The development of cost-effective laparoscopic simulators to target the skills required for laparoscopic splenectomy and other laparoscopic procedures is essential. The advent of devices which isolate and seal the large blood vessels that surround the spleen have reduced intra-operative bleeding and minimized conversions to open splenectomy. Improvements in optics and instrumentation, as well as robotic technology, will continue to define the frontier of minimally invasive surgery, and further facilitate the acceptance of laparoscopic splenectomy for the treatment of benign and malignant hematologic diseases.

Laparoscopic appendectomy

The value of laparoscopy in appendicitis is not established. Since its initial description by Semm in 1983[4], laparoscopic appendectomy (LA) has struggled to prove its superiority over the open technique. This is in contrast to laparoscopic cholecystectomy, which has promptly become the gold standard for gallstone disease despite little scientific challenge. Open appendectomy (OA) has withstood the test of time for more than a century. The procedure is standardized among surgeons and, unlike cholecystectomy, OA is typically completed using a small right lower quadrant incision and postoperative recovery is usually uneventful. It is the most common general surgical procedure performed in Siriraj Hospital. Unlike other minimally invasive procedures, laparoscopic appendectomy did not offer a significant advantage over open appendectomy. It also took longer to perform. The choice of the procedure should be based on surgeon or patient preference.

Division of General Surgery, Department of Surgery, Siriraj Hospital: Experiences in 2005

In the year 2005, a total of 472 patients (184 men; mean age, 56.53 years) underwent laparoscopic surgery. The most common procedure was laparoscopic cholecystectomy (Table 1) with 5.43% conversion rate. Laparoscopic colorectal resection was done in 36 patients (7.69%). Laparoscopic hernioplasty with mesh was used for 5 inquinal hernia repairs (1.07%). Laparoscopic splenectomy, laparoscopic appendectomy and laparoscopic fundoplication were performed less than 1%.

CONCLUSION

As a result of the obvious benefits of laparoscopic cholecystectomy, minimally invasive techniques have been applied to more complex gastrointestinal procedures. The goal in adapting laparoscopic techniques is to offer an operation which results in less pain, shorter hospital stay, more rapid return to normal activities, and improved cosmesis compared with conventional operation.

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