

Laparoscopy-assisted proximal gastrectomy for early gastric cancer is an ugly duckling with unsolved concerns: oncological safety, late complications, and functional benefit

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Received: 6 January 2013 / Accepted: 5 February 2013 / Published online: 13 March 2013
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There are notable changes in that the proportion of early gastric cancer (EGC) and proximal gastric cancer has increased continuously during the past 20 years, from 24.8 % to nearly 50 % and from 5.3 to 14.0 %, respectively. Proximal EGC consists of 30.3 % of all proximal gastric cancer whereas distal EGC consists of 51.5 % of all distal gastric cancer [1–3]. Accordingly, more and more surgeons are interested in laparoscopic gastrectomy for early gastric cancer. In proximal EGC and the concept of minimally invasive surgery, laparoscopy-assisted proximal gastrectomy (LAPG) is a theoretically better treatment option than others [i.e., open proximal gastrectomy, open total gastrectomy, and laparoscopy-assisted total gastrectomy (LATG)]. However, LAPG is not popular these days. Even including the open cases, proximal gastrectomy was performed in only 141 (1.0 %) patients in 2009 [2]. Proximal gastrectomy (PG) is not yet the standard treatment for patients with proximal early gastric cancer (EGC): it is still classified as an investigational treatment by the Japanese gastric cancer treatment guidelines [4]. The application of proximal gastrectomy to proximal EGC has been limited by the following three main concerns. The first is oncological concern, mainly focused on limited lymph node dissection; the second is late complications such as reflux esophagitis and anastomotic stricture, related to reconstruction methods; and the third is functional benefits.

In a recent systematic and meta-analysis comparing total gastrectomy with proximal gastrectomy, it was concluded that total gastrectomy and proximal gastrectomy had similar overall survival outcomes for proximal gastric cancer. However, proximal gastrectomy with esophagogastrostomy exhibited a higher incidence of reflux esophagitis and anastomotic stenosis. Total gastrectomy was therefore recommended for proximal gastric cancer [5].

However, the number of cases of proximal EGC has been increasing in Korea because of national screening programs and advances in endoscopic diagnosis and devices [1–3]. Is it feasible for all these patients with EGC, who are capable of showing a good survival rate after surgery, to undergo open total gastrectomy?

As a minimally invasive surgery, laparoscopic gastrectomy has several advantages over open gastrectomy, especially with respect to early postoperative outcomes—that is, it reduces postoperative pain, surgical stress, and estimated blood loss, it accelerates recovery and return to normal bowel function and oral intake, and it reduces the duration of hospital stay [6–9]. Because gastric cancer is mostly located in the distal area in patients in Eastern countries, laparoscopic distal gastrectomy has been a more common procedure than laparoscopic total or proximal gastrectomy. However, recently, some positive outcomes of laparoscopic total or proximal gastrectomy have been reported [10–12]. In this context, laparoscopic proximal gastrectomy is an attractive treatment option for proximal EGC when considering the prognosis of EGC, the advantages of a minimally invasive surgery and function preservation, including improved nutrition, prevention of anemia, improved production of gut hormones, and a reduction of postoperative complaints [13–16].

If the incidence of late complications such as reflux esophagitis and anastomotic stenosis could be decreased to

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that of total gastrectomy, laparoscopy-assisted proximal gastrectomy (LAPG) has the potential to become the standard procedure for proximal gastrectomy. The most important technical challenge of LAPG may be the reconstruction method, which needs to be designed to prevent reflux symptoms and anastomotic strictures. Several reconstruction methods have already been reported; however, an optimal reconstruction after LAPG has not yet been established.

Several previous studies have applied direct esophago-gastric anastomosis as the reconstruction method, probably because it is simple and needs only one anastomosis. Anti-reflux procedures such as a gastric tube formation, fundoplication, esophagopexy with crural repair, and pyloroplasty have been used for preventing reflux esophagitis and anastomotic strictures. However, all these methods involved esophagogastrostomy, and the results were disappointing because the rates of reflux esophagitis and anastomotic stenosis were still high [10, 17, 18]. A good alternative to esophagogastrostomy reconstruction after proximal gastrectomy is the Roux-en-Y type esophagojejunostomy (E-Jstomy), which is the most powerful anti-reflux reconstruction. There are two kinds of E-Jstomy that can be performed after proximal gastrectomy: jejunal interposition and double-tract reconstruction (DTR). Jejunal interposition has been introduced as an alternative method for preventing severe reflux and is widely performed in open surgery; however, laparoscopic jejunal interposition has not yet gained acceptance because of its technical complexities. These complexities include the formation of a pedicled jejunal flap and the formation of three anastomoses: the mean surgical time was also relatively long (233–614 min) [19, 20]. Double-tract reconstruction consists of three anastomoses: Roux-en-Y esophagojejunostomy, gastrojejunostomy 15 cm below esophagojejunostomy, and jejunojunctionostomy 20 cm below gastrojejunostomy.

Schwartz et al. raised questions about our comparative study in the editorial in this issue. First, our report is the first comparative study on LAPG versus LATG. Of course, this is not too surprising anymore in the setting of proper expertise. However, LAPG and LATG are still technically demanding procedures, in contrast to laparoscopy-assisted distal gastrectomy (LADG), so we cannot directly compare our results with those of LADG as they said. We think surgeries that involve the esophagus are still difficult operations even in the open setting. For example, recently, our Korean Laparoscopic Gastrointestinal Surgery Study (KLASS) group is going to start a prospective registration observatory study between open total gastrectomy and LATG (KLASS-03 study), which shows directly the difficulty of esophagojejunostomy in laparoscopy.

Second, the choice of surgical approach, LAPG or LATG, was determined by the tumor factor. If the tumor size was

relatively large and the volume of remnant stomach was too small to perform esophagogastrostomy, we performed LATG. However, if we use another reconstruction method other than direct esophagogastrostomy, the indication will be expanded to nearly all early proximal gastric cancer.

Third, the overall survival rate was similar in the two groups of our study. Only two cases in the LAPG group and three cases in the LATG group expired. All these expired cases were not related to gastric cancer, which means the disease-specific survival rate was 100 %. For this reason, we did not include disease-specific survival in our study. Furthermore, in the Japanese gastric guidelines (3rd edition), proximal gastrectomy is classified as a modified surgery, which can be done in the EGC except the indication of endoscopic submucosal dissection. These guidelines recommend that D1 or D1 + lymph node dissection (LND) should be performed in proximal gastrectomy, which is based on the knowledge of which lymph node stations are most likely to be involved among proximal EGC. The lymph node stations of most concern in proximal gastrectomy are nos. 5, 6, and 10. According to several retrospective reports, there is no lymph node metastasis along the lower stomach and splenic hilum in gastric cancers that were confined to the muscularis propria [21–25]. Based on these data, LND in LAPG for proximal EGC D1 or D1 + LND is thought to be enough [26].

Fourth, at our institution, LAPG with esophagogastrostomy was performed since May 2003 as in this study; however, the rate of reflux symptoms and anastomotic stenosis after esophagogastrostomy was still high, even though we gradually began to perform a few anti-reflux procedures as well (i.e., gastric tube formation, esophagopexy with crural repair, and fundoplication) [10]. Therefore, in April 2009, LAPG with DTR was introduced at our institute. We think DTR is an easier and simpler procedure than jejunal interposition under laparoscopy. These encouraging data led us to plan a phase III prospective RCT about LAPG versus LATG. As to functional outcomes, our study has several weak points because of its retrospective nature, such as the lack of data of the quality of life using validated questionnaires.

Finally, we, in an Eastern country, do not have much experience and definite data in adjuvant and neoadjuvant chemotherapy after LAPG and LATG because laparoscopic procedures are usually applied to the early stage of gastric cancer, which usually does not require chemotherapy. However, the laparoscopic approach, leading to lower postoperative morbidity than the open method, might be a good option for gastric cancer patients who have received perioperative chemotherapy or chemoradiation treatment in Western centers.

In conclusion, LAPG will be a good alternative procedure for proximal gastric cancer if the rate of reflux

esophagitis and anastomotic stenosis can be low as LATG. We are planning phase III multicenter prospective randomized clinical trials between LAPG and LATG, which should answer a goodly portion of unsolved questions about proximal gastrectomy.

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