

# Laparoscopic Gastrectomy

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Gastric cancer remains among the top 10 causes of cancer-related deaths for both men and women.<sup>2</sup> Radical surgical resection of the tumor is the only hope for cure in these patients.<sup>2,12</sup>

Officially, the first laparoscopic-assisted distal gastrectomy with a Billroth II gastrojejunostomy was performed by Goh et al in 1992, for the treatment of a complicated peptic ulcer.<sup>34</sup> The first laparoscopic gastrectomy, with a Billroth II reconstruction, for cancer was performed by Kitano et al in 1992 and published in 1994.<sup>35</sup> Subsequently, several authors have reported successful laparoscopic subtotal or total gastrectomy, demonstrating the important postoperative advantages of this procedure. The recommended treatment of distal gastric cancer consists of a radical resection of the distal 4/5 of the stomach with a free margin of 5 to 6 cm.<sup>1-3</sup> The extent of the associated lymph node dissection is still debated. Japanese authors suggest an extended dissection with the routine involvement of D1 and D2 lymph nodes, while an even wider (D3 and D4) dissection is advocated in cases of suspected invasion of more distant lymph nodes.<sup>4-8</sup> Western authors often prefer a limited dissection (D1) because of the higher operative mortality and morbidity rates associated with extended lymphadenectomy (D2),<sup>9-13</sup> even when distal pancreatectomy is avoided, as well as the lack of a significantly improved long-term survival data.<sup>14-18</sup>

In the past decade, laparoscopic techniques have gained wide clinical acceptance in surgical practice. This approach offers important advantages when compared with open surgery: reduced intraoperative blood loss, reduced postoperative pain and accelerated recovery,

earlier return to normal bowel function with earlier resumption of oral intake, early discharge from hospital, and lower financial costs.<sup>19-22</sup>

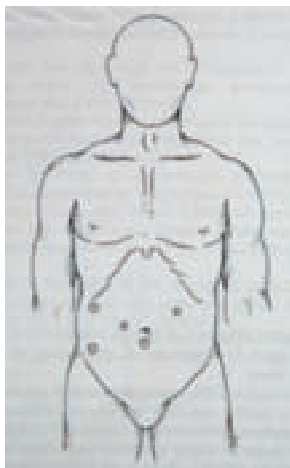
The same advantages have been reported after laparoscopic subtotal or total gastrectomy for benign tumors as well as early gastric cancers.<sup>23-31</sup> However, laparoscopically assisted subtotal gastrectomy for distal gastric cancer can only be justified and widely accepted as a safer alternative to open surgery if equal long-term results are obtained. This would suggest an equivalent radical oncologic resection.

## OPERATIVE TECHNIQUE OF LAPAROSCOPIC DISTAL SUBTOTAL GASTRECTOMY

The procedure is carried out under general anesthesia with endotracheal intubation and epidural analgesia. The patient lies on the table in the supine position, with legs apart and 20° head-up tilt. The surgeon operates in the “French” position with the camera assistant on his left.

### Figure 01

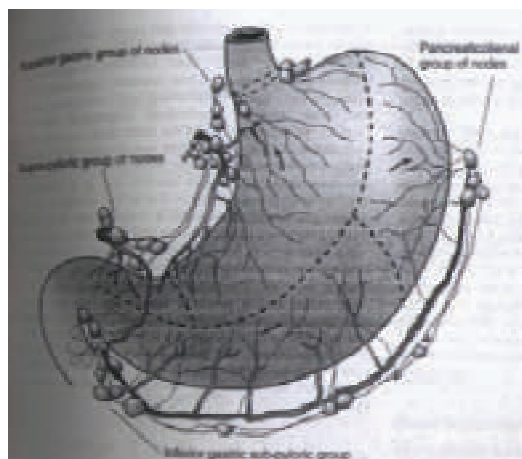
CO<sub>2</sub> pneumoperitoneum is induced after insertion of the first 10/12-mm cannula at the level of the umbilicus, with an open technique. The stomach and the peritoneal cavity are inspected to rule out adjacent organ invasion and peritoneal seeding. Three other trocars are inserted through the abdominal wall, one in the left upper quadrant, one in the right upper quadrant and one in the midline, just below the xyphoid process. At this stage, intraoperative laparoscopic ultrasonography is carried out to scan the liver surface and assess the presence of deep liver metastases.



**Figure 01**

The gastrocolic ligament is divided using the ultrasonic scissors along the border of the transverse colon, thus including the greater omentum in the specimen to be resected. The dissection is continued to the right toward the pylorus to include the group of infra-pyloric lymph nodes (group 6) **Figure 02**. The right gastroepiploic vessels are divided flush with anterior surface of the pancreas, coagulated and divided by the harmonic scissors to avoid inadvertent compromise of lymph nodes. The lymph nodes along the pancreaticoduodenal artery (group 17) may also be removed at this stage. The Kocher maneuver is accomplished, allowing dissection of the retropancreatic nodes (group 13). The first part of the duodenum is dissected and transected with a 35- or 45-mm cartridge endostapler. The lymph nodes of the hepatoduodenal ligament are dissected and removed en bloc. To accomplish the dissection, a cholecystectomy is performed and the elements of the hepatic pedicle (bile duct, left hepatic artery, right hepatic artery, and portal vein) are carefully isolated and encircled with umbilical tapes. Gentle traction on these structures facilitates and expedites the dissection of nodes. The right gastric artery is divided with the ultrasonically activated scissors at its origin from the common hepatic artery. The lymph node dissection is continued to the left along the common hepatic artery (group 8), celiac axis (group 9), left gastric artery (group 7), and proximal splenic artery (group 11b). Residual oozing after lymph node dissection both along the anterior aspect of the pancreas and the lesser omentum is best controlled by argon plasma coagulation. The left gastric vessels are best approached from below after gentle cephalad traction on the stomach with the greater omentum folded up on the anterior aspect of the stomach. The vessels are carefully prepared and separately divided. The dissection of the gastrocolic ligament is continued

toward the spleen; the left gastroepiploic artery is divided either with the harmonic scissors or the endostapler; only the first 2 short gastric vessels are divided using harmonic scissors. Before stomach transection, the cardiac nodes are dissected en bloc: the right cardiac nodes (group 1) are approached continuing the line of dissection of lymph nodes along the left gastric artery. Left cardiac nodes (group 2) are not necessarily dissected for cancer of the distal third of the stomach. When dissected, cephalad traction on the stomach and anterior truncal vagotomy ease the removal of lymphatic tissue. The transection of the stomach and resection of the distal 4/5 of the organ are accomplished by multiple endostapler applications (either 35-mm or 45-mm cartridges).



**Figure 02**

A 50-cm transmesocolic Roux-en-Y loop is prepared and anastomosed side-to-side to the posterior wall of the gastric stump with a single or double application of endostapler (45- vs. 35-mm cartridge). Interrupted intracorporeal sutures close the access opening on the jejunal limb and the gastric stump. A side-to-side jejunojejunal anastomosis at the foot of the Roux-en-Y loop is fashioned by further endostapler application and, finally, the access opening on the jejunal limbs is sutured.

The Billroth II reconstruction is performed similarly: a transmesocolic, isoperistaltic side-to-side gastrojejunal anastomosis on the posterior gastric wall is fashioned by single or double endostapler application, at a distance of 30 cm from the ligament of Trietz. The access opening on the gastric stump and the jejunum is then closed with interrupted 2-0 or 3-0 vicryl sutures. The specimen, inserted into a retrieval bag, is withdrawn through the large-bore cannula.

Despite these encouraging results, at present, many doubts still remain about the ability, during the video-assisted laparoscopic procedure, to satisfy all the oncologic criteria met during conventional, open surgery in gastric cancer patients. In 1999, Shirasihi et al reported a series of 40 laparoscopic assisted Billroth gastrectomies and lymphadenectomies for early cancer of the antrum and gastric body, with no postoperative morbidity and mortality and no recurrence at a mean follow-up of 21 months.<sup>24</sup> In addition, Kitano et al did not observe differences in terms of curability, at a mean follow-up of 21.5 months, in their prospective and randomized series.<sup>27</sup> In 2003, Weber et al published the results of their comparative study between a series of 12 patients affected with a gastric cancer and treated by a laparoscopic gastrectomy, and a series of 13 matched open controls. They did not observe differences between the groups in terms of stage of disease, radical resection, extent of lymphadenectomy, and 18-month survival rates.<sup>37</sup> As far as we know, this is the first prospective and randomized trial comparing 5-year results of subtotal gastrectomy performed for distal gastric cancer with laparoscopic and open approaches. Patients' characteristics were similar, as demonstrated by the lack of differences in demographics, ASA status, pTNM stage, size, and grading of the tumor.

A radical resection was performed in both groups of patients. All specimens were measured at the end of operation, showing a similar length of resection at the level of both lesser and greater gastric curvatures. Free margins of resection were at 5 to 6 cm from the tumor in all patients, as indicated to ensure a low rate of anastomotic recurrence. The mean number of resected lymph nodes was similar in both groups. Thus, the laparoscopic approach did not limit the feasibility of an oncologically correct resection of the gastric tumor and extended lymphadenectomy. Moreover, 5-year overall and free-disease survival rates were not influenced by the surgical approach, confirming the radicality of the laparoscopic resection. As in other laparoscopic procedures, there is important operative and postoperative advantages in LG patients: lower intraoperative blood loss, earlier resumption of oral intake, and earlier discharge from hospital. These results offer a clear answer to our initial question: in experienced hands, laparoscopic-assisted subtotal gastrectomy for distal gastric cancer is a feasible and safe alternative to open, standard gastric resection, with similar short- and long-term results that testify to the oncologic radicality of the procedure. However, laparoscopic gastric surgery is

demanding from a technical point of view, especially when a D2 lymphadenectomy is performed. Adequate training in laparoscopic techniques and procedures is mandatory prior to embarking on a laparoscopic gastrectomy.

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