



# A Study of Clinical Presentation and Management of Malignant Gastric Outlet Obstruction (Northeast India–Based Single-Centre Experience)

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## Abstract

Gastric outlet obstruction (GOO) occurs when there is mechanical obstruction impeding gastric emptying. GOO has both benign and malignant aetiologies. In this paper we want to discuss, clinical presentation and management of malignant GOO. This is a retrospective observational study of 5 years in patients presenting with malignant GOO. Study was conducted in Dr. B. Borooah Cancer Institute, Guwahati, India. Patients with malignant GOO who were operated were included in this study. Chi-square test was used to evaluate association between categorical values. Independent *t* test and one-way ANOVA (analysis of variance) was used for continuous variables. A *p* value < 0.05 was considered statistically significant at 95% confidence interval. Data were analysed using SPSS (Statistical Package for the Social Sciences) software. A total of 107 patients were included in the study. Mean age of patients was 51 years. Carcinoma stomach was the most common cause of GOO, followed by carcinoma gall bladder, pancreatic cancer and duodenal cancer in decreasing order of frequency. Gastrojejunostomy was done in 96 patients, and palliative gastrectomy with gastrojejunostomy was done in 11 patients. There was improvement in gastric outlet obstruction score in most of the patients after GJ with acceptable patency rates at the end of 90 days. Low albumin levels and poor preoperative performance status were associated with increased 90-day mortality. Patients with malignant GOO usually present in poor general condition. Carcinoma stomach was the major cause of GOO in our setup. Adequate preoperative resuscitation, nutritional assessment and correction of malnourishment are of utmost importance for improving outcome of patients. Surgical gastroenterostomy was effective for palliation of obstructive symptoms in our study with improvement in post-operative oral intake and improved quality of life. Our study of 107 patients with GOO has shown that surgical palliation of GOO in the form of gastrojejunostomy improves oral intake of patients with improved post-operative gastric-outlet obstruction scores. Low albumin levels and poor preoperative poor performance status were associated with increased mortality at the end of 90 days.

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## Introduction

Malignant gastric outlet obstruction occurs due to mechanical obstruction impeding gastric emptying. Malignant GOO is commonly seen in patients with carcinoma of stomach, duodenum, pancreas, gallbladder and biliary tree [1]. Patients present with nausea, vomiting, metabolic complications and severe weight loss.

Restoration of gastrointestinal continuity is to be done for palliation of symptoms of GOO [2]. Various methods of palliation include gastrojejunostomy and endoscopic stent placement.

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Both endoscopic stenting and gastrojejunostomy are good means for palliation of symptoms of GOO, but surgical gastroenterostomy is more favoured and has good results [3].

An aim of this article was to study presentation of patients with malignant gastric-outlet obstruction and outcomes of surgical palliation.

## Methods

This is a retrospective observational study of patients presenting with malignant gastric-outlet obstruction who underwent surgical palliation at Dr. Bhubaneshwar Borooah Cancer Institute which is a tertiary cancer referral centre for Northeast India.

## Eligibility Criteria

1. Patients who have undergone surgical palliation of their GOO
2. Patients who have been under follow-up for at least 90 days after completion of treatment

## Primary Outcomes of Interest

1. 90-day patency rate of gastrojejunostomy
2. 90-day mortality

Data was collected from hospital records and telephonic conversation. From a total of 135 patients, 23 patients lost follow-up and 5 patients left against medical advice after surgery, so a total of 107 patients who met eligibility criteria were included in the study.

Chi-square test was used to evaluate association between categorical values. Independent *t* test and one-way ANOVA (analysis of variance) were used for continuous variables. A *p* value < 0.05 was considered statistically significant at 95% confidence interval. Data were analysed using SPSS (Statistical Package for the Social Sciences) software.

Most of these patients presented in emergency, and initial resuscitation was done in emergency department. Patients were hydrated, and metabolic and electrolyte abnormalities corrected. During initial resuscitation, baseline demographic and clinical information was obtained at admission. Upper gastrointestinal endoscopy with biopsy was done in all patients. Imaging was done in the form of contrast-enhanced tomography of the chest and abdomen. Blood work up in the form of complete blood count, renal function tests, liver function tests, and coagulation profile was done.

Preoperative and post-operative oral intake was assessed using GOOSS (gastric-outlet obstruction scoring system). This four-point scoring system used was grade 0 = no oral

intake, grade 1 = liquids only, grade 2 = soft solids, and grade 3 = low residue/full diet. Functional status of patients was evaluated with Eastern Cooperative Oncology Group score (grade 0 = fully active without restriction; grade 1 = able to carry light work; grade 2 = capable of self-care with more than 50% waking hours; grade 3 = limited self-care, confined to bed > 50% of waking hours; grade 4 = completely disabled; grade 5 = dead).

Gastric lavage through Ryle's tube was given to all patients before surgery till output was clear. During this period, patients were allowed clear liquids only. Preoperative nutrition assessment and supplementation was done accordingly. After surgery, enteral nutrition was started through feeding jejunostomy or nasojejunal tubes from post-operative day 1, unless patient was unable to tolerate. Patients were resumed on oral feeds on an average of post-operative day 3.

## Results

From a total of 107 patients, 65 were males and 42 females. Mean age of presentation was 51 years (Table 1). Carcinoma stomach was the major cause of GOO followed by carcinoma gall bladder, carcinoma head of pancreas and carcinoma duodenum in decreasing order of frequency.

Out of 107 patients GOO due to carcinoma stomach was seen in 99 patients, four patients of carcinoma gall bladder, two patients of carcinoma pancreas and two patients of duodenal carcinoma (Table 2).

Surgical procedures performed in our patients were gastrojejunostomy and palliative gastrectomy with gastrojejunostomy. Gastrojejunostomy was done in 96 patients, and palliative gastrectomy in 11 patients (Table 2).

Mean haemoglobin of patients was 6.9 g/dl, and most of the patients needed preoperative blood transfusion. Patients presented with signs of dehydration, and around 22% of

**Table 1** Various characteristics of patients in study (*n* = 107)

Characteristics	Number of patients/percentage
1. Mean age (years)	51
2. Sex (male/female)	65/42
3. History of alcohol intake	53%
4. History of tobacco consumption	58%
5. Diabetes mellitus	13%
6. Hypertension	11%
7. Initial presentation in shock	22%
8. Electrolyte abnormalities	57%
9. Mean haemoglobin	6.9 g/dl
10. Abnormal creatinine levels	18%
11. Significant weight loss	71%
12. Need for preoperative transfusion	41%

**Table 2** Aetiology and treatment done

Characteristics	Number of patients (n = 107)
1. Aetiology:	
- Carcinoma stomach	99
- Gall bladder cancer	4
- Carcinoma pancreas	2
- Duodenal carcinoma	2
2. Treatment done:	
- Open gastrojejunostomy	96
- Palliative gastrectomy + GJ	11

patients presented to the emergency department with shock (Table 1). History of diabetes mellitus was seen in 13% of patients and hypertension in 11% of patients. Around 58% of patients consumed tobacco in some or the other form, and associated alcohol intake was present in 53% of patients (Table 1).

Out of 107 patients, 90-day mortality was seen in 37 patients. 29.3% of patients of carcinoma stomach were dead at the end of 90 days and 100% of patients were dead by the end of 90 days in patients presenting with gastric outlet obstruction due to carcinoma gall bladder, carcinoma head of pancreas and duodenal carcinoma with *p* value < 0.001 (Table 3).

Low albumin levels and poor performance status before surgery were associated with increased 90-day mortality. The mean albumin of patients who were alive at the end of 90 days was  $3.267 \pm 0.369$  ( $p \leq 0.0001$ ), and that of patients who were expired was  $2.822 \pm 0.247$  ( $p \leq 0.0001$ ). When mean score of preoperative ECOG status of patients was taken, patients in mortality group had higher mean ECOG scores  $2.676 \pm 0.479$  ( $p \leq 0.0001$ ) whereas mean ECOG score of patients who were alive was  $2 \pm 0.450$  ( $p \leq 0.0001$ ) which are statistically significant (Table 4).

When preoperative GOSS was compared with GOSS after surgery at 90 days, gastrojejunostomy either after open GJ or palliative gastrectomy with GJ was associated with improved gastric outlet obstruction score and majority of patients who were alive at 90 days had patent gastrojejunostomy. Preoperatively patients had either GOSS of zero or one. Out of 59 patients who had score of GOSS-0 preoperatively, at the end of 90 days, 11.9% of patients had score of GOSS-0, score of GOSS-1 in 11.9%, 25.4% of patients had score of GOSS-2

**Table 3** Ninety-day mortality according to aetiology of GOO

Aetiology	n [percentage of patients]
1. Carcinoma stomach (n = 99)	29 [29.3%] ( $p \leq 0.001$ )
2. Carcinoma gall bladder (n = 4)	4 [100%] ( $p \leq 0.001$ )
3. Carcinoma head of pancreas (n = 2)	2 [100%] ( $p \leq 0.001$ )
4. Duodenal carcinoma (n = 2)	2 [100%] ( $p \leq 0.001$ )

**Table 4** Correlation of 90-day mortality with preoperative albumin and ECOG status

Characteristics	Mean value
1. Albumin levels (g/dl)	
- Alive	$3.276 \pm 0.369$ ( $p \leq 0.0001$ )
- Dead	$2.822 \pm 0.247$ ( $p \leq 0.0001$ )
2. ECOG status:	
- Alive	$2 \pm 0.450$ ( $p \leq 0.0001$ )
- Dead	$2.676 \pm 0.479$ ( $p \leq 0.0001$ )

and 50.8% of patients had score of GOSS-3 (Table 5). Out of 11 patients who had preoperative score of GOSS-1, 18.2% of patients at the end of 90 days had score of GOSS-0, 18.2% of patients had score of GOSS-2 and 63.6% of patients had score of GOSS-3 (Table 5).

### Discussion

Current data suggest that 50–80% of cases of GOO are contributed by malignant GOO [4]. It is most commonly seen in patients with carcinoma of the stomach, duodenum, pancreas, gallbladder and biliary tree [1]. 15–25% of cases occur due to pancreatic carcinoma [5]. Carcinoma stomach was the major cause of GOO in our study, followed by carcinoma gall bladder, pancreas and duodenum in decreasing order of frequency.

Majority of our patients had antro-pyloric growth. Out of 107 patients, 99 patients had GOO due to carcinoma stomach, four patients of carcinoma gall bladder, two patients of carcinoma pancreas and two patients of duodenal carcinoma. Our data is little different from west population that majority of patients who presented with GOO were due to gastric carcinoma (Table 2).

Functional or mechanical GOO develops in unresectable pancreatic cancer. Celiac nerve plexus infiltration by tumour or duodenal blockage causes dysfunction of gastric and duodenal motility [1, 5].

Nausea and vomiting are cardinal symptoms of gastric outlet obstruction. Vomiting is usually non-bilious, and it characteristically contains undigested food particles. They typically

**Table 5** GOSS score at 90 days in comparison with GOSS score at presentation

GOSS at 90 days	GOSS at presentation	
	0 (n = 59)	1 (n = 11)
-0	11.9% (7)	18.2% (2)
-1	11.9% (7)	0% (0)
-2	25.4% (15)	18.2% (2)
-3	50.8% (30)	63.6% (7)

present with symptoms of nausea, vomiting, epigastric pain, weight loss and early satiety. Weight loss is most significant in malignant GOO. Patients present in dehydrated condition with various metabolic abnormalities and malnutrition [1, 6, 7].

Most of our patients were malnourished, and mean albumin of patients ranged from  $2.822 \pm 0.247$  to  $3.267 \pm 0.369$ . Low mean albumin levels preoperatively were associated with increased 90-day mortality in our patients with albumin levels less than  $2.822 \pm 0.247$  being risk factor for poor outcomes with statistically significant  $p$  value of  $<0.0001$  (Table 4). Significant weight loss was seen in 71% attributed to cancer cachexia, late presentation of patients and poverty. Mean haemoglobin was 6.9 g/dl, and most of the patients needed preoperative blood transfusion (Table 1).

Upper gastrointestinal endoscopy is most confirmatory investigation. Laboratory often finds hypochloremic and hypokalemic alkalosis. Dehydration causes raised urea and creatinine levels. Abdominal x-ray may show gastric fluid levels. Enlarged stomach and pyloro-duodenal stenosis is seen in barium meal and follow-through [8].

Electrolyte abnormalities were seen in 57% of our patients. Patients presented with signs of dehydration and around 22% of patients presenting to emergency department with shock. Initial resuscitation was done in the emergency department with correction of fluid and electrolyte abnormalities (Table 1).

Symptomatic treatment is to be done in acute presentation with electrolyte and metabolic abnormalities. Nasogastric tube is inserted to decompress the stomach, correction of electrolyte abnormalities and dehydration accordingly [9]. Approach to treat underlying cause should be next goal once patient is stabilised.

After initial stabilisation in emergency, patients were further managed in Department of Surgical Oncology. Upper gastrointestinal endoscopy with biopsy was done for establishment of definitive diagnosis. Before endoscopy Ryle's tube insertion, lavage with normal saline was done till return fluid was clear. Total parenteral nutrition was given for correction of nutritional deficiencies wherever feasible.

Various methods of palliation include surgical gastroenterostomy and endoscopic stent placement. Current studies and their data show that, though both endoscopic stenting and surgical enterostomy are good means of palliation of symptoms of GOO, surgical gastroenterostomy is more favoured and have good results [3]. Open gastrojejunostomy was done in 96 patients, and palliative gastrectomy with gastrojejunostomy was done in 11 patients. All of our patients had surgical palliation of GOO; none of the patients underwent placement of self-expandable metallic stents (SEMS).

Surgical gastrojejunostomy to bypass the malignant obstruction was traditional method. Self-expandable metal stenting (SEMS) is popular recently. Few randomized controlled trials (RCTs) have compared surgical gastrojejunostomy with stent placement [10, 11]. Data from RCTs favour surgical gastroenterostomy when compared with SEMS placement [10], but there was no difference in either overall survival or patient's quality of life.

SEMS placement is associated with tumour growth through or over stent and stent migration which lead to recurrence of symptoms. RCTs which compared covered and uncovered stents [12–15] concluded that partially covered SEMS had superiority over uncovered SEMS.

Patients in mortality group had higher mean ECOG scores,  $2.676 \pm 0.479$  ( $p \leq 0.0001$ ) whereas mean ECOG score of patients who were alive was  $2 \pm 0.450$  ( $p \leq 0.0001$ ) which was statistically significant (Table 4).

Our study of 107 patients with GOO of various causes has shown that surgical gastroenterostomy improves oral intake of patients with acceptable patency rates. In 70 patients who were alive at end of 90-day assessment, majority of patients had improved gastric outlet obstruction scores. Preoperatively patients had scores of GOSS-0 and GOSS-1. Out of 70 patients who were alive, 59 patients could not tolerate even oral liquids and 11 patients were able to take liquids only. When preoperative GOSS percentage was compared with GOSS at 90 days, it was seen that, out of 59 patients who had score of GOSS-0 preoperatively, at the end of 90 days, 11.9% of patients had score of GOSS-0, score of GOSS-2 in 11.9%, 25.4% of patients had score of GOSS-2 and 50.8% of patients had score of GOSS-3 (Table 5). Out of 11 patients who had preoperative score of GOSS-1, 18.2% of patients at the end of 90 days had score of GOSS-0, 18.2% of patients had score of GOSS-2 and 63.6% of patients had score of GOSS-3 (Table 5).

## Conclusion

Patients with malignant GOO usually present in poor general condition. Carcinoma stomach was the major cause of GOO in our setup. Adequate preoperative resuscitation, nutritional assessment and correction of malnourishment are of utmost importance for improving outcome of patients. Surgical gastrojejunostomy is more favoured. Our study of 107 patients with GOO has shown that surgical palliation of GOO in the form of gastrojejunostomy improves oral intake of patients with improved gastric-outlet obstruction scores. Low albumin levels and poor preoperative performance status were associated with increased mortality at the end of 90 days.

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