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ORIGINAL ARTICLE

Laparoscopy: A Procedure no less than Laparotomy for Lymph Node Dissection in Total Gastrectomy for Gastric Carcinoma

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ABSTRACT

Aim: To show that laparoscopic lymph node dissection and harvesting is equal to laparotomic lymph node dissection in patients undergoing total gastrectomy for gastric carcinoma.

Materials and methods: Retrospective data was collected from 36 patients who underwent total gastrectomy for carcinoma stomach. Fifteen patients underwent open total gastrectomy (OG) and other 21 laparoscopic assisted total gastrectomy (LAG) over a period of 4 years from March 2009 to June 2012. In the laparoscopic group, dissection of lymph nodes and division of ligaments and omentum was done laparoscopically using harmonic scalpel. Both groups were compared for operative blood loss, operative time, blood transfusion, morbidity, mortality, the number of harvested lymph nodes (HLNs) with emphasis on harvested lymph nodes.

Results: There were no significant differences in morbidity or mortality in both groups. Tumor free margins were obtained in all cases. Compared with OG group, the LAG group had significantly less blood loss, but a longer operation time. The mean harvested lymph nodes (HLN's) is 24.7 in LAG group as compared 23.3 in OG group.

Conclusion: Laparoscopic dissection and harvested lymph nodes is equivalent to OG with no other significant differences except for decreased blood loss and increased operative time. Thus, this procedure can achieve the same result as OG.

Keywords: Open gastrectomy, Laparoscopic-assisted gastrectomy, Gastric cancer, Harvested lymph nodes.

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INTRODUCTION

While laparoscopic approaches are used for many abdominal procedures and allow for faster recovery of bowel function, better immunologic response and overall accelerated recovery for the patient, the use of laparoscopy for cancer surgery is still a matter of debate. For patients with cancer, questions remain about the immunologic implications of laparoscopic surgery, the adequacy and standardization of laparoscopic techniques, the risk for disease recurrence, and the impact on survival. The safety and efficacy of laparoscopic surgery for colorectal cancer has certainly been established, but the same rigorous approach to other cancers has yet to be reported. Gastric cancer is the fourth most common cancer and the second leading cause of cancer-related deaths worldwide.[1,2] In the Far East countries such as China,[3] Korea[4] and Japan,[5] gastric cancer is the most prevalent malignancy, and the leading cause of cancer-related deaths. Since the first report of laparoscopic gastrectomy in 1992,[6] laparoscopy-assisted gastrectomy (LAG) has been carried out not only in distal gastrectomy, but also in proximal gastrectomy and total gastrectomy.[7-9] Several randomized control trials (RCTs) have shown that LAG can be performed in early gastric cancer (EGC).[10-15] Radical surgical resection of the stomach and regional lymph nodes dissection is still the mainstream of the treatment of AGC. However, LAG for the treatment of advanced gastric cancer (AGC) has remained controversial, mainly due to a lack of evidence from large-scale studies demonstrating that laparoscopic D2 dissection, the standard lymphadenectomy for AGC, is equivalent to open surgery. Recently, some studies have evaluated the outcome of D2 lymph node dissection in LAG and open surgery for gastric cancer.[16-19] In this study, we evaluated operative blood loss, operative time, blood transfusion, morbidity, mortality, the number of harvested lymph nodes (HLNs) with emphasis on HLNs between LAG and OG.

MATERIALS AND METHODS

Retrospective data was collected from 36 patients who underwent total gastrectomy for carcinoma stomach over a period of 4 years from March 2009 to June 2012 in the Department of Surgery SCB Medical College, Cuttack, India. The exclusion criteria included: (1) invasion of adjacent structures; (2) distant metastases; and (3) associated comorbid conditions making unfit to undergo surgery. Routine blood examination, chest X-ray, contrast-enhanced computed tomographic scan of the abdomen and pelvis and endoscopy were performed before operation. Biopsy revealed adenocarcinoma in all cases. The study population thus included 20 cases that successfully underwent radical gastrectomy with D2 dissection. Twenty-one cases underwent LAG and other 15 OG. Mean period of follow-up was 8 months.

OPERATIVE PROCEDURE

Laparoscopy-assisted total gastrectomy with D2 dissection: This procedure was performed for gastric cancer involving more than two-third of the stomach. Under five port approach (Fig. 1) the greater omentum was first dissected, using the harmonic scalpel along the border of the transverse colon. The right gastroepiploic vessel was clipped and cut at its origin with the harmonic; lymph nodes alongside of it were removed. The duodenal tunnel was made and duodenum was divided 2 cm distal to prepyloric vein using linear cutting stapler (Fig. 2). Then the left gastroepiploic vessel was cut, allowing lymph nodes alongside it to be removed. Then the gastropancreatic fold was exposed. Along with the gastroduodenal artery, the common hepatic artery could be skeletonized easily. The right gastric artery was divided and cut at its origin, from the proper hepatic artery to complete dissection of lymph nodes alongside of it. Then the lymph nodes located along the celiac trunk and the left gastric artery was removed. The left gastric artery was cut from the celiac trunk using clips. Then the splenic artery was skeletonized from its origin to the end in order to remove lymph nodes. After returning the stomach and the greater omentum to normal position, the lesser omentum could be resected close to the liver edge (Fig. 3) to the esophagogastric junction, with dissection of lymph nodes. Lastly lymph nodes along the hepatic artery were dissected. After standard D2 dissection was completed, an upper midline incision (about 10 cm) was made. The gastrectomy was performed using knife at the esophagogastric junction (Fig. 4) and esophagojejunostomy was done using circular stapler (Figs 5 and 6) (Ethicon make) and jejunojejunostomy was done to complete Roux-en-y anastomosis.

In open gastrectomy (OG) upper midline incision about 20 cm was given and the procedure is same as LAG.

Postoperatively patients were on Ryle's tube for minimum of 5 days. Oral liquids were started from 6th postoperative day. During surgery, operative time, blood loss, and the amount of blood transfusion were recorded. Postoperative complications, categorized as surgical and nonsurgical complications were observed. Mortality was defined as any death that occurred during hospital stay. The depth of tumor invasion, tumor size, margins, the number of HLNs, and positive lymph nodes were determined by pathological analysis.

RESULTS

There were no significant differences in morbidity or mortality in both groups. Tumor free margins were obtained in all cases. Compared with OG group, the LAG group had significantly less blood loss, but a longer operation time. Since, we were interested in the number of lymph node harvested, the mean HLN's were 24.7 in LAG group as compared 23.3 in OG group.

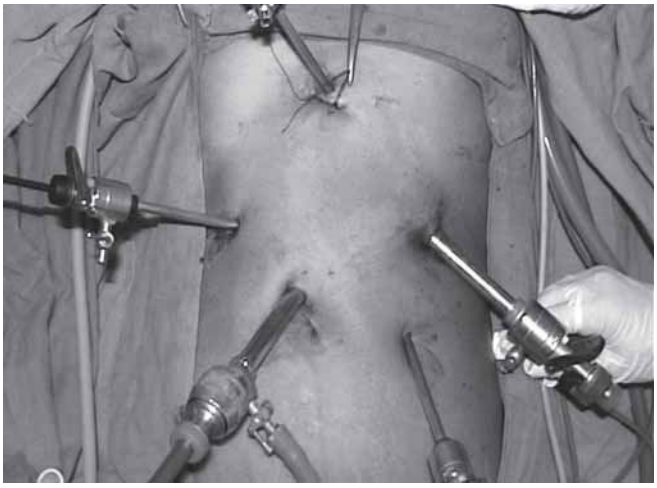

Fig. 1: Port positions in laparoscopic gastrectomy

Fig. 2: Division of pylorus distal to prepyloric vein using linear cutter stapler

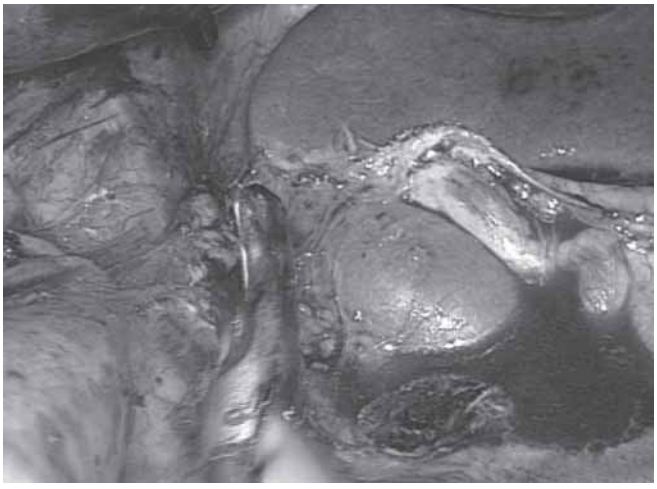

Fig. 3: Division of lesser omentum close to liver edge

Fig. 4: Gastrectomy performed using knife at the esophago-gastric junction

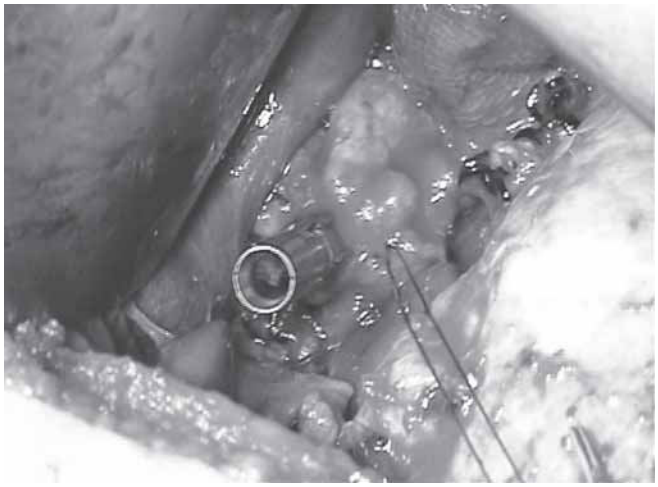

Fig. 5: Anvil placed into the esophagus

Fig. 6: Docking of anvil into circular stapler

DISCUSSION

For the treatment of AGC, surgical procedures include gastrectomy and lymphadenectomy. However, the extent of lymph node dissection has remained controversial worldwide.[19] In Eastern Asian countries such as Japan, China, and Korea, D2 dissection has been the standard operation.[20] However, in Western countries, D2 dissection is thought to be accompanied by significant mortality and morbidity, with no survival advantage.[21-23] Hartgrink et al[22] reported the results of a Dutch gastric cancer group trial in 2004, which included 711 patients who underwent randomly assigned treatment with curative intent (380 in D1 and 331 in D2). Both the postoperative morbidity (25 *vs* 43%, $p < 0.001$) and mortality (4 *vs* 10%, $p = 0.004$) were significantly higher in patients who underwent D2 dissection, while there was no difference in the 11-year overall survival (30 *vs* 35%, $p = 0.53$) between the two groups. Those results were similar to that of the Medical Research Council Gastric Cancer Surgical Trial. [22] However, the conclusions drawn from those two famous RCTs were questioned by Eastern investigators. The main concern was that 80 centers participated in the Dutch gastric cancer group trial, so the mean number of patients who underwent D2 dissection in each center was less than 5. Thus, the discommenders considered it very difficult to perform safe and standard D2 dissections in each center. Unexpectedly, in the 15-year follow-up from the Dutch gastric cancer group trial, published in 2010,[24] the gastric cancer-related death rate of the D2 group was significantly lower than that of the D1 group (37 *vs* 48%, $p = 0.01$), local recurrence was 12% in the D2 group *vs* 22% in D1, and regional recurrence was 13% in D2 *vs* 19% in D1. Thus, the authors recommended D2 dissection as the standard surgical approach for resectable gastric cancer. Currently, more and more evidences have proved D2 dissection as a feasible and safe procedure with survival advantages as compared with the D1 dissection,[25-27] and D2 dissection has been gradually accepted by Western investigators. In the 2010 National Comprehensive Cancer Network guidelines, the panel recommended that gastric cancer surgery should remove D2 lymph nodes with the goal of examining 15 or more lymph nodes. Although, D2 dissection is performed in AGC as a standard procedure, more and more investigators have emphasized the need for D2 dissection in EGC because of preoperative understaging.[28,29] In gastric cancer, laparoscopic surgery has not yet been validated, and thus, was only performed in a limited number of patients with EGC in six small-scale RCTs;[10-13,15] this was due to the difficulties in systematic lymph node dissection, especially in the standard D2 dissection. The number of HLNs is regarded as an important short-term oncological outcome of laparoscopic D2 dissection. Several recent retrospective studies have shown that laparoscopic D2 dissection is both a safe and oncologically feasible procedure, with a similar number of HLNs compared with open dissection.[16-19,28] Du

et al[16] evaluated 82 patients with AGC who underwent laparoscopy-assisted total gastrectomy with D2 dissection compared with 94 patients who received open surgery; a similar number of HLNs was obtained in both groups (34.2 ± 13.5 *vs* 36.4 ± 19.1, p = 0.331). In our hospital we are doing D2 dissection for all cases of gastric cancer. In this study we want to highlight that laparoscopic D2 gastrectomy provides same result as that of open surgery even in terms of HCNs as there is very much debate now over this issue which is also an important prognostic factor.

CONCLUSION

Laparoscopic dissection and harvested lymph nodes is equivalent to OG with no other significant differences except for decreased blood loss and increased operative time. Thus, this procedure can achieve the same result as OG. However, large-scale RCTs with a longer follow-up period should be carried out in future studies to prove that LAG with D2 dissection is a good alternative to OG in selected patients.

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