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Original Research

Assessment of Anatomy and influence of the splenic artery in laparoscopic spleen-preserving splenic lymphadenectomy: An observational study

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ABSTRACT:
Background: Assessment of the anatomy and influence of the splenic artery in laparoscopic spleen-preserving splenic lymphadenectomy**. Materials & methods:**100 patients with presence of upper- or middle-third gastric cancer who underwent laparoscopic total gastrectomy with spleen-preserving splenic lymphadenectomy (LTGSPL).Complete demographic and clinical details of all the patients was obtained. All patients underwent abdominal helical CT. The original scanning pictures were used to individually recreate the 3D images via CT (3DCT) of the splenic vessels. The case was regarded as being of the scattered type if the distance was greater than or equal to 2 cm. Then either the concentrated group or the scattered group was given the patients. SPSS software was used to record and analyse each outcome. **Results:** Out of 100 patients, terminal branches of the SpA (Splenic artery) was concentrated type in 66 percent of the patients while it was distributed type in 34 percent of the patients. Significant results were obtained while comparing the type of SpA among patients with concentrated type and distributed type of SpA. Significant results were obtained while comparing the operative time at splenic hilum, blood loss at splenic hilum and number of retrieved LNs among patients and concentrated type and distributed type of SpA. **Conclusion:** Understanding the anatomical characteristics enables surgeons to carry out LTGSPL in a safe and efficient manner. The vascular anatomy of the splenic hilum is complex and variable.
Key words: Splenic Lymphadenectomy, Spleen, Laparoscopic

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INTRODUCTION

In the realm of stomach cancer surgeries, splenectomy has been a contentious topic for many years, particularly for the treatment of proximal gastric cancer. For a D2 LN dissection during a total gastrectomy, the splenic hilar lymph node (LN) needs to be excised. Moreover, up to 26% of patients with proximal or whole stomach cancer had LNs along splenic arteries or splenic hilar region LN involvement. It has been established that pancreas-preserving total gastrectomy with splenectomy has the same long-term surgical outcomes as pancreato-splenectomy while having a lower rate of postoperative morbidity, despite the fact that pancreato-splenectomy was previously recommended for the complete removal of LNs along the splenic vessels or at the splenic hilum.[1-3]

Pancreas-preserving total gastrectomy has been shown to substantially increase morbidity and mortality, in addition, it is also suggested that splenectomy during gastrectomy might not improve the prognosis or even adversely affect on survival in patients with gastric cancer. As an alternative of pancreas-preserving total gastrectomy, spleen-preserving total gastrectomy has been applied and recommended for the treatment of proximal gastric cancer. The majority of surgeons currently solely use laparoscopic surgery for treating early-stage gastric cancer patients; splenectomy is not advised during laparoscopic gastric cancer surgeries.[4-6]Hence; the present observational study was conducted with the aim of assessing anatomy and influence of the splenic artery in laparoscopic spleen-preserving splenic lymphadenectomy.

MATERIALS & METHODS

The present observational study was conducted in the department of general surgery and human anatomy with the aim of assessing anatomy and influence of the splenic artery in laparoscopic spleen-preserving splenic lymphadenectomy.100 patients with presence of upper- or middle-third gastric cancer who underwent laparoscopic total gastrectomy with spleen-preserving splenic lymphadenectomy (LTGSPL).Complete demographic and clinical details of all the patients was obtained. All patients underwent abdominal helical CT. The original scanning pictures were used to individually recreate the 3D images via CT (3DCT) of the splenic vessels. The instance was classified as concentrated type when the SpA split into its terminal branches less than 2 cm from the splenic hilum. The case was regarded as being of the scattered type if the distance was greater than or equal to 2 cm. Then either the concentrated group or the scattered group was given the patients. According to the recommendations of the Japanese Classification of Gastric Carcinoma, a splenic hilar lymphadenectomy was carried out. The splenic hilar LNs were dissected. Dissection of the LNs at the SpA trunk was the next phase. Dissection of the LNs in the spleen's superior pole region is the third phase. The splenic hilar lymph nodes are then thoroughly dissected. SPSS software was used to record and analyse each outcome.

RESULTS

Out of 100 patients, terminal branches of the SpA (Splenic artery) was concentrated type in 66 percent of the patients while it was distributed type in 34 percent of the patients. Significant results were obtained while comparing the type of SpA among patients with concentrated type and distributed type of SpA. Mean SGAs among patients of the concentrated type and distributed type of SpA was 3.68 and 3.61 respectively. Mean operative time at splenic hilum was 22.13 minutes and 27.35 minutes among patients of the concentrated type and distributed type respectively. Mean blood loss at splenic hilum was 13.36 ml and 18.42 ml respectively. Significant results were obtained while comparing the operative time at splenic hilum, blood loss at splenic hilum and number of retrieved LNs among patients and concentrated type and distributed type of SpA.

Table 1: Vascular anatomy of the splenic hilum in the two groups

Variable		Terminal branches of the SpA		p-value
		Concentrated type	Distributed type	
Type of SpA	Single branch	9	0	0.001 (Significant)
	2-branched	49	31	
	3-branched	8	3	
SpA along the pancreas	Type I	18	10	0.328
	Type II	41	22	
	Type III	4	1	
	Type IV	3	1	
Mean no. of SGAs (Short gastric arteries)		3.68	3.61	0.468

Table 2: Comparison of intraoperative variables

Intraoperative variables	Terminal branches of the SpA		p- value
	Concentrated type	Distributed type	
Operative time (mins)	174.3	175.6	0.158
Operative time at splenic hilum (min)	22.13	27.35	0.001*
Blood loss at splenic hilum (ml)	13.36	18.42	0.000*
No. of retrieved LNs	39.12	45.87	0.002*

*: Significant

DISCUSSION

Since the first report of laparoscopic-assisted distal gastrectomy (LADG) for early gastric cancer, laparoscopic surgery for gastric cancer has been shown to be an effective modality, with significant advantages over open surgery, including a smaller surgical incision, reduced intraoperative bleeding, less postoperative pain, faster recovery of bowel function, a shorter hospital stay, faster return to daily activities, and improved quality of life. The indications for laparoscopic gastrectomy have been extended to include patients with advanced gastric cancer (AGC).[6-9]Hence; the present observational study was conducted with the aim of assessing anatomy and influence of the splenic artery in laparoscopic spleen-preserving splenic lymphadenectomy.

Out of 100 patients, terminal branches of the SpA (Splenic artery) was concentrated type in 66 percent of the patients while it was distributed type in 34 percent of the patients. Significant results were obtained while comparing the type of SpA among patients with concentrated type and distributed type of SpA. Mean SGAs among patients of the concentrated type and distributed type of SpA was 3.68 and 3.61

respectively. Wang JB et al investigated whether computed tomography with 3D imaging (3DCT) can reduce the risks associated with laparoscopic surgery. They performed a retrospective case-control study evaluating the efficacy of preoperative 3DCT of the splenic vascular anatomy on surgical outcomes in patients undergoing laparoscopic spleen-preserving splenic hilar lymph node (LN) dissection for upper- or middle-third gastric cancer. The mean numbers of retrieved splenic hilar LNs were similar in patients in group 3DCT and group NO-3DCT (2.85 ± 2.33 vs 2.48 ± 2.18, P > 0.05). The operation time and blood loss at the splenic hilum were lower in the patients in group 3DCT (P < 0.05 each). The postoperative recovery time and complication rates were similar between the two groups (P > 0.05 each). Subgroup analysis showed that the operation time at the splenic hilum in patients with a BMI ≥ 23 kg/m(2) was significantly shorter in patients in group 3DCT than in group NO-3DCT (20.27 ± 5.84 min vs 26.17 ± 11.01 min, P = 0.003). In patients with a BMI < 23 kg/m(2), the overall operation time (171.8 ± 26.32 min vs 188.09 ± 52.63 min, P = 0.028), operation time at the splenic hilum (19.39 ± 5.46 min vs 23.74 ± 9.56 min, P = 0.001), and blood loss at the splenic hilum (13.27 ± 4.96 mL vs 17.98 ± 8.12 mL, P = 0.000) were significantly lower in patients in group 3DCT than in group NO-3DCT. After 40 operations, the operation time (18.63 ± 4.40 min vs 23.85 ± 7.92 min, P = 0.000) and blood loss (13.10 ± 4.17 mL vs 15.10 ± 4.42 mL, P = 0.005) at the splenic hilum were significantly lower in patients who underwent 3DCT, but there were no significant between-group differences prior to 40 operations.3DCT is critical for surgical guidance to reduce the risks of splenic LN dissection.[10]

Mean operative time at splenic hilum was 22.13 minutes and 27.35 minutes among patients of the concentrated type and distributed type respectively. Mean blood loss at splenic hilum was 13.36 ml and 18.42 ml respectively. Significant results were obtained while comparing the operative time at splenic hilum, blood loss at splenic hilum and number of retrieved LNs among patients and concentrated type and distributed type of SpA. In another study conducted by Zheng CH et al, authors investigate the splenic hilar vascular anatomy and the influence of splenic artery (SpA) type in laparoscopic total gastrectomy with spleen-preserving splenic lymphadenectomy (LTGSPL).There were 205 patients with a concentrated type (64.7%) and 112 patients with a distributed type (35.3%) SpA. There were 22 patients (6.9%) with a single branch of the splenic lobar vessels, 250 (78.9%) with 2 branches, 43 (13.6%) with 3 branches, and 2 patients (0.6%) with multiple branches. Eighty seven patients (27.4%) had type I splenic artery trunk, 211 (66.6%) had type II, 13 (4.1%) had type III, and 6 (1.9%) had type IV. The mean splenic hilar lymphadenectomy time (23.15 ± 8.02 vs 26.21 ± 8.84 min; P = 0.002), mean blood loss resulting from splenic hilar lymphadenectomy (14.78 ± 11.09 vs 17.37 ± 10.62 mL; P = 0.044), and number of vascular clamps used at the splenic hilum (9.64 ± 2.88 vs 10.40 ± 3.57; P = 0.040) were significantly lower in the concentrated group than in the distributed group. However, the mean total surgical time, mean total blood loss, and the mean number of harvested splenic hilar lymph nodes were similar in both groups (P > 0.05 for each comparison). There were also no significant differences in clinicopathological and postoperative characteristics between the groups (P > 0.05).It is of value for surgeons to know the splenic hilar vascular anatomy when performing LTGSPL.

CONCLUSION

Understanding the anatomical characteristics enables surgeons to carry out LTGSPL in a safe and efficient manner. The vascular anatomy of the splenic hilum is complex and variable.

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