

Early international results of laparoscopic gastrectomies

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Abstract

Background: The first totally laparoscopic Billroth II gastrectomy was performed in 1992. To date, laparoscopic gastrectomy has been performed by a small number of surgeons around the world and the laparoscopic approach has been extended to Billroth I and total gastrectomy. The aim of this study is to review the state of laparoscopically performed gastrectomies in the international scene.

Methods: Questionnaires were prepared and sent to every surgeon in the world known by the authors or their contacts to have performed a laparoscopic gastrectomy. A questionnaire survey was started in July 1994 and completed by November 1994. Data collected included age, sex, type of gastric resection, technique of reconstruction after resection, average duration of surgery, time to liquid and solid intake, postoperative hospital stay, complications, and opinions of the surgeons.

Results: Sixteen surgeons contributed to this study. A total number of 118 cases of laparoscopic gastrectomies, comprising Billroth I (11), Billroth II (87), vagotomy and anrectomy (10), and total gastrectomy (10) had been performed. The indications were gastric and/or duodenal ulcers and benign and malignant gastric tumors.

Conclusions: Laparoscopic gastrectomy was found to be superior to the open technique by 10 of 16 surgeons because of faster recovery, less pain, and better cosmesis. The procedure was an expensive and long operation according to four. Two surgeons were uncertain of any benefit because of limited experience.

Key words: Laparoscopic gastrectomy — International results — Questionnaire survey

sity Hospital, laparoscopic gastrectomy began being performed by a number of surgeons around the world. Some modifications to the original procedure have been described [4, 6]. The laparoscopic approach has also been extended to other related operations such as wedge resection, Billroth I gastrectomy, and total gastrectomy. The indications have also been expanded to early gastric cancer and palliative resections for advanced gastric cancer.

The aim of this study is to evaluate the early international gastrectomy results. As the data is diverse, uncontrolled, and incomplete, we feel that this study has more value as a historical record of the development of a new procedure than as a scientific testimony to its efficacy at this moment. It would, for instance, be extremely nice to have the data of the initial experience of open gastrectomy around the world during the year 1885, 4 years after its initial development by Theodore Billroth.

Materials and methods

In order to evaluate the state of laparoscopic gastrectomy today, we prepared a questionnaire and sent it to every surgeon in the world known by the authors or their contacts to have performed a laparoscopic gastrectomy. As the procedure had just been described, we assumed that the number would be small and that not many would be left out. The study was started in July 1994 and all questionnaires were returned by 30 November 1994. Several surgeons who stated that they only performed endoscopic mucosal resections or wedge resections were excluded. Our own series of 18 cases with Billroth II gastrectomy were included.

Data collected included age, sex, indication for operation, type of gastric resection, technique of reconstruction after resection, numbers of endostaplers (Endo-GIA) used, average duration of surgery, average time to mobilize the patient, time to liquid and solid intake, mean hospital stay, time to return to work, postoperative complications, and surgeon's opinion on laparoscopic gastrectomy.

Results

The questionnaire was answered by all of those surgeons who received it. According to the data collected from these surgeons and our own experience (16 surgeons from 16

After the first successful totally laparoscopic Billroth II gastrectomy was performed in the Singapore National Univer-

Table 1. The indications for operation

Indication	Patients, <i>n</i> = 118 (%)
Gastric cancer	46 (38)
Gastric ulcer	35 (30)
Duodenal ulcer	23 (19)
Gastric + duodenal ulcer	5 (4)
Benign gastric tumor	3 (3)
Non-Hodgkin's lymphoma	2 (2)
Tubulovillous adenoma	1 (1)
Angiodysplasia	1 (1)
Gastric volvulus	1 (1)
Pancreatic rest	1 (1)

different centers in 12 countries), the numbers of laparoscopic gastrectomies were 118, comprising 11 Billroth I gastrectomy, 87 Billroth II gastrectomy, 10 vagotomy, and antrectomy and 10 total gastrectomy. The range in number of cases reported by contributors was one to 22. Eighty-four (71%) of the cases were men and 34 (29%) were women; mean age was 49 years ranging from 24 to 91 years. The data provided by contributors represents a consecutive experience.

The most common indication for operation was gastric cancer (in 46–38% of the cases). The stage of these tumors and lymph node status were not stated in the questionnaire forms. Other common indications were gastric ulcers in 35 and duodenal ulcers in 23 (Table 1).

The operations were totally laparoscopic in 94 (79%) and laparoscopic assisted in 24 (21%) of the patients. In laparoscopic-assisted cases, the hand-sewn anastomoses were fashioned between duodenum and proximal transected stomach with the usual technique as in open surgery through a 5-cm transverse muscle-splitting incision over the duodenal cap in patients with Billroth I gastrectomy. In patients with Billroth II gastrectomy, a 5-cm left subcostal muscle-splitting incision was made to perform the gastrojejunostomy. The anastomoses were completed totally laparoscopically using staples (Endo GIA) in 60 (51%) patients. The combination of Endo GIA and intracorporeal hand-sewn technique was used in 55 (46%) cases in whom the anastomoses were performed by Endo GIA and side openings were closed with laparoscopic suturing material. The anastomoses were performed totally hand-sewn in three (3%) cases. The mean number of endoscopic staples (Endo GIA) used was five, ranging from four to 16.

Conversion to open surgery was mandatory in six (5%) cases because of bleeding in three, stapler failure in one, transection line too close to the esophagus in one, and inability to localize the ulcer site in one.

The average duration of the surgery was 215 min, ranging from 90 to 360 min. In the postoperative period, the average time to mobilize patient was 28 h, commencement of liquid intake 3 days, solid food 5 days, and the mean hospital stay 8 days. Return to normal daily activities took an average of 17 days (Table 2).

Postoperative complications were anastomotic obstruction in four (4%), bleeding in two (2%), anastomotic leak in three (3%), and sepsis in two (2%). Other complications were duodenal stump leak in one (1%)

Table 2. Postoperative recovery

	Average time (range)
Mobilization of patient (hours)	28 (6–192)
Liquid intake (days)	3 (1–6)
Solid intake (days)	5 (2–12)
Hospital stay (days)	8 (3–30)
Return to daily activities (days)	17 (9–90)

and gastric atony in one (1%). There were two operation-related mortalities; duodenal stump leakage with sepsis in one patient and subhepatic abscess and death at reoperation in the other. One patient died of AIDS-related pneumonia.

Laparoscopic gastrectomy was considered superior to open technique by 10 of 16 surgeons contributing to this study because of faster recovery, less pain, and better cosmesis. According to four of those who responded, it was an expensive and long operation. Two surgeons were uncertain due to the small number in their personal series.

Discussion

Laparoscopic gastrectomy has been performed by a number of surgeons around the world and many modifications to the original technique have been described. Besides the totally intraperitoneal laparoscopic gastrectomy, laparoscopic-assisted gastrectomy either by gasless technique (elevating the abdominal wall with U-shaped retractor) or insufflating the abdomen by CO₂ has been practiced by some authors [12]. The laparoscopic approach can now be extended to other related operations such as Billroth I gastrectomy, wedge resection, and total gastrectomy [1, 7, 10, 12–14].

Indications for laparoscopic Billroth II gastrectomy include: (1) chronic duodenal or pyloric channel ulcer which has failed to heal after adequate medication and *Helicobacter pylori* eradication; biopsy must be taken to exclude malignancy; (2) failure of benign gastric peptic ulcer to heal after 3 months of well-supervised and compliant medical treatment; (3) bleeding gastric ulcer after failure of endoscopic hemostasis; (4) a perforated benign gastric ulcer with minimal soilage; (5) early gastric cancer, and (6) palliative resection in advanced gastric carcinoma [3, 5, 8]. Relative contraindications are previous upper abdominal surgery and severe cardiopulmonary disease. Indications for laparoscopic Billroth I gastrectomies are the same as for Billroth II gastrectomies. Technically, in most cases of Billroth I procedures, dissection and resection phases are carried out under the conditions of pneumoperitoneum, but the gastroduodenostomy is done by open technique through a small incision in the right upper quadrant [1, 12]. Wedge resections can easily be performed with endostaplers and are mainly indicated in benign tumors of the stomach [9] and selected early gastric cancers [8].

The indications for laparoscopic gastrectomy has been expanded to early gastric cancer and palliative resections of

advanced gastric cancer. However, the gastric malignancies should be carefully evaluated and selected for laparoscopic approach. Thus, in early gastric cancer, partial resection, intragastric mucosal resection, or distal partial gastrectomy can be performed. Laparoscopic palliative resection for advanced gastric carcinoma is also feasible. The place of the laparoscopic approach in stage II and III gastric carcinomas is still uncertain. In these cases a meticulous and extensive nodal dissection can improve survival. Melotti and Azagra, however, reported encouraging preliminary results in these intermediate stages [2, 11]. The general surgical community remains unconvinced and longer follow-up and bigger trials are required.

There are certain advantages to laparoscopic gastrectomy. It holds promise of less pain, less immobility, quicker alimentation, less wound and respiratory complications, and early return to normal daily activities. Therefore, this technique is patient-friendly. On the other hand, with the technology we have today, it is still quite a technical challenge to the surgeon. In addition, the high cost of endoscopic stapling devices is an important drawback of this technique. However, this can be overcome when surgeons improve their hand suturing skills. Many suturing assist devices are now available to make laparoscopic anastomosis less daunting.

Most surgeons performing this operation were impressed by the prompt recovery, earlier mobilization, and prompt recovery of gut function in the successful cases. However, the real benefit of this procedure will not be scientifically proven for some time due to difficulties in collecting large numbers of cases and documenting them. A randomized controlled trial comparing open and laparoscopic gastrectomy will also be difficult to carry out as the indications in benign disease are shrinking as a consequence of the proven effectiveness of *Helicobacter pylori* eradication therapy.

This is very preliminary data. Therefore, we can not draw very definitive conclusions from this study. It just documents the preliminary efforts of surgeons around the world experimenting with this new technique. We are sure that in 5–10 years, the situation will become clearer because more data, and more scientific presentation of data, will be available.

This data, however, has historical value because it is the

first worldwide survey of this very new procedure. Fifty to 100 years from now, when people look back, they will at least have some information as to how this procedure started and spread around the world.

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