The New Ropanasuri Journal of Surgery

Volume 4 | Number 1 Article 8

6-28-2019

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Recommended Citation

Putranto, Agi Satria and Siahaya, Fransisca Janne (2019) "Factors Related with Complication Following Gastrectomy: Retrospective Analysis based on the Clavien–Dindo Classification System," *The New Ropanasuri Journal of Surgery*: Vol. 4 : No. 1 , Article 8.
DOI: 10.7454/nrjs.v4i1.70
Available at: https://scholarhub.ui.ac.id/nrjs/vol4/iss1/8

New Ropanasuri Journal of Surgery 2019 Volume 4 No.1:31–33.

The New Ropanasuri Journal of Surgery

OPEN ACCESS
Published by Department of Surgery
Faculty of Medicine, Universitas Indonesia

Factors Related with Complication Following Gastrectomy: Retrospective Analysis based on the Clavien–Dindo Classification System

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Email: fransiscajanne@gmail.com Received: 06/Dec/2018 Accepted: 26/Jun/2019 Published: 28/Jun/2019
http://www.nrjs.ui.ac.id DOI: http://dx.doi.org/10.7454/nrjs.v4i1.70

Abstract

Introduction. Surgical resection is the only curative treatment option in the management of gastric cancer. A study carried out and aimed to retrospectively analyze all complications following gastrectomy in accordance with severity of Clavien–Dindo classification, in addition to identify the related factors to postoperative complications.
Method. The cross-sectional study enrolling a total of 35 patients with complete medical records who underwent gastrectomy in Cipto Mangunkusumo General Hospital Jakarta between January 2007 and December 2017. The complications and related factors were evaluated. Statistical analysis was employed to find out the correlation.
Results. Of the 35 patients underwent gastrectomy at Cipto Mangunkusumo General Hospital Jakarta, the median age was 67, and 51.4% were female. Median of preoperative albumin was 3.0 g/dL, intraoperative blood transfusion was 217 mL and intraoperative blood loss was 500 mL. A total of 32 out of 35 subjects (91.4%) underwent partial gastrectomy and three total gastrectomy (8.6%). The incidence of severe complications (stage ≥IIIa) was 25.7% (n = 9). Those requiring surgical intervention caused by pneumothorax (5.7%), intra-abdominal bleeding (2.9%), anastomotic leakage (5.7%), duodenal stump leak (2.9%). Septic shock/death also found (8.5%). Age, intraoperative blood loss, and intraoperative blood transfusion were positively correlated with complication ($p < 0.05$).
Conclusion. In accordance with Clavien-Dindo classification, age, intraoperative blood loss and intraoperative transfusion were correlated with post-gastrectomy complications.

Keywords: *Clavien-Dindo classification, post-gastrectomy complication, gastrectomy*

Introduction

Gastric cancer emerged as a global health problem places the third most frequently diagnosed cancer in male and the fifth in females.[1] To date, the surgical resection referred to the only curative treatment option. In advances to surgical techniques and perioperative management, the incidences of death and complications are decreasing but unfortunately remain unacceptably high at 17.9-40.1%, even in the high-volume hospitals, and their occurrence is influenced by various pre-operative factors.[2-4] The Clavien-Dindo classification (Table 1) was first proposed by Dindo et al. (1992) has been widely used in systematically assessment the severity of complications of various abdominal surgery, including gastrectomy.[4,5]

The modified Clavien-Dindo system employed in the study described as follows:

1. Any deviations from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic and radiological interventions. The allowed therapeutic regimens include antiemetics, antipyretics, analgesics, diuretics, electrolytes, and physiotherapy. This grade also includes wound infections that were opened bedside.
2. Complications that require pharmacological treatment with drugs other than those allowed for grade I complications. Blood transfusions and total parenteral nutrition are also included.
3. Complications that require surgical, endoscopic or radiological interventions
   a. Not under general anesthesia
   b. Under general anesthesia
4. Life-threatening complications (including central nervous system complications) that require treatment in the intensive care unit.
   a. Single organ dysfunction (including dialysis)
   b. Multiorgan dysfunction
5. Death.

In the present study, the modified Clavien-Dindo classification was employed to classify the complications associated with gastrectomy and to find out the related factors. The aim of study was to find out whether the classification may be employed and to find out the complication(s) and related factor.

Method

A cross-sectional study carried out at Cipto Mangunkusumo General Hospital (CMGH) Jakarta in a period of June to August 2018. Subjects whose underwent gastrectomy managed in digestive surgery division RSCM between January 2007 to December 2017 were reviewed. The following inclusion criteria were applied to select the patients enrolled on the study, while as those with incomplete data were excluded. Data collected from the medical record. Complications were identified and classified according to the Clavien-Dindo classification. The analysis of this study proceeded using spearman test to find out the correlation between the variables, which was significant as p value less than 0.05. Committee of ethic Faculty of Medicine, Universitas Indonesia approved the study No 653/UN2.F1/ETIK/2016.

Results

A total of 35 subjects were enrolled in this study. The median age was 67, and 51.4% were female. Median preoperative albumin serum was 3.0 g/dL, median intraoperative blood loss was 500 mL median intraoperative blood transfusion was 217 mL. A total of 32 subjects (91.4%) underwent partial gastrectomy while as 3 (8.6%) underwent total gastrectomy. Subjects characteristics are presented in table 1.

Table 1. Subject characteristics in this present study

Variables	n (%)
Age (years) Median (min-max)	67 (48-87)
Gender	
– Male	17 (48.6%)
– Female	18 (51.4%)
Co-morbidities	
– ≤1 co-morbid	17 (48.6%)
– >1 co-morbid	18 (51.4%)
BMI (kg/m^2)	
– Normal	11 (31.4%)
– Malnutrition	24 (68.6%)
Type of gastrectomy	
– Partial	32 (91.4%)
– Total	3 (8.6%)
Other organ resection	
– Yes	15 (42.9%)
– No	20 (57.1%)
Lymph node dissection	
– Yes	13 (37.1%)
– No	22 (62.9%)
Clavien-Dindo classification	
– Grade <3	26 (74.3%)
– Grade ≥3	9 (25.7%)
Albumin serum (g/dL), median (min-max)	3.0 (2.3-4)
Intra-operative blood transfusion (mL), median (min-max)	217 (0-859)
Intra-operative blood loss (mL), median (min-max)	500 (100-2500)

Documented complications in accordance with the Clavien-Dindo classification is presented in table 2. The incidence of grade ≥3 complications was 25.7% (n = 9). There are three variable showed significant correlation was age (p = 0.04), intra-operative blood loss (p = 0.01) and intra-operative blood transfusion (p = 0.01). Correlation between pre-operative and intra-operative factors and the occurrence of postoperative complications after gastrectomy presented in table 3.

Out of 50 subjects studied, 20 subjects had weight loss during the observation. From 20 subjects who had hospital malnutrition, one subject was from those who did not proceed to surgery, while the rest were those who had undergone surgery. This hospital malnutrition incidence was smaller compared to the previous research conducted in 2007, in which the incidence was 52%. The characteristics of the subjects with and without hospital malnutrition were compared in table 2.

Table 2. Complication(s) according to Clavien-Dindo classification

Grade < 3	n (%)	Grade ≥3	n (%)
Prolonged of parenteral nutrition	3 (8.6%)	Pneumothorax	2 (5.7%)
Post-operative blood transfusion	5 (14.3%)	Intra-abdominal bleeding	1 (2.9%)
Pharmacological supporting therapy	18 (51.4%)	Anastomosis leakage	2 (5.7%)
		Duodenal stump leak	1 (2.9%)
		Septic shock/death	3 (8.5%)
Total	26 (73.3%)	Total	9 (25.7%)

Table 3. Correlation of preoperative factors to Clavien-Dindo Classification

Variable	Clavien-Dindo Classification	
	r	p
Age	0.34	0.04*
Albumin serum	-0.20	0.25
Intra-operative transfusion	0.42	0.01*
Intra-operative bleeding	0.39	0.01*

Discussion

The study descriptively shows the incidence of grade ≥3 complications following gastrectomy was 25.7% (n = 9) at our institution. These findings are concordance with the study conducted in China (2015) showing the incidences of death and complications as high as 17.9-40.1% post-gastrectomy.[2] There is a significant positive correlation between a variable of age with post-gastrectomy complication. Geriatric patients referred to the risk factors to the complication ($r = 0.34$; $p<0.05$). Positive correlation meanings the older the patients are more likely to have a post-gastrectomy complication. Hamakawa et al (2016) found this group of patients often have multiple comorbid, and subject with more than two comorbid has a more significant risk of complication post-surgery.[6]
In the study also showed serum albumin preoperative shows no significant correlation to post-gastrectomy complication ($r = -0.21$; $p = 0.25$); This might be caused by most of subjects has serum albumin level <3.5 g/dL (88.6% ; n = 31) so it could not be determinant factor. Indonesia's national health insurance regulation also limited preoperative albumin transfusion to maximum ≥2.5 g/dL of serum level. It makes most of our patient had albumin serum <3.5 g/dL preoperatively. It is well known that low preoperative serum albumin is a strong predictor of postoperative morbidity. Initial hypoalbuminemia can affect early surgical outcomes irrespective of the replacement of albumin. It is assumed that hypoalbuminemia pre-operative reflects a state of malnutrition.[7]

Variable of intra-operative blood transfusion and intra-operative blood loss shows positive correlation ($r = 0.4$; $r = 0.3$) and statistically significant ($p <0.05$). As much as 65.7% (n = 23) of subjects underwent intra-operative blood transfusion (median 217 mL; 0-859 mL) and all the subjects with grade ≥3 complications underwent intra-operative blood transfusion (500-1800 mL). This related to the type and extension of the procedures performed such as type of gastrectomy, other organ resection and lymph-node dissection. Only a few studies show the correlation of perioperative blood transfusion and intraoperative blood loss in gastric cancer. Study of Park et al (2005) shows a significant correlation between intraoperative blood transfusion to the incidence of complication, while the study of Nakagawa et al (2016) found intraoperative blood loss as an independent risk factor in post-gastrectomy complication.[8,9,10]

Even though in a retrospective study that limited, it was descriptively found the factors that significantly correlated with the complication(s) following gastrectomy with employment of Clavien-Dindo system. Thus, it might be useful to employ the classification in the future direction, and as the guide for surgeon whose working in the field of GI malignancy.

Conclusion

Age, intra-operative blood loss and intra-operative transfusion are positively correlated with post-gastrectomy complication based on the Clavien-Dindo classification

Disclosure

Author disclose there was no conflict of interest.

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