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Short Term Surgical Complications in operable Gastric Cancer According to Clavien–Dindo Classification System

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Abstract **Original Research Article**

Background: Gastric cancer is the fifth most common cause of cancer-related death in Bangladesh. Curative resection remains the main modality of its successful treatment but the rate of postoperative complications is still high. This study was aimed to classify the short-term surgical complications in operable gastric cancer according to Clavien-Dindo (C-D) classification system. ***Methodology:*** Following convenience sampling, 32 patients of operable gastric cancer who underwent gastrectomy in the Department of General Surgery, Bangabandhu Sheikh Mujib Medical University, from July 2019 to June 2020 were observed for their postoperative complication rate, type, and grade by C–D classification system. Data were analyzed with SPSS version 23. ***Result:*** Out of the 32 patients 12 (37.50%) patients developed complications. C-D classification Grade I, II, IIIa, IIIb, IVa and IVb complications were observed in 7(21.9%), 2 (6.25%), 0 (0%), 2 (6.25%), 1 (3.12%) and 0 (0%) cases respectively. Thirty days mortality was 6.30%. ***Conclusion:*** The Clavien-Dindo classification system is an easy and useful tool to evaluate and compare complications following gastric cancer surgery.

Keywords: Short term surgical complications, operable gastric cancer, Clavien-Dindo classification system.

INTRODUCTION

Gastric cancer is the fifth most common malignancy worldwide and the third leading cause of cancer death [1]. Although multi-modal therapy can improve survival of gastric cancer patients, surgery is generally considered as the only treatment modality that can cure it [2]. But the incidence of complications following gastric cancer surgery is still unacceptably high at 17.9- 40.1% [3]. In addition to systemic complications common short term surgical complications following gastric cancer surgery are surgical site infection (SSI), anastomotic failure, duodenal stump leakage, haemorrhage, intrabdominal abscess, paralytic ileus, etc. Variation in complication rates often occurs due to a particular definition of complications by individual researchers. Historically it has been defined as 'local', 'systemic', 'major', 'minor', 'short term', 'long term' etc. To analyze surgical outcomes it is necessary to report complications using a standardized method [4]. It has been observed that an increasing number of studies [5-8] are using the Clavien- Dindo (C- D) classification system proposed by Dindo *et al.*, [9] for assessing the outcome of gastric cancer surgery. It has been considered simple, reproducible, flexible, and applicable irrespective of the cultural background. Moreover it has brought uniformity and has standardized the method of classification of complications.

Despite better facilities, complications following gastric surgery occur even in tertiary level hospitals of our country. Very few studies in

Bangladesh have observed the short term surgical complications following surgery in operable gastric cancer and none have classified them according to any recognised classification system. But classifying complications by an acceptable classification system will provide us a better basis for judging, comparing and improving our practice. This is why this study was designed to observe the incidence and severity of short term surgical complications according to Clavien-Dindo (C- D) classification system.

PATIENTS AND METHODS

This prospective case series study was conducted in the Department of General Surgery, BSMMU over one year from July 2019- June 2020. Any diagnosed case of carcinoma stomach who seemed to be operable after the initial clinical and radiological assessment was targeted for entry in the study but a final assessment for operability was done at laparotomy. Among them, 32 patients those who fulfilled the inclusion criteria and underwent an appropriate surgical procedure (Total or Subtotal gastrectomy) were finally included in the study. Patient's demographic characteristics, preoperative investigation findings, operative and histopathological details were recorded in the data collection sheet. All patients were followed up starting from 1st postoperative day up to one month for any complications. During hospital period complications were managed properly and recorded in datasheet. Later information was collected from follow-up clinic or from their home over the phone to know the patient condition and any new complications. All postoperative complications were recorded individually and then graded according to Clavien–Dindo classification system. Data were analysed by using computer software SPSS-23 (Statistical Package for Social Sciences).

Operational Definitions

- **Operable Gastric Cancer:** Operable gastric cancer is that gastric cancer patient in whom gastric resection was possible with curative intent. The criteria for unresectibility for cure were 1) Locoregionally advanced Disease- a) Infiltration of the root of the mesentery or para-aortic lymph node highly suspicious on imaging or confirmed by biopsy. b) Invasion or encasement of major vascular structures (excluding the splenic vessels) and 2) Distant metastasis or peritoneal seedlings.
- **Short term Surgical Complications:** For this study short term surgical complication was defined as any of the complications from the above dependent variable list that occurred within 30 days of surgery.
- **Severity of Complications:** Clavien-Dindo Classification (Annexure-II) was used to grade the complications following surgery. Complications are regarded as minor if they are of grade I and II and as major if they are of grade III and IV. Grade V complication was shown as 30-day mortality.

Ethical Consideration

According to Helsinki Declaration for Medical Research involving Human Subjects 1964, all the patients were informed about the study design, the underlying research question and the right of the participants to withdraw themselves from the research at any time, for any reason. Informed written consent was obtained from each subject who voluntarily provided consent to participate in this study. Approval for the study was taken from Institutional review board (IRB), BSMMU, Dhaka to carry out this study (Memo no- BSMMU/2019/9325; Date- 3/9/2019).

RESULTS

Table- 1: Distribution of the patients according to demographic characteristics (n=32)

Variable		Number (n)	Percentage (%)
Age	≤ 60	23	71.90
	> 60	09	28.10
Sex	Male	23	71.90
	Female	09	28.10
BMI (kg/m^2)	Underweight	09	28.10
	Normal	20	62.50
	Overweight or obese	03	09.40
Habit of smoking	Yes	18	56.20
	No	14	43.80
Comorbidity	Diabetes mellitus	07	21.90
	Hypertension	06	18.80
	Cardiopulmonary diseases	04	12.50

Out of 32 patients, 23 (71.90%) were aged≤ 60 years and majority of them were male 23 (71.90%).Nine (28.10%) patients were underweight (BMI <18.50 kg/m^2), 18 (56.20%) had a habit of smoking and 17 (53.2%) had a history comorbid diseases. Lower radical gastrectomy was performed in 28 (87.50%) and total gastrectomy was performed in 4 (12.50%) patients.

Table 2: Distribution of patients according to postoperative findings (n=32)

Post-operative events		Number (n)	Percentage (%)
Complications	Yes	12	37.50
	No	20	62.50
30-days mortality	Yes	02	06.30
	No	30	93.70
Postoperative hospital stay (Days) Mean±SD		15.41±06.38	

Table- 3: Distribution of patients according to individual complications, their management and 30-days mortality (n= 12)

Individual complications	n (%)	Management	C-D grade	30-days mortality and day of death	Cause
Anastomotic failure	1 (3.1)	Conservative (required TPN)	II		
Duodenal stamp leakage	1 (3.1)	Operative (under GA)	IIIb	Yes, 13th POD	MODS
Stomal obstruction	1 (3.1)	Operative (under GA)	IIIb		
Minor SSI	4 (12.5)	Conservative	I		
Respiratory complications	1 (3.1)	Conservative	I		
Urinary complications	1 (3.1)	Conservative (antibiotic)	II		
Cardiac complications	1 (3.1)	Conservative	IVa	Yes, 2nd POD	AMI
Prolong ileus	2 (6.3)	Conservative	I		

Complications were observed in 12 (37.50%) cases of the study subjects and 30 days mortality was observed in 2 (6.30%) cases. The mean postoperative hospital stay of the patients was 15.41±06.38 days. Out of 02 deaths one patient died on 2nd POD due to acute myocardial infarction. The other patient developed duodenal stump leakage and underwent 2nd laparotomy on 10th POD. Ultimately he died on 13th POD due to multi-organ dysfunction syndrome.

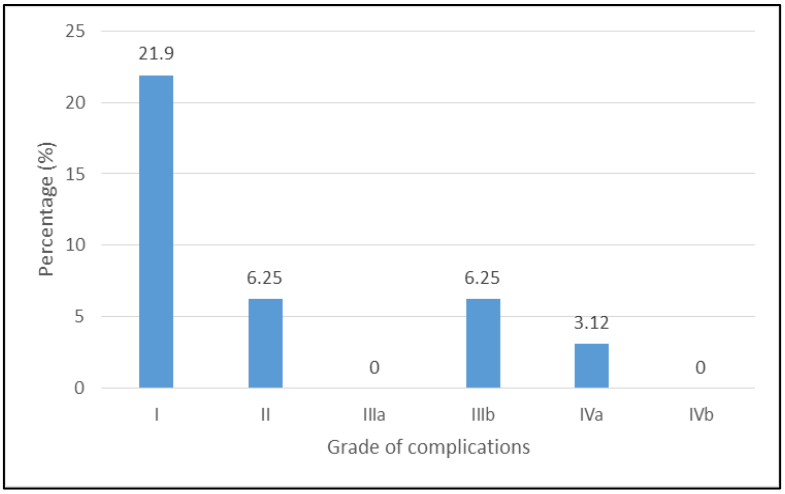

Figure 1: Severity of complications according to C-D classification (n=12)

Grade I, II, IIIa, IIIb, IVa and IVb complications were observed in 7 (21.9%), 2 (6.25%), 0 (0%), 2 (6.25%), 1 (3.12%) and 0 (0%) cases respectively. Minor complications (< IIIa) were observed in 09 (28.15%) patients among which infective complications (SSI) were the commonest followed by prolong ileus. Major complications (IVa and IVb) were observed in 03 (9.37%) patients namely duodenal stump leakage, stomal obstruction, cardiac complication (AMI).

DISCUSSION

The purpose of this prospective case series study was to evaluate the short term surgical complications by Clavien-Dindo (C-D) classification system following surgery for operable gastric cancer. In Bangladesh earlier two studies by Rahman (2014) [10] and Rahaman (2017) [11], each observed 50 patients to measure the incidence of early postoperative complications following surgery for gastric malignancy. Their rate of overall complications was 68% and 32% respectively. In both of their series, most frequent complications were wound infection (30%), followed by acute postoperative hemorrhage (10%). Postoperative mortality in their studies was 4% and 8% respectively. But their evaluation of complications was not by any structured grading system that gives an easy platform to compare with other studies.

In our study among 32 study subjects, 12 (37.50%) cases developed complications. This rate of complications was within the reported range of 20- 46% mentioned in the summary of a most recent systematic review and meta- analysis of 64 follow-up studies following gastrectomy for cancer [12]. According to Clavien- Dindo classification system Grade I, II, IIIa, IIIb, IVa and IVb complications were observed in 7(21.9%), 2 (6.25%), 0 (0%), 2 (6.25%), 1 (3.12%) and 0 (0%) cases respectively. Major complications (Grade III and IV) occurred in 3 (9.37%) cases. The incidence of major complications in our study was lower than 12.4% observed by Lee *et al.*, [8] and 14% observed by Nevo *et al.*, [13] But our overall complications and thereby individual graded complications were higher than those reported in the East- Asian series by Lee *et al.*, [8] Xiao *et al.*, [3] and Yang *et al.*, [14] Their reported overall complications were between 12–15%.

The incidence of Grade V complication, which has been regarded as 30 days mortality in our study was 6.30%. It was also higher than those in the East- Asian series [3, 8, 14] where it is usually less than 1%. Basically, increasing experience and hospital case volume due to the highest incidence of gastric cancer in the world over years has decreased morbidity and mortality following surgery in the East Asian countries, such as Korea and Japan [15, 16]. The mean postoperative hospital stay of our patients was 15.41±06.38 days which was more or less similar to Bruno *et al.*, [14] (12 ± 4.8 days) and Xiao *et al.*, [3] (14.1 ± 4.5 days).

CONCLUSION

Postoperative complications are associated with worse survival among patients with resected gastric cancer. The Clavien-Dindo classification of postoperative complications is an acceptable method to evaluate and compare the surgical complications. So, it can be a better basis for judging, comparing and improving our surgical practice in regards to radical gastrectomy.

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CONFLICT OF INTEREST

All the authors of this study do not have any financial interest or conflict with any industries or parties.

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