Observation of Early Outcome and Complications among Gastric Cancer Surgery Patients

Tanvir Hasan Shoaib[1]*, Girin Chandra Biswas[2], Lt Col Shahajadi Shanjida Parveen[3], Mahnaz Tabassum Prova[4], Md Ekramul Haque[5], Kaselia Fatema[6], Sonia Rahman[7], Md. Nahid Hossen[8]

*[1]Assistant Professor, Department of Surgical Oncology, National Institute of Cancer Research & Hospital, Dhaka, Bangladesh,
Email: dr.shoaib30@gmail.com,
Orcid ID: 0009-0006-3183-0789

[2]Assistant Professor, Department of Surgical Oncology, Sher-e-Bangla Medical College, Barishal, Bangladesh,
Email: girinbiswas@gmail.com,
Orcid ID: 0009-0000-4684-9024

[3]Commanding Officer, 61 Field Ambulance, Dhaka, Bangladesh,
Email: dr.shanjida30@gmail.com,
Orcid ID: 0009-0005-6412-3186

[4]Assistant Professor, Department of Surgical Oncology, Sylhet MAG Osmani Medical College, Sylhet, Bangladesh,
Email: provatabassum@yahoo.com,
Orcid ID: 0009-0006-9608-3593

[5]Medical Officer, Department of Uro-Oncology, National Institute of Cancer Research & Hospital, Dhaka, Bangladesh,
Email: drekram82@gmail.com,
Orcid ID: 0000-0001-7177-2313

[6]Resident, Department of Obstetrics & Gynaecology, Mymensingh Medical College Hospital, Mymensingh, Bangladesh,
Email: kaseliafatema48@gmail.com,
Orcid ID: 0009-0005-5692-9024

[7]Junior Consultant, Department of Surgery, Rupganj Upazila Health Complex, Narayanganj, Bangladesh,
Email: dr.shrahman@yahoo.com,
Orcid ID: 0009-0006-9173-2347

[8]Assistant Surgeon, Department of Medical Oncology, Sheikh Hasina National Institute of Burn and Plastic Surgery, Dhaka, Bangladesh,
Email: nahid003@yahoo.com,
Orcid ID: 0009-0001-5095-5935
*Corresponding author

Abstract

Background Gastric cancer remains a significant public health challenge in Bangladesh, with a high prevalence of habitual risk factors and late-stage diagnoses. This study aims to evaluate the early outcomes and postoperative complications among gastric cancer surgery patients in a resource-limited setting. **Material & Methods:** This prospective, cross-sectional observational study was conducted from July 2017 to March 2019 at the Department of Surgical Oncology, National Institute of Cancer Research and Hospital, Dhaka. Forty patients with biopsy-proven operable gastric carcinoma were selected using purposive non-randomized sampling. Data were collected through clinical evaluations, structured interviews, and case record forms, focusing on demographic characteristics, habitual risk factors, tumor-related features, types of surgery, duration of surgery, hospital stay, and postoperative complications. Statistical analyses were performed using SPSS-22. **Results:** The mean age of participants was 65.16 ± 10.28 years, with a male predominance (70%). Smoking (70%) and beetle leaf consumption (90%) were prevalent habitual risk factors. Distal stomach cancer was more common (65%), with a mean tumor size of 5.00 ± 2.00 cm. Lower radical gastrectomy was performed in 65% of cases. Most surgeries (60%) were completed within 1 to 1.5 hours. Hospital stay durations varied, with 45% staying 11-15 days. Postoperative complications were noted in 52.50% of patients, including wound infections (20%) and urinary tract infections (15%). **Conclusions:** This study highlights the critical need for improved early detection, risk factor mitigation, and postoperative care in gastric cancer management within Bangladesh. These findings provide a foundation for future research and clinical strategies aimed at enhancing patient outcomes in similar resource-limited settings.

INTRODUCTION

Gastric cancer remains a significant public health concern worldwide, ranking as the fifth most common cancer and the third leading cause of cancer-related mortality. The incidence and prevalence of gastric cancer exhibit considerable geographical variation, with higher rates observed in East Asia, including Japan and South Korea, compared to Western countries. In South Asia, including Bangladesh, the burden of gastric cancer is also rising, necessitating focused research and improved clinical management strategies.[1,2] Gastric cancer is a multifactorial disease, with its pathogenesis influenced by a complex interplay of genetic, environmental, and lifestyle factors. Chronic infection with Helicobacter pylori, dietary habits, smoking, and genetic predispositions are well-established risk factors contributing to the development of this malignancy.[3] The pathophysiology of gastric cancer involves a multistep process characterized by the accumulation of genetic mutations and epigenetic alterations leading to the malignant transformation of gastric mucosal cells. This transformation is often preceded by chronic inflammation, atrophic gastritis, intestinal metaplasia, and dysplasia, ultimately culminating in adenocarcinoma.[4] Given the complexity of its etiology and progression, early detection and timely intervention are crucial for improving patient outcomes. Surgery remains the cornerstone of curative treatment for gastric cancer, particularly for early-stage disease. Surgical resection, often combined with perioperative chemotherapy or chemoradiotherapy, has been shown to significantly improve survival rates.[5,6] Despite advances in surgical techniques and perioperative care, the outcomes of gastric cancer surgery can vary widely, influenced by factors such as patient demographics, tumor characteristics, and healthcare infrastructure. Early outcomes post-surgery, including 30-day mortality, survival rates, recovery times, and quality of life, are critical indicators of the effectiveness of surgical interventions. Studies have demonstrated that minimally invasive surgeries, such as laparoscopy-assisted gastrectomy, offer better short-term outcomes and comparable long-term survival rates compared to open surgeries.[7] Additionally, endoscopic submucosal dissection (ESD) has emerged as a valuable option for early gastric cancer, offering less invasive treatment with good oncological outcomes.[8] However, the benefits of these advanced surgical techniques are often tempered by the risk of postoperative complications, which can significantly impact patient recovery and long-term survival. Common complications following gastric cancer surgery include infections, anastomotic leaks, and postoperative bleeding, each associated with varying degrees of morbidity and mortality. Infections, both surgical site and systemic, remain a prevalent complication, necessitating rigorous perioperative infection control measures.[9,10] Anastomotic leaks, one of the most serious complications, require prompt detection and management to prevent severe outcomes.[11] Postoperative bleeding, although less common, also poses significant risks and may necessitate additional surgical or endoscopic interventions.[12] In the context of Bangladesh, the challenges in managing gastric cancer are compounded by the limitations of the healthcare infrastructure. While there has been impressive progress in providing essential surgical services at government-run hospitals,

significant disparities exist between urban and rural healthcare facilities. Sub-district hospitals often lack the necessary surgical capabilities, equipment, and trained personnel, which are more readily available in district/general hospitals.[13] Furthermore, the overall cancer care scenario in Bangladesh is characterized by a shortage of specialized oncology services, limited access to advanced diagnostic and treatment facilities, and inadequate cancer awareness and screening programs.[14,15] These limitations contribute to late-stage diagnoses and poorer outcomes for many cancer patients. Previous studies in South Asia have highlighted similar challenges and underscored the need for region-specific strategies to improve cancer care. In Bangladesh, efforts have been made to address these gaps through initiatives such as the National Cancer Control Strategy and Plan of Action, which aims to enhance cancer care infrastructure and services.[16] Additionally, mobile health (mHealth) interventions have been proposed to bridge the gap in cancer care between rural and urban areas, providing a means to improve early detection and treatment adherence.[17] In summary, while significant strides have been made in the surgical management of gastric cancer, the outcomes and complications of such interventions remain a critical area of study, particularly in resource-limited settings like Bangladesh. This study aims to provide comprehensive observational data on early outcomes and complications among gastric cancer surgery patients in Bangladesh, thereby contributing to the global understanding of gastric cancer management and informing localized improvements in clinical practice and healthcare policy.

MATERIAL AND METHODS

This prospective cross-sectional observational study was conducted from July 2017 to March 2019 at the Department of Surgical Oncology, National Institute of Cancer Research and Hospital (NICRH), Mohakhali, Dhaka. Ethical clearance for the study was obtained from the Institutional Review Board (IRB) of NICRH, ensuring adherence to ethical standards. The study population comprised patients suffering from gastric carcinoma who were admitted to NICRH for operative treatment. A purposive non-randomized sampling technique was employed to select the study sample. The sample size was determined to be 40 patients. Inclusion criteria included patients with biopsy-proven operable gastric carcinoma who were willing to participate in the study. Exclusion criteria encompassed patients with a history of another malignancy, previous gastric surgery, stage IV disease, those unfit for surgery, and those unwilling to participate in the study. Patients presenting with primary gastric carcinoma at the Department of Surgical Oncology, NICRH, were selected based on the predefined inclusion and exclusion criteria. The diagnosis was established through clinical, radiological, and histopathological evaluations. Upon obtaining informed consent, a detailed history and physical examination were conducted for each patient. Data were collected using a structured case record form, which included patient interviews and clinical records. The outcomes of the surgery were measured by assessing postoperative complications and estimating serum albumin levels preoperatively and postoperatively. The collected data were meticulously compiled, sorted, and analyzed using the Statistical Package for Social Science

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(SPSS) version 22. Quantitative data were expressed as frequency, percentage, and mean ± standard deviation (SD). Statistical significance was set at p<0.05. Comparisons of continuous variables between preoperative and postoperative states were made using paired sample t-tests, while comparisons of proportions between different groups were made using Z proportion tests.

RESULTS

The baseline characteristics of the 40 participants in the study are summarized in Table 1. The age distribution showed that the majority of participants were between 56-65 years old (32.50%), followed by those aged 66-75 years (25.00%), 76-80 years (22.50%), and 45-55 years (20.00%), with a mean age of 65.16 ± 10.28 years. There was a higher prevalence of males (70.00%) compared to females (30.00%). The body mass index (BMI) distribution indicated that half of the participants had a BMI in the normal range of 18.5-24.9 kg/m² (50.00%), while 40.00% were in the overweight range of 25-30 kg/m², and 10.00% were classified as obese (BMI >30 kg/m²), with a mean BMI of 24.15 ± 3.30 kg/m². In terms of socioeconomic condition, a significant majority of the participants were from the middle socioeconomic class (70.00%), with the remaining 30.00% from the lower socioeconomic class. There were no participants from the upper socioeconomic class.

The distribution of participants by habitual risk factors is presented in Table 2. A significant proportion of the participants were smokers, with 70.00% reporting a history of smoking. Beetle leaf and nut consumption was prevalent among 90.00% of the participants, indicating a

high level of this habitual practice within the study group. Additionally, 20.00% of the participants reported alcohol consumption.

The distribution of the anatomical site of cancer among the participants is shown in Table 3. The majority of the cases were located in the distal stomach, accounting for 65.00% of the participants. In contrast, 35.00% of the participants had cancer located in the proximal stomach.

The distribution of tumor-related characteristics among the participants is detailed in Table 4. Tumor size varied, with 65.00% of participants having tumors measuring between 2.5 and 4 cm, 20.00% with tumors sized 4.1 to 6 cm, and 15.00% with tumors between 6.1 and 9.2 cm, resulting in a mean tumor size of 5.00 ± 2.00 cm. Regarding tumor type, 40.00% were classified as Type 1, 25.00% as Type 2, 20.00% as Type 0, and 15.00% as Type 3, with no cases of Type 4. In terms of T staging, 40.00% of the tumors were classified as T3, 30.00% as T4a, 25.00% as T2, and 5.00% as T1, with no T4b tumors reported. For N staging, 40.00% of participants were classified as N2, 30.00% as N3, 20.00% as N1, and 10.00% as N0. Tumor metastasis was present in all participants (100.00%), indicating that all patients had metastatic disease at the time of assessment.

The distribution of the types of surgery performed on the participants is presented in Table 5. The majority of the participants underwent lower radical gastrectomy, accounting for 65.00% of the cases. Total gastrectomy was performed on 25.00% of the participants, while 10.00% underwent upper radical gastrectomy.
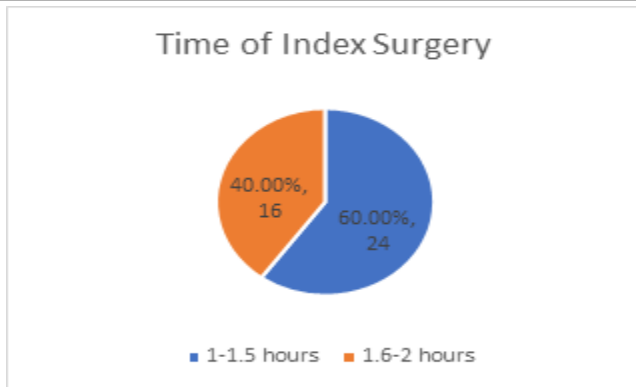
Figure 1: Distribution of study subjects according to time of index surgery
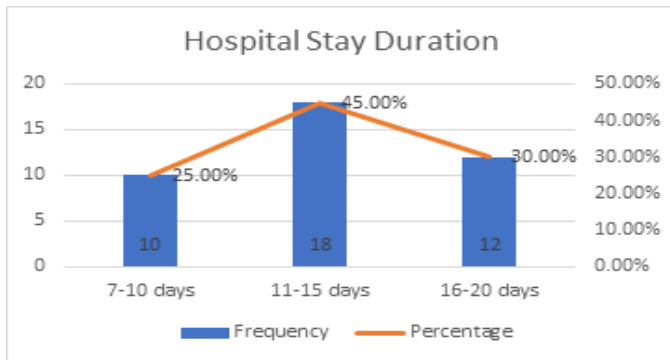

Figure 2: Distribution of study subjects according to hospital stay (n=40)

[Figure 1] illustrates the distribution of study subjects according to the time of index surgery.

The majority of the surgeries (60.00%) were completed within 1 to 1.5 hours, involving 24 participants. The remaining 40.00% of surgeries, involving 16 participants, took between 1.6 to 2 hours.

[Figure 2] depicts the distribution of study subjects according to their hospital stay duration. The majority of participants (45.00%) had a hospital stay of 11-15 days, involving 18 patients. This is followed by 30.00% of participants who stayed for 16-20 days, accounting for 12 patients. The remaining 25.00% of participants had a hospital stay of 7-10 days, involving 10 patients.

The distribution of postoperative complications among the participants is shown in [Table 6]. Nearly half of the participants (47.50%) experienced no complications following surgery. Among those who did experience complications, wound infection was the most common, occurring in 20.00% of participants. Urinary tract infections were reported in 15.00% of participants, while pneumonia was observed in 7.50%. Both peritonitis and duodenal sump leaks were less frequent, each affecting 5.00% of participants.

Table 1: Distribution of baseline characteristics among the participants (n=40)

Baseline Characteristics	Frequency	Percentage
Age (years)		
45-55	8	20.00%
56-65	13	32.50%
66-75	10	25.00%
76-80	9	22.50%
Mean±SD	65.16 ± 10.28	
Sex		
Male	28	70.00%
Female	12	30.00%
BMI (kg/m2)		

18.5-24.9	20	50.00%
25-30	16	40.00%
>30	4	10.00%
Mean±SD	24.15±3.30	
Socioeconomic Condition		
Lower	12	30.00%
Middle	28	70.00%
Upper	0	0.00%

Table 2: Distribution of participants by habitual risk factors (n=40)

Habitual Risk Factors	Frequency	Percentage
Smoking	28	70.00%
Beetle leaf and nut consumption	36	90.00%
Alcohol consumption	8	20.00%

Table 3: Distribution of anatomical site of cancer (n=40)

Anatomical Site	Frequency	Percentage
Proximal Stomach	14	35.00%
Distal Stomach	26	65.00%

Table 4: Distribution of tumor related characteristics among participants (n=40)

Tumor related characteristics	Frequency	Percentage
Tumor Size (cm)		
2.5-4	26	65.00%
4.1-6	8	20.00%
6.1-9.2	6	15.00%
Mean ± SD	5.00±2.00	
Tumor Type		
Type 0	8	20.00%
Type 1	16	40.00%
Type 2	10	25.00%
Type 3	6	15.00%
Type 4	0	0.00%
T staging		
T1	2	5.00%
T2	10	25.00%
T3	16	40.00%
T4a	12	30.00%
T4b	0	0.00%
N Staging		
N0	4	10.00%

N1	8	20.00%
N2	16	40.00%
N3	12	30.00%
Tumor Metastasis		
Present	40	100.00%
Absent	0	0.00%

Table 5: Distribution of type of surgery among the participants (n=40)

Type of Surgery	Frequency	Percentage
Total Gastrectomy	10	25.00%
Lower Radical Gastrectomy	26	65.00%
Upper Radical Gastrectomy	4	10.00%

Table 6: Distribution of postoperative complications among the participants (n=40)

Postoperative Complications	Frequency	Percentage
Wound Infection	8	20.00%
Pneumonia	3	7.50%
Peritonitis	2	5.00%
Urinary Tract Infection	6	15.00%
Duodenal Sump Leak	2	5.00%
No Complications	19	47.50%

DISCUSSION

The present study offers an in-depth analysis of early outcomes and complications among gastric cancer surgery patients in Bangladesh, highlighting critical baseline characteristics, habitual risk factors, anatomical site distributions, tumor-related characteristics, types of surgery performed, time of index surgery, hospital stay durations, and postoperative complications. Our findings are consistent with existing literature, providing a robust comparative framework. The baseline characteristics of our participants indicated a mean age of 65.16 years, with a majority being male (70%) and primarily from the middle socioeconomic class (70%). This demographic distribution aligns with other studies indicating a higher incidence of gastric cancer among older males and varying socioeconomic statuses globally and in other Asian populations.[18,19] The mean BMI of 24.15 kg/m², with 50% of participants having a normal BMI and 10% classified as obese, is reflective of the global trend where BMI influences cancer risk and prognosis.[20] Habitual risk factors identified in our study, such as a high prevalence of smoking (70%) and beetle leaf and nut consumption (90%), are well-documented risk factors for gastric cancer.[21] Studies have consistently shown that smoking significantly increases gastric cancer risk and is associated with various cancer subtypes.[22] Similarly, beetle leaf and nut consumption, prevalent in South Asia, has been linked to an elevated cancer risk due to the carcinogenic substances present in these products.[23] The anatomical site distribution

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revealed that 65% of cases were located in the distal stomach, which is consistent with global trends where distal gastric cancers are more common, particularly in regions with high Helicobacter pylori infection rates.[24] Tumor-related characteristics in our study showed a mean tumor size of 5.00 cm, with significant proportions of Type 1 (40%) and Type 2 (25%) tumors. This distribution is comparable to findings from studies indicating the prognostic significance of tumor size and type.[25,26] Our T staging results, with 40% classified as T3 and 30% as T4a, reflect advanced disease at diagnosis, which is a common challenge in regions with limited early detection facilities.[27] Regarding surgical interventions, lower radical gastrectomy was the most common procedure (65%), followed by total gastrectomy (25%). This aligns with current surgical practices aimed at achieving clear margins and removing affected lymph nodes.[28] The average duration of surgery, with most procedures completed within 1 to 1.5 hours, is indicative of efficient surgical practices.[29] Hospital stay durations varied, with the majority (45%) staying 11-15 days, which is comparable to findings in similar surgical settings where postoperative recovery and complication management influence hospital stay.[30] Postoperative complications were observed in 52.50% of participants, with wound infections (20%), urinary tract infections (15%), and pneumonia (7.50%) being the most common. These findings are consistent with other studies that highlight the impact of postoperative infections on patient outcomes.[31] For instance, Takeuchi et al. and Li et al. reported similar rates of postoperative infections and their significant impact on long-term survival.[32,33] In conclusion, this study provides valuable insights into the early

outcomes and complications of gastric cancer surgery in Bangladesh, emphasizing the need for improved early detection, risk factor mitigation, and postoperative care to enhance patient outcomes. Comparative analysis with global and regional studies underscores the similarities and contextual differences in gastric cancer management, guiding future research and clinical practice improvements in resource-limited settings.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSIONS

The present study provides valuable insights into the early outcomes and postoperative complications among gastric cancer surgery patients in Bangladesh. Our findings underscore the prevalence of significant habitual risk factors, such as smoking and beetle leaf consumption, and highlight the commonality of distal gastric cancer within this population. The analysis of tumor-related characteristics, types of surgery performed, and the duration of hospital stay contributes to a comprehensive understanding of the surgical and postoperative landscape for gastric cancer patients in a resource-limited setting. These results emphasize the need for enhanced early detection strategies, effective risk factor mitigation, and improved postoperative care to optimize patient outcomes. Future research should focus on longitudinal studies to monitor long-term outcomes and the effectiveness of intervention strategies tailored to the Bangladeshi context.

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