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Original Research Article

Comparative study between assisted laparoscopic and open D2 distal gastrectomy for gastric cancer

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ABSTRACT

Background: Although laparoscopic gastrectomy has been in use for many years, there was great debate for its technical feasibility and oncological safety. However, with recent advancements of laparoscopic surgical instruments and the accumulation of operative experience, laparoscopic gastrectomy becomes more feasible, and laparoscopic D2 lymphadenectomy has been achieved.
Methods: This study was prospectively conducted from April 2016 to September 2018 on 40 patients presenting with distal gastric cancer to the outpatient clinic of Menoufia University Hospitals. All patients in the study performed radical distal gastrectomy with D2 lymphadenectomy aiming for cure. The patients were divided into 2 groups: group A (20 patients operated upon with open gastrectomy (OG) technique) and group B (20 patients operated upon with the laparoscopic gastrectomy (LG) technique). Both groups were compared in this study regarding operative details, short term post-operative complications and pathological results.
Results: The mean operative time in OG was shorter than LG (p value: 0.04), while there was significant difference between both groups regarding blood loss, mean blood loss in OG was 420.8±87.6 ml and in LG was 283.4±45.9ml, parenteral analgesic requirement was significantly less in LG than OG (p value: 0.04) while no significant difference regarding Intra-operative complications and pathological results.
Conclusions: Assisted Laparoscopic distal gastrectomy with D2 lymphadenectomy is feasible and safe with less post-operative pain and short hospital stay.

Keywords: Distal gastric cancer, Open gastrectomy, Laparoscopic gastrectomy

INTRODUCTION

Although the overall incidence of gastric cancer has been declined, it remains the second leading cause of cancer-related deaths worldwide with the highest incidence in Korea and Japan.[1]

The overall survival rate of patients with gastric cancer has been increased not only due to the early detection with an intensive surveillance programs but also the aggressive surgery approaches including an extensive lymph node dissection. Additionally, the improved perioperative management on the patients has improved the survival rate.[2]

The recommended treatment of operable distal gastric cancer consists of a radical resection of the distal 2/3 of the stomach with a free margin of 5 to 6 cm and D2 lymphadenectomy.[3]

Since the first case of a laparoscopy-assisted gastrectomy was reported by Kitano et al, the number of patients underwent laparoscopic gastrectomy for early gastric cancer (EGC) has been increased rapidly especially in far east countries, where there is a high incidence of EGC.[4]

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 patient satisfaction.[5]

In Egypt, gastric cancer represents 2.1% of all cancer patients, about 1433 cases annually are diagnosed .Most of them have T3 or T4 tumors, many patients receive neoadjuvant therapy therefore this study was undertaken to compare the feasibility of laparoscopic distal gastrectomy to the conventional open technique.[6]

Author aim to compare between open and laparoscopic radical distal gastrectomy in patients with gastric carcinoma regarding post-operative complications and pathological results.

METHODS

Author conducted prospective study including 40 patients diagnosed having distal gastric carcinoma at Menoufia University Hospitals between April 2016 and September 2018. Before the beginning of the study, ethics approval was obtained from the Menoufia University Hospital's Review Board and a written informed consent was obtained from all participants prior to subject characterization and sample collections. Patients were randomly classified into 2 groups using closed envelope method. Patients are allocated randomly to open distal gastrectomy group (20 patients) or laparoscopic distal gastrectomy group (20 patients).

Exclusion criteria

It includes patients with gastrointestinal stromal tumors, patients with metastatic disease, patients unfit for surgery, and patients who refused to participate in the study.

All patients were subjected to history taking, general and local examination and laboratory investigations were performed including CBC, renal functions, liver enzymes and prothrombin time and concentration.

CT abdomen and pelvis with oral and IV contrast, CT chest was done to exclude metastasis, bone scan was performed to one patient with suspicious bone ache to exclude bone metastasis and upper endoscopic examination and biopsy with histopathological examination was done.

Patients were prospectively blindly randomized to undergo an open or laparoscopic surgical approach. Informed written consent was obtained from patients. Single experienced team performed all the procedures.

Operative technique of laparoscopic distal gastrectomy was carried out under general anesthesia; the patient lied on the table in the supine position, with legs apart and 20° head-up tilt. The surgeon operated in "French" position and trocars were inserted (Figure 1).

Figure 1: Trocars sites and the position of the patient and surgeons.

The peritoneal cavity was inspected to rule out liver metastasis, ovarian metastasis, peritoneal seeding and ascites. Then, traction of transverse colon was done and the gastrocolic ligament was divided and the dissection was continued to the left toward the spleen to include (group 4 sb) lymph node and the left gastroepiploic artery was divided using harmonic scalpel.

The upper surface of pancreas was dissected from posterior wall of stomach. Followed by, the dissection then continued to the right toward the pylorus to include infrapyloric lymph nodes (group 6) and the right gastroepiploic vessels were divided.

The first part of the duodenum was dissected and transected with a linear laparoscopic endostapler. The lymph nodes of the hepatoduodenal ligament were dissected and the right gastric artery was divided and the lymph node dissection was 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).

The left gastric vessels were dissected and divided and lymph nodes along lower part of lesser curvature (group 3) were included. The transection of the stomach and resection of the distal 4/5 of the organ were accomplished by multiple endostapler applications (either 35-mm or 45-mm cartridges). A 50-cm transmesocolic Roux-en-Y loop was prepared and anastomosed side-to-side to the posterior wall of the gastric stump with endostapler.

Aside-to-side jejunojejunal anastomosis at the foot of the Roux-en-Y loop was fashioned by further endostapler application and, finally, the access opening on the jejunal limbs is hand sutured. Half of laparoscopic group patients completed the anastomoses laparoscopically but unfortunately due to lack of endostaplers, a 4-cm small midline incision was done, and hand sewn Roux-en-Y anastomosis was performed to the other patients of this group.

Hemostasis was ensured and the drains were inserted and the wound was closed.

In operative technique of open distal gastrectomy, the patient lie on the table in the supine position and proper draping and prepping was done. Then, amid line exploratory incision was done. Then the steps of gastrectomy were completed as mentioned before.

Post-operative management procedure includes close follow up and monitoring. All patients remained NPO until open bowel was ensured and anastomotic leak was excluded, oral feeding was allowed gradually. Intravenous analgesics were given regularly in the first 24 hours every six hours then on demand.

Discharge criteria were met once the patient became generally well, ambulant, tolerating oral feeding, no complications occurred or if any complication happened, the patient was discharged after proper management patient was referred to oncology center to receive adjuvant therapy if needed.

Statistical analysis

The collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 21, SPSS Inc. USA). Data were described using mean and standard deviation (SD) and frequencies according to the type of the data (quantitative or categorical respectively). Chi-square and fisher exact test were used for comparison of qualitative variables. Author used one-way ANOVA test to compare between means of categorical and numerical data. Significance level (p-value) was adopted, i.e., $p<0.05$ for interpretation of results of tests of significance.

RESULTS

There were 40 patients diagnosed having distal gastric carcinoma at Menoufia University Hospitals between April 2016 and September 2018.

20 patients (13 males and 7 females) underwent open gastrectomy (OG) and 20 patients (9 males and 11 females) underwent laparoscopic gastrectomy (LG). Clinical characteristics of patients are summarized in (Table 1). Mean ages at diagnosis were 54.7 (range 41 to 68) years in the OG group and 56.3 (range 39 to 62) years in the LG group, respectively with no significant difference.

The mean operation time for OG group is 150.7±28.4 while in LG group is 180.2±72.1 with significant p=0.04. The mean blood loss intraoperative in OG group is 420.8±87.6 while in LG group mean blood loss is 283.4±45.9 with highly significant (p=0.0001) as shown in (Table 2).

The results of early postoperative period outcomes are shown in (Table 3). There were five complications in OG (25%) and three complications in LG (15%) but no difference between the two groups complications (p=0.3). The details of complications including wound infection, anastomosis leak, wound dehiscence, and bleeding are shown in (Table 3). There was one case of mortality in the LG group and one cases mortality in OG group. One patient in the open group developed anastomosis leakage on the 5th day of the postoperative period.

There were significant differences in parenteral analgesics, as LG group needs less analgesics than OG group (OG; 4.9±2.1 vs LG; 3.1±0.5) with significant p=0.04. Patients undergo laparoscopic gastrectomy start oral intake earlier than OG group (LG;.4.1±1.1 vs OG; 5.8±1.9) with significant p-value (0.03). Length of hospital stay is less in LG group than OG group (LG; 6.9±1.6 vs OG 8.8±3.2) with significant p-value (0.02). as shown in (Table 4).

Table 1: General characteristics of the studied groups.

Parameters		Open gastrectomy (20)		Laparoscopic gastrectomy (20)		χ^2	P value
		No	%	No	%		
Age (mean±SD)		54.7±4.3		56.3±5.9		1.6*	0.9
Sex	Male	13	65.0	9	45.0	1.6	0.2
	Female	7	35.0	11	55.0		

Table 2: Characteristics of the procedure.

Parameters	Open gastrectomy (20)	Laparoscopic gastrectomy (20)	t-test	P value
	Mean±SD			
Operation time	150.7±28.4	180.2±72.1	2.27	0.04
Blood loss	420.8±87.6	283.4±45.9	13.4	<0.001

Table 3: Post-operative complications.

Parameters	Open gastrectomy (n=20)		Laparoscopic gastrectomy (n=20)		Fisher exact test	P value
	N	%	N	%		
Wound infection	3	15.0	1	5.0	1.1	0.3
Wound dehiscence	1	5.0	0	0.0	1.03	0.3
Leak	1	15.0	0	0.0	1.03	0.3
Bleeding	0	0.0	1	15.0	1.03	0.3
Mortality	1	5.0	1	5.0	-	-

Table 4: Recovery period.

Parameters	Open gastrectomy (n=20)	Laparoscopic gastrectomy (n=20)	χ^2	P value
	Mean ±SD			
Parenteral analgesia	4.9±2.1	3.1±0.5	3.9	0.04
Time to start oral feeding	5.8±1.9	4.1±1.1	3.2	0.03
Hospital stay	8.8±3.2	6.9±1.6	2.4	0.02

The number of harvested lymph nodes (23 nodes in OG and 24 nodes in LG, p=0.2) and positive lymph nodes (5.9 nodes in OG and 6.1 in LG, p=0.5). No positive surgical margin between two groups.

DISCUSSION

The study revealed significant difference between both groups regarding mean operative time; it was longer in the laparoscopic group (180.2±72.1) than open group (150.7±28.4), this finding agree with Siani et al and Jeong et al.[7,8] This significant difference was due to laparoscopic gastrectomy is more technically demanding than open gastrectomy and may result from the learning curve associated with the procedure. Further development in surgical techniques, especially for anastomosis and new instruments, may further decrease the operation time for laparoscopic gastrectomy.

Kim et al and Linder et al recorded that intra operative blood loss was lower in laparoscopic group than open; this finding is consistent with the results of this study.[9,10] The reason for less intraoperative blood loss in laparoscopic gastrectomy than open gastrectomy may be due to magnification equipments that can benefit the surgeons with a broader perspective view to better control the bleeding of small blood vessels and due to the introduction of an ultrasound knife and ligasure devices that may decreased the volume of bleeding and the difficulty of tissue separation experienced in laparoscopic surgery.

Intra operative bleeding from slipped clipping of left gastric artery and injured portal vein occurred in two patients during laparoscopic gastrectomy, conversion to open procedure was done to control bleeding. Both patients were excluded from the results.

No significant differences between both groups regarding early post-operative complications, wound infection occurred in 3 cases in OG and one case in LG and was managed conservatively with daily dressing and proper antibiotics. Also one case in OG developed wound dehiscence that was closed after proper debridement. Minor anastomotic leak happened in one patient in OG and was managed conservatively. Postoperative bleeding occurred in one patient in LG exploration was done that revealed slipped clips of left gastroepiploic artery that was controlled.

The results revealed a statistically significant reduction of postoperative pain judged by the time patients needed to control their pain by parenteral analgesics between the open (mean time 4.9±2.1d) and laparoscopic group (mean time 3.1±0.5d), Topal and his colleagues emphasized that conventional large incisions can be more traumatic than the actual procedure and contribute to adverse metabolic responses seen in the perioperative period.[11]

The results of this study showed significant differences between both groups regarding the start of oral feeding and days of hospital stay: LG patients start oral feeding earlier and their hospital stay was shorter in this group, this finding has been reported by Viñuela et al and Siani et al.[7,12]

Detailed pathological studies of the resected specimens in this study revealed no statistically significant difference in the number of lymph nodes harvested with the mean number of total lymph nodes harvested in LG was (24.1±3.9) and open groups (23.9±4.2). Surgical removal of at least 15 lymph nodes is advocated in gastric cancer. The mean number of harvested lymph nodes in both groups was more than 15. The surgical approach did not

appear to influence the lymph node yield; these results similar to Lee et al results.[13]

Other studies with longer period of follow up are recommended to detect long term complications and oncological safety of the procedure.

CONCLUSION

Assisted laparoscopic distal gastrectomy with D2 lymphadenectomy is feasible and safe with less post-operative pain and short hospital stay.

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REFERENCES

1. Jung KW, Park S, Kong HJ, Won YJ, Boo YK, Shin HR, et al. Cancer statistics in Korea: incidence, mortality and survival in 2006-2007. J Korean Med Sci. 2010;25(8):1113-21.
2. Kodera Y, Fujiwara M, Ohashi N, Nakayama G, Koike M, Morita S, et al. Laparoscopic surgery for gastric cancer: a collective review with meta-analysis of randomized trials. J Am Coll Surgeons. 2010;211(5):677-86.
3. Park DJ, Han SU, Hyung WJ, Kim MC, Kim W, Ryu SY, et al. Long-term outcomes after laparoscopy-assisted gastrectomy for advanced gastric cancer: a large-scale multicentre retrospective study. Surg Endo. 2012;26(6):1548-53.
4. Kitano S, Iso Y, Moriyama M, Sugimachi K. Laparoscopy-assisted Billroth I gastrectomy. Surg Laparo Endo. 1994;4(2):146-8.
5. Park CH, Song KY, Kim SN. Treatment results for gastric cancer surgery: 12 years' experience at a single institute in Korea. Euro J Surg Oncol. 2008;34(1):36-41.
6. EL Bolkainy MN, Nouh M, EL Bolkainy T. Breast cancer in Topographic pathology of cancer. 2005: 5-32.
7. Siani LM, Ferranti F, De AC, Quintiliani A. Completely laparoscopic versus open total gastrectomy in stage I-III/C gastric cancer: safety, efficacy and five-year oncologic outcome. Minerva Chirurgica. 2012;67(4):319-26.
8. Jeong O, Jung MR, Kim GY, Kim HS, Ryu SY, Park YK. Comparison of short-term surgical outcomes between laparoscopic and open total gastrectomy for gastric carcinoma: case-control study using propensity score matching method. J Am Coll Surg. 2013;216(2):184-91.
9. Kim HS, Kim BS, Lee IS, Lee S, Yook JH, Kim BS. Comparison of totally laparoscopic total gastrectomy and open total gastrectomy for gastric cancer. J Laparo Endo Adv Surg Tech. 2013;23(4):323-31.
10. Linder BJ, Frank I, Cheville JC, Tollefson MK, Thompson RH, Tarrell RF, et al. The impact of perioperative blood transfusion on cancer recurrence and survival following radical cystectomy. European Urol. 2013;63(5):839-45.
11. Topal B, Leys E, Ectors N, Aerts R, Penninckx F. Determinants of complications and adequacy of surgical resection in laparoscopic versus open total gastrectomy for adenocarcinoma. Surg Endo. 2008;22(4):980-4.
12. Viñuela EF, Gonen M, Brennan MF, Coit DG, Strong VE. Laparoscopic versus open distal gastrectomy for gastric cancer: a meta-analysis of randomized controlled trials and high-quality nonrandomized studies. Annals Surg. 2012;255(3):446-56.
13. Lee MS, Lee JH, Park DJ, Lee HJ, Kim HH, Yang HK. Comparison of short-and long-term outcomes of laparoscopic-assisted total gastrectomy and open total gastrectomy in gastric cancer patients. Surg Endo. 2013;27(7):2598-605.

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