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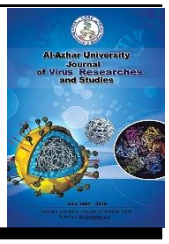

Role of Laparoscopy in Assessment of Resectability and Resection of Gastric Cancer

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Abstract

Treatment options for gastric cancer (GC) are based on tumor staging. Although only surgery provides improved survival, resection should be avoided in the presence of intra-abdominal disease (liver, peritoneal, or non-local lymph node metastases). The aim of the study to clarify laparoscopy role in management of gastric cancer either for complete resection of the tumor in respectable cases or to detect irresectable cases. 30 patients with Gastric cancer who presented to surgical oncology unit in Al-Azhar University hospitals were divided into two groups to compare open versus laparoscopic gastrectomy. The sensitivity of laparoscopy for detection of distant metastases was 88.1%, specificity 100% and accuracy 95.7%, sensitivity of laparoscopy for detection of peritoneal metastases was 88.3%, specificity 100% and accuracy 95.4%, sensitivity of laparoscopy for detection of Lymph node metastases was 55.2%, specificity 100% and accuracy 66.1%. Laparoscopy use especially staging laparoscopy in gastric cancer complements preoperative imaging studies characterized by their limited ability to identify regional extension of the primary tumors and/or metastatic/peritoneal disease.

Keywords: Gastric cancer, Prospective, Resectability, Laparoscopy, Preoperative, Metastases.

1. Introduction

Gastric cancer is the second, after pulmonary cancer, cause of death due to malignant cancers in the world. In Egypt, cancer stomach is in the eleventh rank constituting 2.1% of all cancers with age-standardized incidence rates (ASRs) 2.3/10.0000. This is compared to a median age of 70 years in the USA. The cumulative risk of developing gastric cancer from birth to age 74 is 1.87% in males and 0.79% in females worldwide [1]. Chronic atrophic gastritis with intestinal metaplasia, peptic ulcer, dysplasia, partial gastrectomy and polyps increases the risk of gastric cancer. Environmental factors which can cause an increase in the risk of occurrence of gastric cancer include, among others, dietary factors, smoking as well as a Helicobacter pylori infection [2]. Symptoms are generally nonspecific may include abdominal pain, weight loss, nausea, decreased food intake due to anorexia, early satiety and weight loss from inadequate calorie intake rather than increased

catabolism. Gastric cancer survival rates have steadily improved over the past 40 years thanks to earlier detection and better treatment options [3]. Development of gastric cancer is multifactorial with an interplay involving both infection with Helicobacter pylori and host polymorphisms in a process initiated by specific H. pylori genotypes and the host immune response [4]. Surgical treatment remains the only curative management option. Subtotal or total gastrectomy with regional lymphadenectomy is the standard treatment for resectable gastric cancer. Less invasive gastrectomy with limited lymphadenectomy, such as pylorus-preserving gastrectomy and proximal gastrectomy, has been proposed for Early gastric carcinoma (EGC) that has a low possibility of nodal metastasis and a high probability of cure [5]. Because of the improved outcome achieved with laparoscopic procedures for early gastric cancer, indications for laparoscopic procedures have been expanded from early to advanced gastric cancer [6]. Over the last decade, the use of robot-assisted surgery has increased dramatically. However, long-term role of robotic surgery in treatment of gastric cancer has not been proven using well-designed randomized trials. All available meta-analyses are based on retrospective comparative study designs [7]. Ongoing studies and multi-center registries may determine the best approach to treat gastric cancer [8]. The aim of the study is to clarify the role of laparoscopy in management of gastric cancer either for complete resection of the tumor in resectable cases or to detect irresectable cases to avoid unnecessary exploration. In order to clarify the benefits of laparoscopy, cases done with laparoscopy compared to cases completed with open surgical technique.

2. Patients and Methods

This is a prospective study of 30 patients with Gastric cancer who presented to surgical oncology unit in Al-Azhar university hospitals divided into two groups to compare open versus laparoscopic gastrectomy. This study was approved by Institution Research Board (IRB) of Faculty of Medicine, Al-Azhar University. Confidentiality and personal privacy had been respected in all levels of the study.

2.1 Inclusion criteria and exclusion criteria:

1. No indications of pulmonary, hepatic, or other metastases after preoperative routine chest x-ray, abdominal ultrasound.
2. Upper abdominal CT examination; favorable endurance of the operation; and no tumor directly invading the pancreas, spleen, liver, or colon.
3. Early gastric cancer r (T1, T2, T3<10cmcancer stomach) with lymph node status(N0-N1).

2.2 Study groups:

Patients divided into two groups, Group A for patients underwent laparoscopic resection. Group B for patients went for open gastric resection.

2.3 Surgical strategy:

Lymph node dissection is performed during vascular mobilization according to guidelines taking out lymph nodes en bloc on the side of the resection. Type D1 + lymph node dissection (stations 8a and 9 for DG) is performed for cancer thought to be extending submucosally, and type D2 (stations 8a, 9, 11p, and 12a for DG) is performed for all patients with tumors invading the muscle or with evidence of radiological or macroscopic lymph node involvement (16) Figure. 1. The reconstruction method after DG is as follows: a Billroth I reconstruction by the delta-shaped method is normally performed, but Roux-en-Y reconstruction,

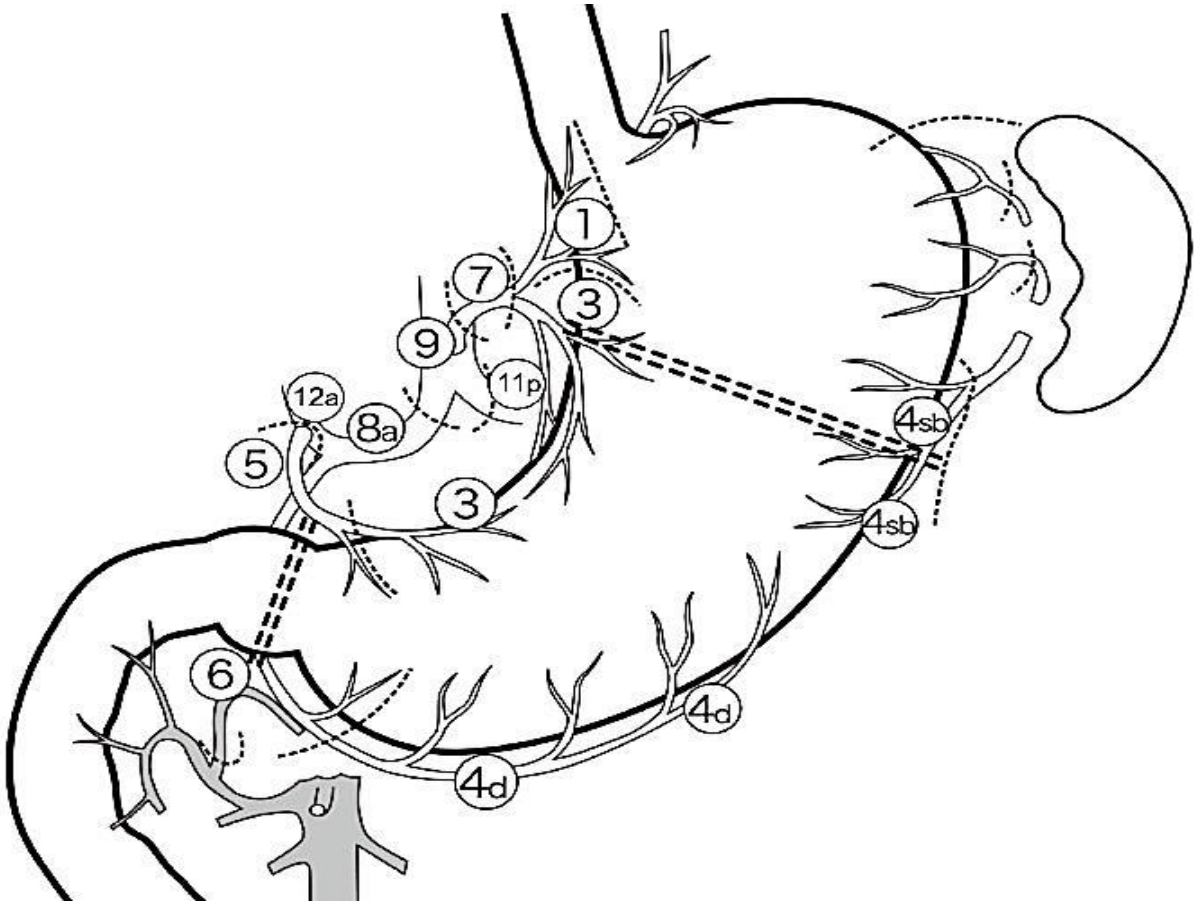

Figure (1): Summary of D2 lymph node dissection targets during distal gastrectomy.

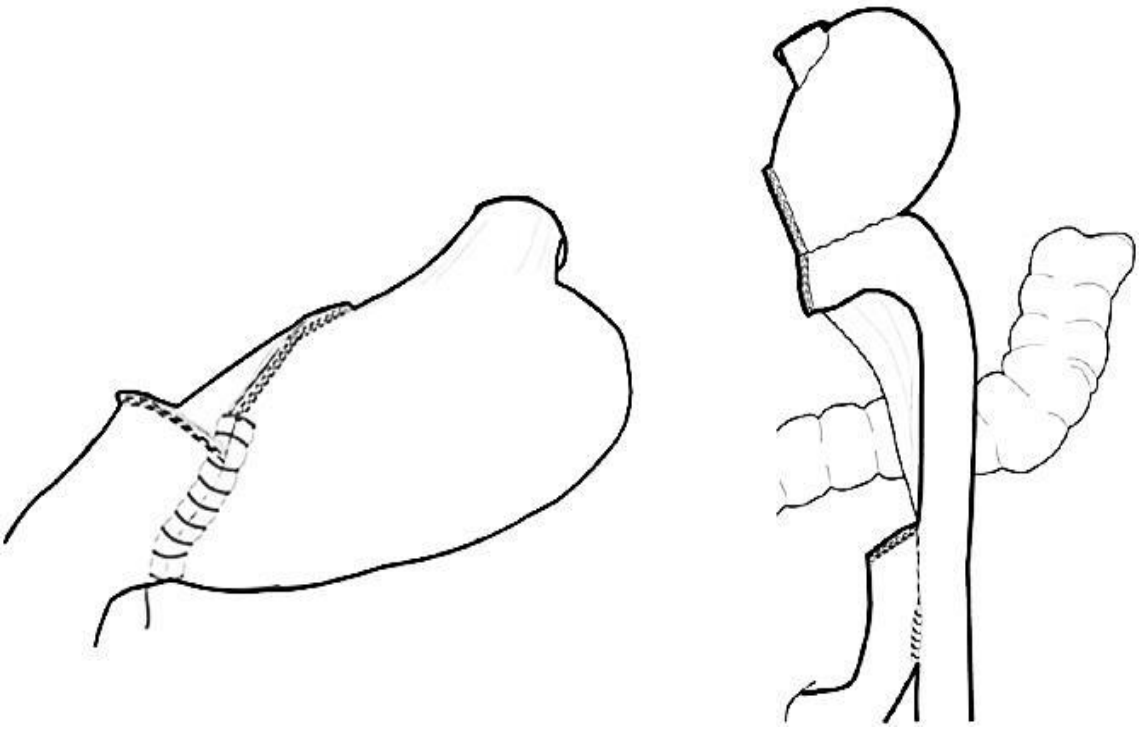

Figure (2): Protocol for intracorporeal stapled Billroth I and Roux-en-Y reconstructions.

which consists of totally mechanical gastrojejunostomy and an intracorporeal side-to-side jejunojejunostomy, is applied for patients with a small remnant stomach or hiatal hernia of the stomach Figure. 2.

2.4 Surgical Procedure:

An incision is made in the gastrocolic ligament just outside the gastroepiploic arcade on the body of the stomach. The left gastroepiploic artery (LGEA) is dissected, clipped, and divided using laparoscopic coagulating shears (LCS) or a sealing device (No. 4sb node dissection). The gastrocolic ligament is divided along the same plane distally toward the right side of the patient and the right gastroepiploic vessels. The No. 4d lymph nodes are dissected in the same process. The right gastroepiploic vein (RGEV) and artery are dissected, clipped, and divided using LCS or the sealing device while dissecting No. 6 nodes in the process**.** Right gastric vein and artery were divided at the base, taking out No. 5 lymph nodes on the side of the resection. The left border of the portal vein can be followed for a No. 12a lymph node dissection. The peritoneum overlying the anterior surface of the pancreas is incised and the dissection is progressed cranially until the anterior surface of the common hepatic artery (CHA). This plane is followed over the artery to dissect the No. 8a lymph nodes. Dissection of the deeper tissues behind the artery leads to the No. 8p lymph nodes. Dissection is continued posteriorly along the anterior surface of the celiac trunk toward the diaphragmatic hiatus for the No. 9 lymph nodes. Extension of this dissection laterally along the splenic artery allows for dissection of No. 11p lymph nodes. Lesser curvature lymph nodes (No. 3 and No. 1 proximally) are separated from the gastric wall of the stomach. A specimen pouch was used to retrieve the specimen with its attached lymph nodes.

2.5 Outcome of the study:

Data were collected for all patients with gastric carcinoma after informed consent and included patient demographics, diagnostic test results, staging, treatment, outcome, and patient satisfaction variables. Comparison between laparoscopic and open management in operative time, bleeding, surgical specimen in regard of proximal and distal safety margin, lymph node included, pathology report, post-operative stay, when patient started adjuvant therapy and outcome are the core of the study.

2.6 Outcome of the study:

Analysis of data was done using Statistical Program for Social Science version 20 (SPSS Inc., Chicago, IL, USA). Quantitative variables were described in the form of mean and standard deviation. Qualitative variables were described as number and percent. In order to compare parametric quantitative variables between two groups, Student t test was performed. P value < 0.05 is considered significant.

3. Results

Table .1 shows that the mean age of the patients at the time of operation were 49.3± 3.61 years for the laparoscopic gastrectomy group versus 53.1 ± 7.4 years for the open gastrectomy group, male percent was higher in open gastrectomy than laparoscopic group with no significant difference between the studied groups as regard age or gender as shown in Figure .3. Comparison between the studied groups as regard TNM stage was shown in Table. 2. and Figure .4. Table. 3 shows that there is high significant difference between the two included techniques as regard duration of surgery, with longer duration in laparoscopic gastrectomy as shown in Figures (5, 6). Table (4) shows that there is high significant difference between the studied techniques as regard operative

blood loss as shown in Figure (7), also their high significant difference between the studied techniques as regard harvested LNs, while there is no significant difference between them as regard LOS or gastrectomy. Table (5) shows that there is significant difference between the two studied groups as regard complication as shown in Figure (8). Table (6) shows that the recurrence-free survival rate for one year was 80% in the LG. Recurrences occurred in 3 (20%) patients in the LG group. Table (7) shows that the recurrence-free survival rate for one year was 66.7% in the OG group. Recurrences occurred in 5 (33.3%) patients in the OG group. Table (8) and figure (9) shows Kaplan-Meier survival curve for Diseases Free Survival. Table (9) shows that sensitivity of laparoscopy for detection of Distant metastases was 88.1%, specificity 100% and accuracy 95.7%, sensitivity of laparoscopy for detection of Peritoneal metastases was 88.3%, specificity 100% and accuracy 95.4%, sensitivity of laparoscopy for detection of Lymph node metastases was 55.2%, specificity 100% and accuracy 66.1%.

Table (1): Demographic data in between the studied groups.

Variable	**Laparoscopic gastrectomy (n=15)**		**Open gastrectomy (n=15)**		**T test**	**P value**
Age: (Years):						
Mean ± SD Range	49.3± 3.61 (38-59)		53.1 ± 7.4 (39-66)		1.7	0.123
	No.	**%**	**No.**	**%**	**χ2**	**P value**
Gender:						
Female Male	8 7	53.3 46.7	5 10	33.3 66.7	1.22	0.26

χ2 is for chi square **P value is significant if <0.05.**

Table (2): Comparison between the studied groups as regard TNM stage.

Variable	**Laparoscopic gastrectomy (n=15)**		**Open gastrectomy (n=15)**		**χ2**	**P value**
	No.	**%**	**No.**	**%**		
TNM stage:						
II III	8 7	53.3 46.7	9 6	60.0 40.0	0.135	0,712

χ^2 for chi square test.

Table (3): Comparison between the studied groups as regard the duration of operation.

Variable	**Laparoscopic gastrectomy (n=15)**	**Open gastrectomy (n=15)**	**t-test**	**P value**
Duration of operation(min):				
Mean ± SD Range	250.4 ± 25.98 180-320	160.2± 20.4 130-235	7.49	**<0.001 (HS)**

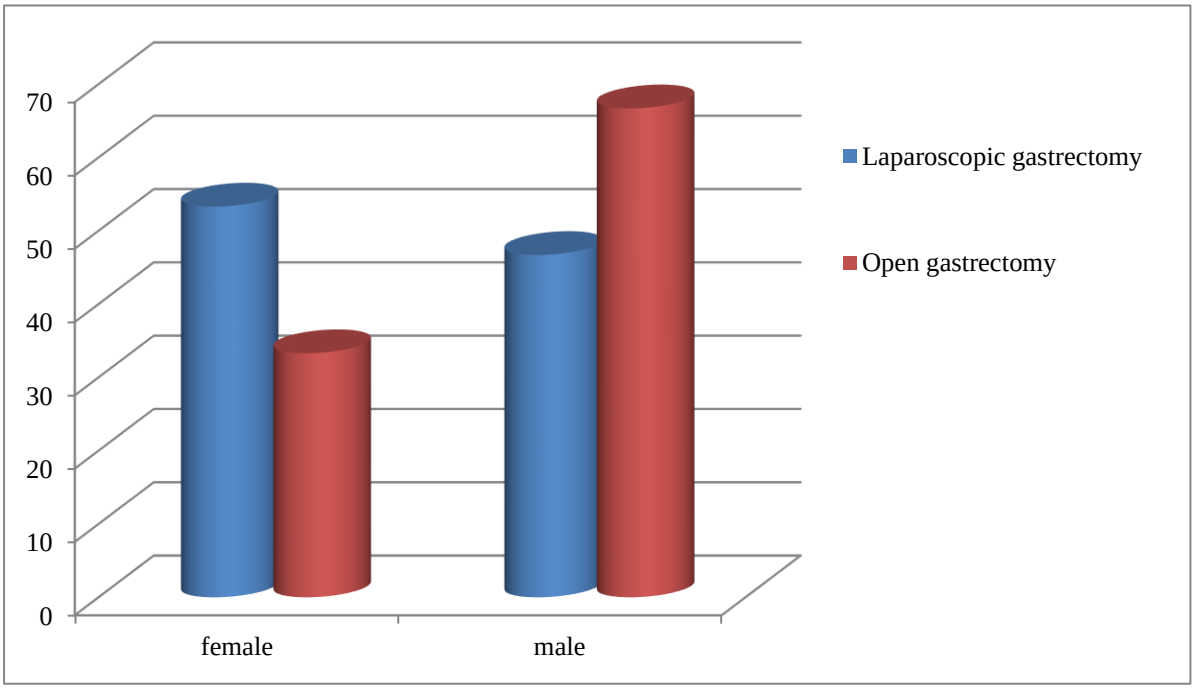

Figure (3): Gender distribution among the studied groups.

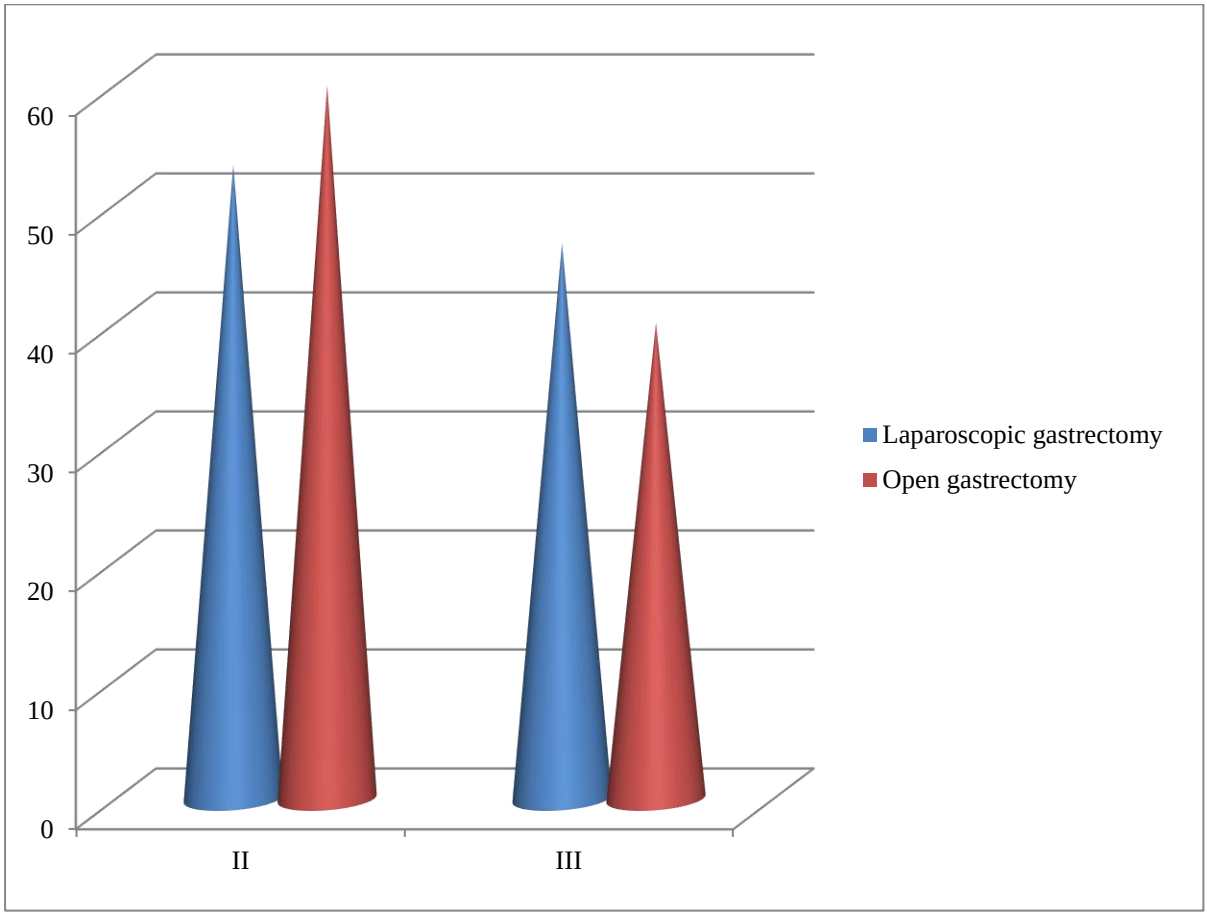

Figure (4): Comparison between the studied groups as regard TNM stage.

Table (4): Comparison between the studied groups as regard perioperative circumstances.

Variable	Laparoscopic gastrectomy (n=15)		Open gastrectomy (n=15)		T test	P value
Length of hospital stay(days):						
Mean ± SD Range	6.1±1.1 4-21		7± 1.61 4-17		1.6	0.23
Harvested LN:						
Median Range	19 11-25		25 18-29		U 55.4	**0.04 (S)**
Operative blood loss ml:						
Mean ± SD	230.3±70.09 130-400		540.75±75.11 340-750		11.70	**<0.001 (HS)**
	No.	**%**	**No.**	**%**	**χ^2**	**P value**
Gastrectomy:						
Distal Proximal Total	9 5 1	60.0 33.3 16.7	7 5 3	46.7 33.3 20.0	1.25	0.535

Table (5): Comparison between the studied groups as regard complications.

Variable	Laparoscopic gastrectomy (n=15)		Open gastrectomy (n=15)		χ^2	P value
	No.	**%**	**No.**	**%**		
Complication:						
Viscus injury	0	0.0	0	0.0	14.0	**0.002 (S)**
Leakage	2	13.3	0	0.0		
Wound infection	0	0.0	4	26.7		
Post-op. bleeding	0	0.0	3	20.0		
Incisional hernia	0	0.0	5	33.3		

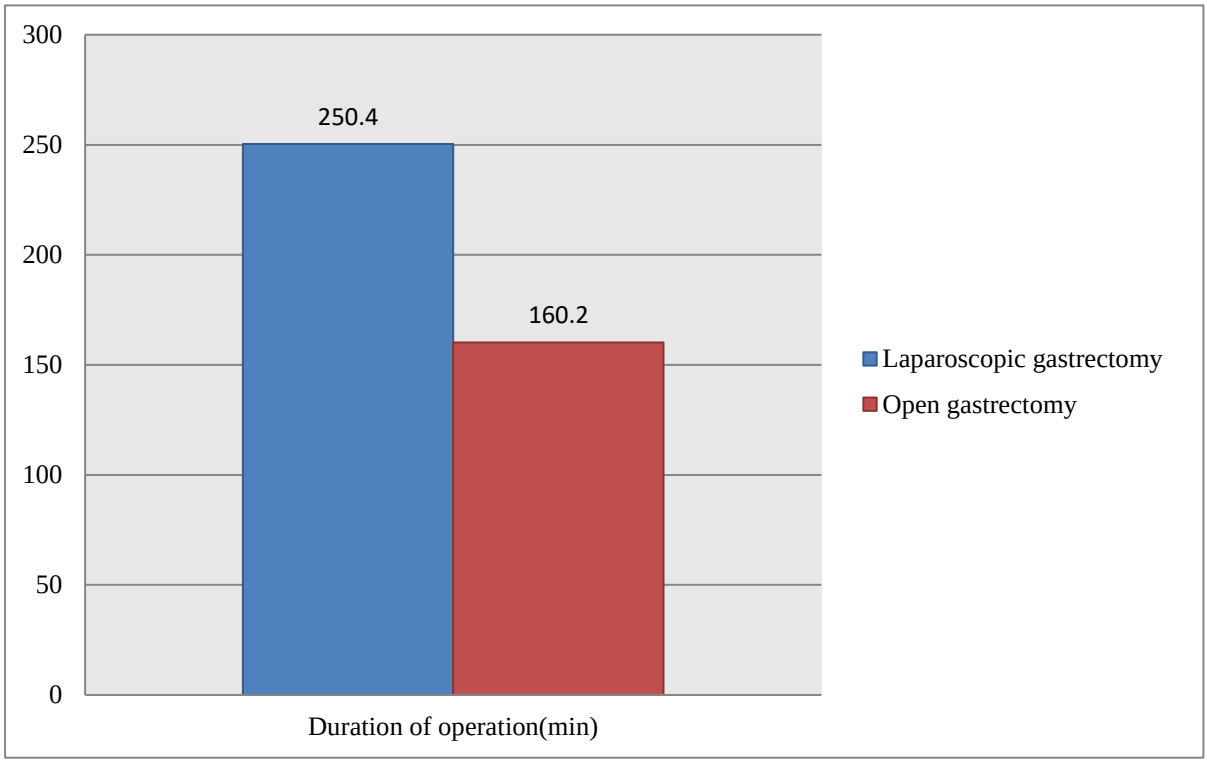

Figure (5): Mean duration of operation of the studied groups

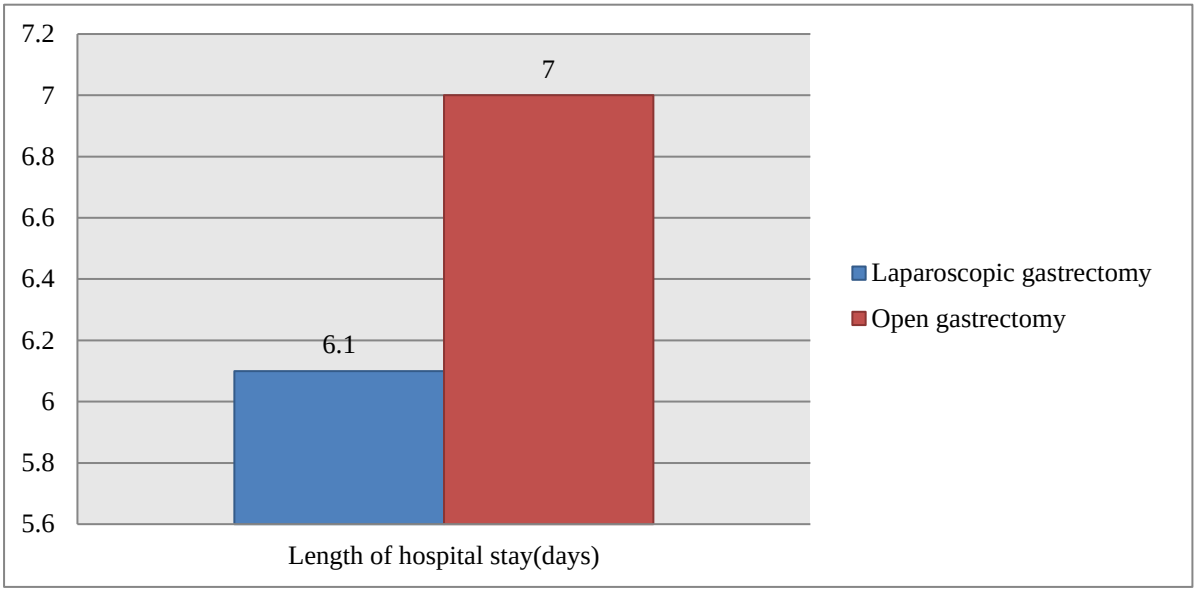

Figure (6): Mean duration of operation of the studied groups.

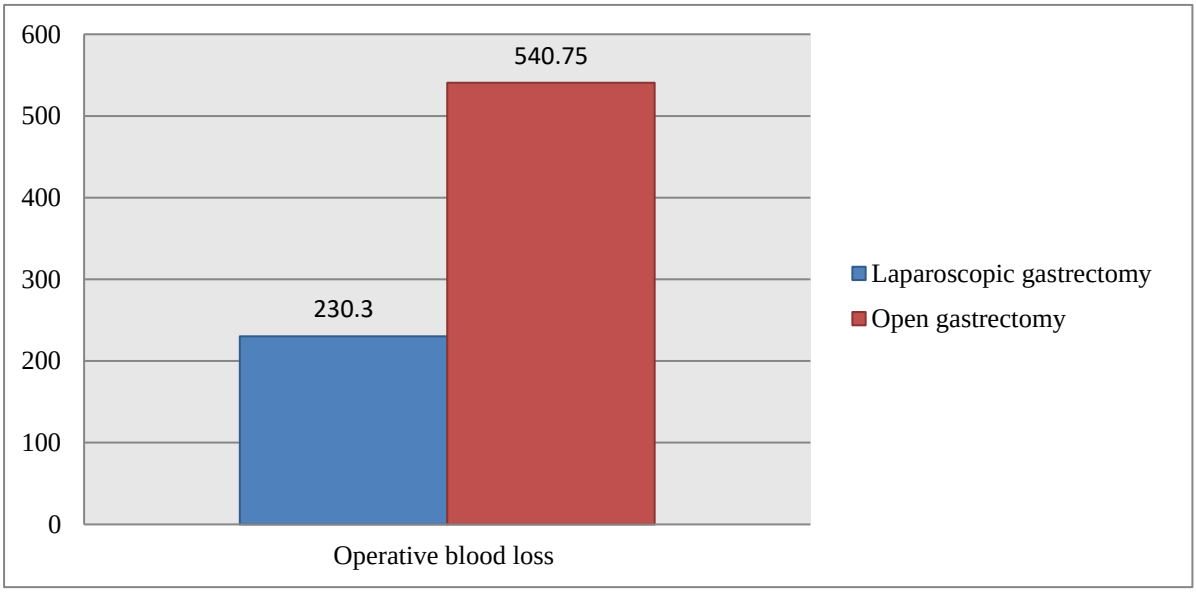

Figure (7): Mean Operative blood loss of the studied groups.

Table (6): Recurrence Free Survival and Over All Survival in Laparoscopic group.

Variable	Recurrence		One Year Recurrence Free Survival (%)		One Year Overall Survival (%)	
	No.	%	No.	%	No.	%
Laparoscopic gastrectomy:						
	3	20.0	12	80.0	14	93.3

Table (7): Recurrence Free Survival and Over All Survival in open gastrectomy group.

Variable	Recurrence		One Year Recurrence Free Survival (%)		One Year Overall Survival (%)	
	No.	%	No.	%	No.	%
Open gastrectomy:						
	5	33.3	10	66.7	13	86.7

Table (8): Kaplan-Meier survival curve for Diseases Free Survival.

	Mean	%	Log rank	
			□□	P
Group A(LG)	11.429	85.7	7.079*	0.008*
Group B(OG)	8.50	50.0		

Table (9): The sensitivity, specificity and diagnostic accuracy of laparoscopy for distant metastases, peritoneal metastases and lymph node metastases.

Variable	Sensitivity	Specificity	Accuracy
	%	%	%
Distant metastases			
	88.1	100.0	95.7
Peritoneal metastases			
	88.3	100.0	95.4
Lymph node metastases			
	55.2	100.0	66.1

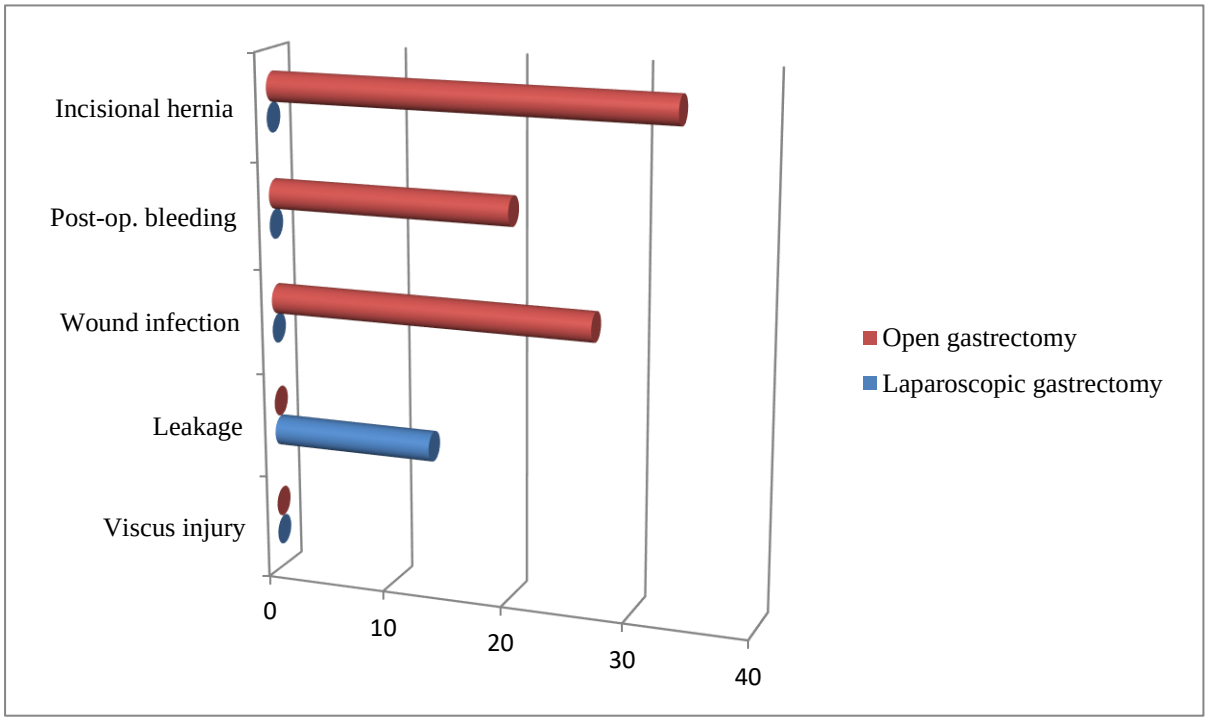

Figure (8): Early onset complication among the studied groups.

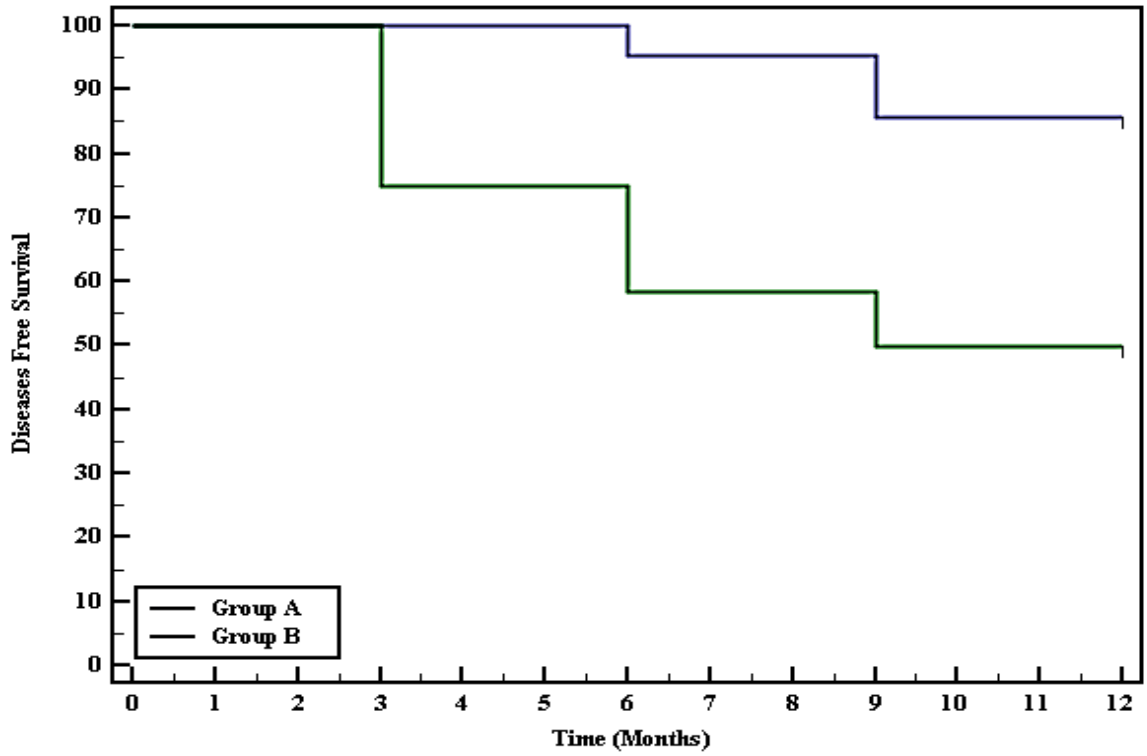

Figure (9): Early onset complication among the studied groups.

4. Discussion

Cervical Gastric cancer is the second, after pulmonary cancer, cause of death due to malignant cancers in the world. There is a geographic diversification in the occurrence of gastric cancer [9]. Unfortunately, the prognosis of patients who undergo curative treatment remains relatively poor, with a 5-year overall survival rate of 20–40%. The main cause for this poor prognosis is tumor recurrence. The poor prognosis, treatment-related morbidity and mortality, and impairments in quality-of-life result in a high disease burden [10]. Worldwide, GC is the 5th most common malignancy in both sexes representing 6.8% of their total with an estimated 950,000 cases in 2012. Incidence rates are about twice as high in men as in women and mortality rates are high in both sexes [11]. Helicobacter pylori infection, male sex, a family history, high intake of salt-preserved foods and dietary nitrite or low intake of fruit and vegetables and smoking were considered risk factors of GC. More than 70% of GCs occur in developing countries particularly in Eastern Asia [12]. Staging laparoscopy (SL) plays a cardinal role in the investigation algorithm of patients with gastric cancer (GC) and helps provide the optimal treatment. The role of laparoscopy in the staging of GC was introduced in the early 1980s [13]. A retrospective analysis of 193 cases by [14] showed that surgery for GC could have been avoided in 42.5% of instances if laparoscopy had been instituted during the initial evaluation. The aim of the study was to clarify the role of laparoscopy in management of gastric cancer either for complete resection of the tumor in respectable cases or to detect irresectable cases to avoid unnecessary exploration. The present study was a prospective analysis of 30 consecutive patients with Gastric cancer who presented to surgical oncology unit in Al-Azhar university hospitals divided into two groups to compare open versus laparoscopic gastrectomy. As regard the demographic characteristics, the present study revealed that the mean age of the patients at the time of operation were 49.3± 3.61 years for the

laparoscopic gastrectomy group versus 53.1 ± 7.4 years for the open gastrectomy group, male percent was higher in open gastrectomy than laparoscopic group with no significant difference between the studied groups as regard age or gender. In accordance with our results, a study of [15] in which comparing the short-term surgical outcomes of 124 patients who underwent LG with those of 124 patients who underwent open gastrectomy, there were 124 cases (81 males and 43 females) included in the LG group with a mean age of 52.7 years old. In line with our study, the study of [16] that aimed to study the clinical-pathological features, treatments and outcomes of gastric carcinoma (GC) in the elderly (⩾65 years) and the non-elderly Egyptian patients and reported that mean ± SD of age of participants is 54.1 ± 12.3, male was 95 (56.5) and Female was 73 (43.5) and there was no statistical significant difference between two groups regard age or sex. Tegels et al. [17] reported in their study that laparoscopic gastrectomy was used in 52 patients [mean age 68 years (± 9, range 50 to 87)] and open gastrectomy was used in 25 patients [mean age 70 years (± 10, range 46 to 85)]. SL prior to gastrectomy has been broadly applied to diagnose peritoneal metastases. Studies evaluating the percentage of patients who benefit from SL are abundant, with percentages varying between 16 and 38% [18]. In the present study, 53.3% of cases in laparoscopic group were stage II and 46.7% were stage III while in open group 60% were stage II and 40% were stage III, and there is no significant difference between the two studied groups as regard TNM stage. In contrast to our findings, the study of [16] reported that most patients presented at an advanced stage i.e., TNM stage III or IV and peritoneal and liver metastases were the commonest sites of metastases. Laparoscopic gastrectomy (LG) has now gained worldwide acceptance as a treatment for early gastric cancer. A large number of non-randomized trials, randomized trials, and meta-analyses have confirmed that LG is safe and feasible, with advantages such as less pain, early recovery, and comparable oncological outcomes with open gastrectomy (OG) [19]. As regard the duration of operation in the two groups, the present study revealed that that there is high significant difference between the two included techniques as regard duration of surgery, with longer duration in laparoscopic gastrectomy. Consistent with our findings, the study of [17] made a comparison between the two techniques and reported that total theatre time utilized was 191 min ± 95 for the open procedure and 286 min ± 65 for the laparoscopic gastric resection ($P < 0.001$). In contrary, the study of [19] revealed that there was no significant difference in operation time between two groups ($P=0.258$). In patients with gastric cancer, surgical resection is the only treatment that can offer cure or increase long-term survival [20], Laparoscopic surgery for gastric cancer has gained popularity despite initial concerns regarding safety and oncological adequacy [21]. Our study showed that there is high significant difference between 2 techniques as regard operative blood loss and Harvested LNs, while there is no significant difference between them as regard either total or partial gastrectomy. Finding showed a significant longer operating time for LADG than for ODG. Longer operations expose patients to a protracted anesthesia, which may increase the morbidity and even mortality rates especially in older patients with comorbidities and also increase the direct cost of the procedure. In line with our results, study of [22] reported that laparoscopic gastrectomy is comparable to open gastrectomy with regard to surgical and oncological outcomes in which four trials were considered suitable for meta-analysis. A total of 82 patients underwent LADG and 80 had ODG. For only one of the eight outcomes, the summary point estimates favored LADG over ODG; there was a significant reduction of 104.26 ml in intraoperative blood loss for LADG (WMD, −104.26, 95% confidence interval (CI) −189.01 to −19.51; $p = 0.0159$). There

was however a 83.08 min longer duration of operating time for the LADG group compared with the ODG group (WMD 83.08, 95% CI 40.53 to 125.64; p = 0.0001) and significant reduction in lymph nodes harvesting of 4.34 lymph nodes in the LADG group (WMD −4.3, 95% CI −6.66 to −2.02; p = 0.0002). On another hand, our study revealed that that there is significant difference between the two studied groups as regard complication, with least complications rate in laparoscopic group. Similar to our results, the study of [17] reported that laparoscopic gastrectomy was associated with a lower rate of overall complications and major complications, 16 (31%) vs 15 (60%), P = 0.025 and 6 (12%) vs. 7 (28%), P = 0.104 respectively. Anastomotic leakage rates were higher in patients undergoing open gastrectomy than laparoscopic gastrectomy 2 (12%) and 2 (4%) respectively, P = 0.322. The differences in major complications and anastomotic leakage rates were not statistically significant in the prospective series. Also, patients who underwent laparoscopic resection had a shorter length of hospital stay and ICU stay. Metanalysis of [22] showed a higher incidence of perioperative complications after ODG; however, this did not reach statistical significance when compared to LADG. Because laparoscopic surgery avoids a large abdominal incision, this decreases the incidence of postoperative pain, which in turn decreases the incidence of atelectasis, hypoventilation, pneumonia, and coronary ischemia. A number of RCTs and observational studies in a metanalysis of [23] have shown that laparoscopic procedures are associated with less suppression of FVC and FEV1 compared to their open counterpart, in all the RCTs of LADG versus ODG, the authors have observed more cardiorespiratory complications following ODG compared to LADG. Also, the incidence of wound infection is higher for the open cohort because of the larger incision size. The laparoscopic gastric procedure in the meta-analysis of [22] they had been shown that 34% reduction in the relative odds of complications, which although not statistically significant certainly translates into better outcome for the patient and the health care system. This study revealed that recurrence-free survival rate for one year was 80% in the LG. Recurrences occurred in 3 (20%) patients in the LG group, while the recurrence-free survival rate for one year was 66.7% in the OG group and recurrences occurred in 5 (33.3%) patients in the OG group, and there was highly statistically significant difference between two groups as regard recurrence free survival and overall survival. In contrary to our results, the randomized clinical trial of [24] reported that Three-year disease-free survival rate was 76.5% in the laparoscopic distal gastrectomy group and 77.8% in the open distal gastrectomy group, absolute difference of -1.3% and a 1-sided 97.5% CI of -6.5% to ∞, not crossing the prespecified non inferiority margin. Three-year overall survival rate (laparoscopic distal gastrectomy open distal gastrectomy: 83.1% vs. 85.2%; adjusted hazard ratio, 1.19; 95% CI, 0.87 to 1.64; P = .28) and cumulative incidence of recurrence over the 3-year period (laparoscopic distal gastrectomy vs. open distal gastrectomy: 18.8% vs 16.5%; sub hazard ratio, 1.15; 95% CI, 0.86 to 1.54; P = .35) did not significantly differ between laparoscopic distal gastrectomy and open distal gastrectomy groups. Smaller-scale randomized trial of [25] had different findings where it was reported that neither 3-year nor 5-year disease-free survival were significantly different between laparoscopic gastrectomy and open gastrectomy groups. This noninferiority of efficacy, along with the superiority of safety over open gastrectomy, suggests that the indication for laparoscopic distal gastrectomy could be extended to include locally advanced gastric cancer [26]. Staging laparoscopy has been incorporated into the diagnostic strategy for advanced gastric cancer for years, in some therapeutic guidelines SL is recommended for preoperative staging. Historically, the value

of SL has been controversial [27]. Shandall and Johnson [28] wrote, "In gastric carcinoma, the value of laparoscopy is doubtful as a high percentage requires at least palliative surgery". In contrast, Gross et al. [29] wrote, "Laparoscopy is a useful method for the assessment of GC and allows easy biopsy, particularly of peritoneal deposits. Unnecessary laparotomy is avoided, and the morbidity of the procedure is minimal. Finally, our study assessed the efficacy of laparoscopy in detection of distant metastases, peritoneal metastases and lymph node metastases, and revealed that sensitivity of laparoscopy for detection of Distant metastases was 88.1%, specificity 100% and accuracy 95.7%, sensitivity of laparoscopy for detection of Peritoneal metastases was 88.3%, specificity 100% and accuracy 95.4%, sensitivity of laparoscopy for detection of Lymph node metastases was 55.2%, specificity 100% and accuracy 66.1%. Tsuchida et al. [30] determined that "lymph node metastases by CT scan" were significant predictive factors for peritoneal disease by multivariate analysis of 31 SL cases, and sensitivity, specificity, positive predictive factor (PPV), negative predictive factor (NPV) and accuracy for peritoneal disease were 91.9%, 37.9%, 46.7%, 88.7% and 58.0%, respectively, using a total of 231 cases limited to c T3/T4. In gastric cancer, preoperative laparoscopy can avoid unhelpful surgical exploration in the case of peritoneal dissemination of tumor or liver metastases undetected by conventional staging [31]. Moreover, laparoscopic approach offers surgical palliation in certain patient groups [32]. In a previous study of Onate-Ocana et al. [33] the SL sensitivity and specificity for abdominal metastases was 97.6% and 98.5% respectively, and in another study of Conlon [34], the accuracy was 94%. The SL diagnostic accuracy for peritoneal metastases in our patients was 95.4%, close to other published series of Song et al. [35] in which SL diagnostic accuracy for peritoneal metastases was 91.7%; 94% in Yano et al. [36]. The 100% specificity of SL for peritoneal and visceral metastases in our study is due to histopatological intraoperative confirmation of metastases in all patients. The new approaches with neoadjuvant chemotherapy, currently under investigation, will probably enhance and further define the role and the importance of staging laparoscopy in patients with gastric cancer [37]. However, significant limitations exist in the interpretation of our data due to the limited number of published randomized control trials, the small sample sizes to date, and the limited duration of follow-up.

5. Conclusion

In conclusion, staging laparoscopy is a safe and effective staging modality in patients with gastric carcinoma. It avoids unnecessary laparotomies in a significant number of patients and should be mandatory if neo-adjuvant treatment is planned. Laparoscopic gastrectomy was associated with significantly decreased blood loss and fewer postoperative complications, earlier hospital discharge, and early mobilization with decreased requirement for analgesia, but at the expense of a significantly longer operating time and fewer lymph nodes retrieval.
Based on our results we recommend for further studies on larger sample size to reemphasize our conclusion. We recommend for multicenter randomized control trials based mainly on the long-term results.

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