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ANALYSIS OF GASTRIC OUTLET OBSTRUCTION: CLINICAL AND PATHO- PHYSIOLOGICAL PERSPECTIVES IN A TERTIARY HOSPITAL OF SOUTHERN ODISHA

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ABSTRACT

INTRODUCTION: Gastric outlet obstruction is defined as the clinical and patho-physiological consequence of any disease process that produces a mechanical impediment to gastric emptying. The causes of gastric outlet obstruction can be benign or malignant. These obstructions may stem from intrinsic or extrinsic factors. While "pyloric stenosis" is frequently employed to denote the condition, it's somewhat misleading as the obstruction point seldom occurs at the pylorus. With growing awareness of the ailment, shifts in dietary patterns, and the accessibility of medications such as H2 receptor blockers and proton pump inhibitors, the occurrence of peptic ulcers and gastric outlet obstructions is on the decline. METHODS: A prospective study was conducted at the Department of Surgery, M.K.C.G Medical College and Hospital, Berhampur, spanning from January 2023 to January 2024. OBSERVATIONS: The majority of gastric outlet obstruction (GOO) cases presented in the fifth decade of life, followed closely by the sixth decade. Both malignant and benign etiologies were prevalent in this age group. Out of the 40 cases studied, 32 were males and 8 were females, resulting in a male-to-female ratio of 4:1. Vomiting and epigastric pain emerged as the most common symptoms observed in the study. Vomiting was characterized as spontaneous, projectile, and non-bilious among cases of cicatrizing ulcer and stomach carcinoma. Visible gastric peristalsis was observed in 24 cases, accounting for 60% of the total study population. Dehydration was noted in 70% of cases, while anemia was present in 55% of cases. A succession splash was audible in only 45% of cases, and a palpable mass was detected in 22.5% of cases. Truncal vagotomy and gastrojejunostomy were performed in 8 cases of duodenal ulcer, while distal gastrectomy with Billroth-II reconstruction was conducted in 18 cases of stomach carcinoma. The remaining cases of stomach carcinoma were managed through palliative operations. CONCLUSION: This study offers insights into the presentation and aetiology of GOO. Carcinoma of the stomach emerged as the most common cause of GOO in adults, followed by cicatrizing duodenal ulcer. GOO predominantly affected males in the fifth decade of life.

Key words- gastric outlet obstruction, GOO, carcinoma stomach, cicatrizing duodenal ulcer

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INTRODUCTION

Gastric outlet obstruction (GOO) is a clinical and pathophysiological consequence of any disease process that creates a mechanical hindrance to gastric emptying, which can be intrinsic or extrinsic. Common causes of obstruction include pyloric stenosis secondary to peptic ulceration and gastric cancer, with the latter becoming more prevalent in recent years. GOO occurs in approximately 2% of patients with chronic duodenal ulcer, while other causes include gastric polyps, bezoars, ingestion of caustic substances, and pancreatic pseudocysts. From a pathological perspective, the term "pyloric stenosis" is often inaccurate in adult patients, as the site of obstruction is rarely at the pylorus itself. Instead, it is more commonly found immediately proximal to the sphincter, where carcinoma diagnosis is more likely, or more distally in the duodenal bulb, typically associated with duodenal ulcer. However, increased awareness of the disease, dietary changes, and the availability of medications such as H2 receptor blockers and proton pump inhibitors, along with the discovery of the association of H. pylori with peptic ulcer diseases and its effective eradication with H. pylori kits, have led to a decreased incidence of patients requiring surgery and a reduction in complications like pyloric stenosis. Concurrently, the incidence of antral carcinoma of the stomach causing GOO has relatively increased, possibly due to enhanced early diagnosis facilitated by flexible fibre optic endoscopy. Benign gastric outlet obstruction encompasses conditions such as peptic ulcer disease, stomach polyps, pyloric stenosis, duodenal webs, gallstone obstruction, pancreatic pseudocysts, and bezoars. On the other hand, malignant gastric outlet obstruction is attributed to stomach cancer, pancreatic cancer, ampullary cancer, cholangiocarcinoma, and metastatic cancers. Given the obscure aetiology and nonspecific symptoms and signs in the early stages, diagnosis can challenge even seasoned clinicians. Unless treated promptly, prognosis for this disease is typically grim. In this region, malignant gastric outlet obstruction is particularly prevalent, primarily due to stomach carcinoma.

This study aims to review the changes in the presentation of gastric outlet obstruction in light of evolving trends in management due to new drugs and investigative modalities. Despite the lack of uniformity in criteria for accepting a case of gastric outlet obstruction, various diagnostic indicators can be utilized, including projectile vomiting of undigested food, visible gastric peristalsis, gastric succussion splash, palpable hypertrophied stomach, delayed emptying of the stomach on barium meal studies, gastric residue exceeding 500 ml in adults, aspirate exceeding 400 ml on saline load test, and demonstration at operation or autopsy of grossly narrowed gastric outlet.

AIM AND OBJECTIVES:

1. To ascertain the aetiology of Gastric Outlet Obstruction (GOO) among adult patients from southern Odisha seeking treatment at M.K.C.G Medical College and Hospital, Berhampur.
2. To study the clinic Patho-physiological aspects of gastric outlet obstruction.
3. To assess the effectiveness of diagnostic approaches and treatment protocols for Gastric Outlet Obstruction in adults.
4. To track surgical interventions performed for cases of GOO and analyse post-surgery outcomes.

MATERIALS AND METHODS

This prospective study was conducted in the Department of General Surgery and department of Gastrointestinal surgery, M.K.C.G Medical College and Hospital, Berhampur. All consecutive patients presenting with clinical features of Gastric outlet obstruction, were examined and admitted to the inpatient department of General Surgery Department and GI surgery of M.K.C.G Medical College and Hospital, Berhampur, between January 2023 till January 2024.

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INCLUSION CRITERIA

All patients admitted to M.K.C.G Medical College Hospital, General Surgery and GI Surgery Department, regardless of sex, exhibiting signs and symptoms of gastric outlet obstruction.

EXCLUSION CRITERIA

- Patients that denied informed consent for the study.
- Patients under the age of 14 years.
- Pregnant females.

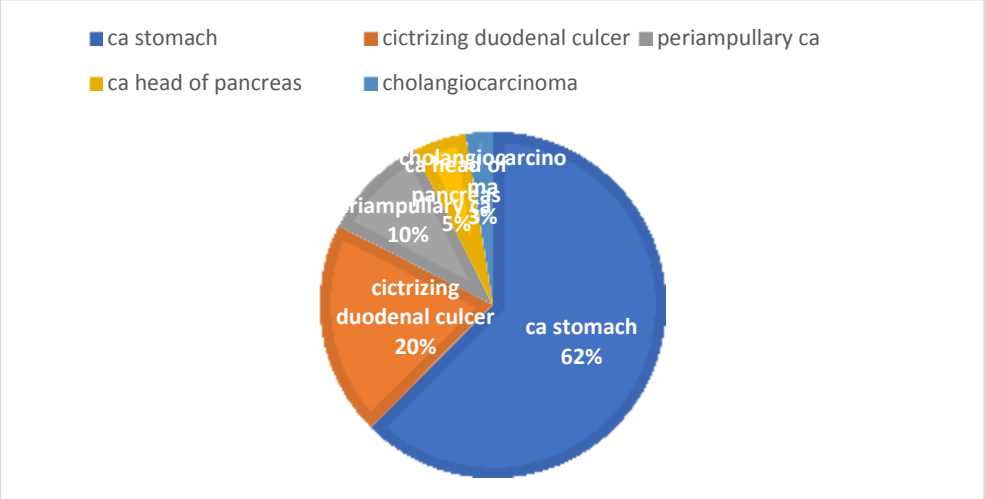
Relevant clinical data was obtained from the patients in a pre-formed questionnaire. Clinical investigations and Routine investigations were done. And patients were managed as per the protocol. Data was collected, tabulated and analysed using SPSS 29.0.10.

RESULTS

1. **Distribution of aetiology.**
   Out of 40 cases studied 25 were due to carcinoma stomach, 7 were due to other malignancies and 8 due to cicatrizing ulcer.

ETIOLOGY	NO. OF CASES	Percentage
Ca stomach	25	62.5%
Cicatrizing ulcer	8	20%
Ca head of pancreas	2	5%
Periampullary carcinoma	4	10%
cholangiocarcinoma	1	2.5%
TOTAL	40	

Table 1.1 (etiological distribution of GOO)



Graph.1 (etiological distribution of GOO)

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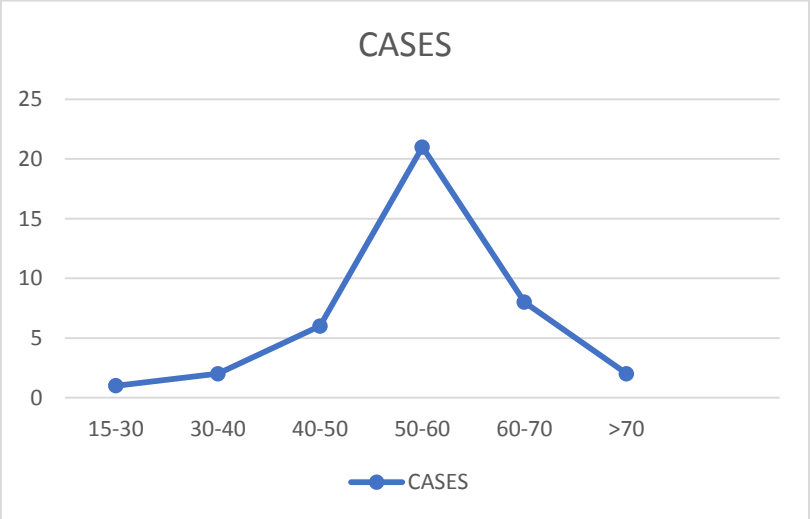
2. **Age Distribution**

GOO was most commonly observed in individuals during their fifth decade of life, closely followed by the sixth decade. Within this age range, both malignant and benign etiologies were prevalent.

AGE	CASES	PERCENTAGE %
15-30	1	2.5
30-40	2	5
40-50	6	12
50-60	**21**	**52.5**
60-70	8	20
>70	2	5

Table 2.1 age distribution



graph 2 age distribution

3. **Sex distribution**

Among the 40 cases studied , 32 were males and 8 were females, resulting in a male-to-female ratio of approximately 4:1. When considering specific etiologies, the male-to-female ratio for stomach carcinoma is approximately 2:1, while for chronic duodenal ulcers, it is 4:1.

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Sex	Total cases	Ca stomach	DU	Others
Male	32 (80%)	19	7	6
female	8 (20%)	6	1	1

Table 3.1 gender distribution

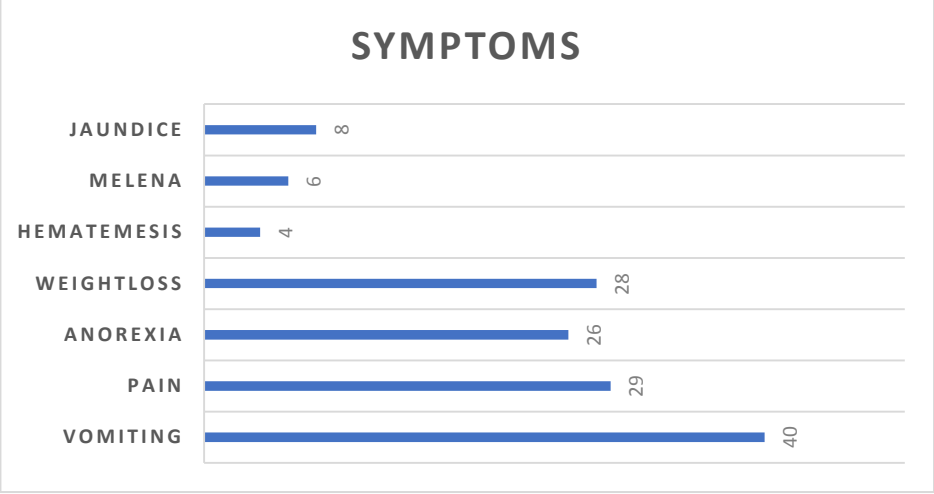
4. SIGNS AND SYMPTOMS

SYMPTOMS	CASES	PERCENTAGE
VOMITING	40	100%
PAIN	29	72.5%
ANOREXIA	26	65%
WEIGHTLOSS	28	70%
HEMTEMESIS	4	10%
MELENA	6	15%
JAUNDICE	8	20%

Table 4.1 symptoms of goo

The primary symptoms observed in the study are vomiting and epigastric pain. Vomiting tends to be spontaneous and projectile, usually non-bilious in cases of cicatrizing ulcer and stomach cancer. Bilious vomiting, however, is more commonly associated with periampullary carcinoma or carcinoma of the pancreatic head. Within the clinical presentation of gastric outlet obstruction (GOO), prominent features include vomiting, epigastric pain, abdominal distension, and weight loss. Other symptoms noted encompass anorexia, weight loss, hematemesis, and melena.

Graph 4.1 symptoms of GOO



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SIGNS	CASES	PERCENTAGE %
Visible gastric Peristalsis	24	60
Pallor	22	55
Dehydration	28	70
Succussion splash	18	45
Palpable mass	9	22.5
Ascites	4	10

Table 4.2 signs in GOO

Gastric peristalsis is visibly present in 24 cases, constituting 60% of the total study population. Dehydration is observed in 70% of cases, while anemia is detected in 55%. A succussion splash is audible in only 45% of cases, and a palpable mass is discernible in 22.5%. Ascites is identified in 10% of cases.

5. ELECTROLYTE IMBALANCE

Assessing the sodium, potassium, and chloride levels in the blood, patients were classified based on the presence or absence of electrolyte imbalance. Out of 32 cases with malignant causes of gastric outlet obstruction, 16 (50%) exhibited electrolyte imbalances in their blood reports, while among benign causes, 6 out of 8 patients (75%) demonstrated such imbalances.

CAUSES	CASE	PERCENTAGE
Malignant	16	50%
benign	6	75%

Table 5.1

6. SURGICAL PROCEDURES

Truncal vagotomy and gastrojejunostomy were performed in 8 cases among all duodenal ulcer cases. Distal gastrectomy with Billroth-II reconstruction was carried out in 18 cases of stomach carcinoma. For the remaining cases of stomach carcinoma, management involved palliative gastrojejunostomy in 2 cases, feeding jejunostomy in 4 cases, and total gastrectomy was feasible in only 1 case. Additionally, palliative gastrojejunostomy and hepaticojejunostomy were conducted in 6 cases, while palliative gastrojejunostomy and cholecystojejunostomy were performed in 1 case.

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PROCEDURES	CA STOMACH	CICATRIZING DU	OTHERS
GJ+ TV	0	8	0
DG+ BILROTH II	18	0	0
TOTAL GASTRECTOMY	1	0	0
FEEDNG JEJUNOSTOMY	4	0	0
Palliative GJ	2	0	0
Palliative GJ+HJ	0	0	6
Palliative CJ+GJ	0	0	1

Table 6.1 surgical procedures in GOO.

7. COMPLICATIONS

complications	**cases**
Superficial wound infection. (SSI)	3 (7.5%)
Bile leak	1 (2.5%)
Stomal ulcer	1 (2.5%)
Early post operative Mortality	3 (7.5%)
Recurrence	1 (2.5%)

Table 7.1 complications and follow-up.

All cases of stomach carcinoma were referred to the radiotherapy department for adjuvant chemotherapy treatment with injections of 5FU and leucovorin for three cycles. Patients with cicatrizing duodenal ulcers were discharged postoperatively after 8-10 days and advised to follow an anti-H. pylori regimen along with proton pump inhibitors. Patients were followed up at 3 months at 6 months.

All cases of peptic ulcer followed postoperatively till date showed no complications. one of periampullary and 3 cases of ca stomach died within 1 month of surgery before receiving adjuvant treatment. 5 cases of carcinoma stomach died within 6 months of follow up. Remaining cases were receiving chemotherapy

DISCUSSION

The discussion primarily revolves around observations derived from the presentation of symptoms, signs, investigative procedures, surgeries performed, and subsequent follow-up of patients with Gastric Outlet Obstruction (GOO) treated at the Department of General Surgery and GI surgery, M.K.C.G Medical College and Hospital over one year period.

The breakdown of GOO cases by their underlying causes is as follows:

- GOO secondary to Stomach Cancer: 25 cases (62.5%)
- GOO secondary to Peptic Ulcer: 8 cases (20%)
- GOO secondary to Periampullary Cancer: 4 cases (10%)

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- GOO secondary to Cancer of the Head of the Pancreas: 2 cases (5%)
- GOO secondary to Cholangiocarcinoma: 1 case (2.5%)

Malignancy emerges as the leading cause of GOO, evident in 32 cases (80%), with Carcinoma of the Stomach constituting the majority, accounting for 25 cases (62.5%), while the remaining 7 cases (13%) are attributed to other malignancies. The second most prevalent cause is cicatrizing duodenal ulcers, observed in 8 cases (20%). Notably, there's a shift observed from the previous dominance of Duodenal ulcers as the primary cause of GOO. These findings reflect an increase in carcinoma-related GOO cases and a decrease in peptic ulcer-related instances. These trends align with studies by Derek Frederickson et al. and Mc-Quaid et al. (2010), which report malignancies accounting for 50-80% of cases and 61% of cases, respectively. Similarly, Dallas N. Shone et al. (2008) report 72.9%, and S. Essoun, J.C.B. Dakubo note 72.9%.

Analyzing individual incidences, Carcinoma of the Stomach emerges as the most common malignancy, representing 62.5% of cases in our study, which is comparable to findings by JAKA et al. (42.9%) and S. Essoun, J.C.B. Dakubo (55%). Cicatrizing duodenal ulcers rank as the most common benign condition, observed in 20% of cases in our study, aligning closely with JAKA et al. (28.3%) and S. Essoun, J.C.B. Dakubo (25%).

In this study, the majority of patients fell within the 5th decade, with a mean age of 54 years. For malignancies, the mean age was 58, whereas for benign diseases, it was 47.5 years, with a standard deviation of 12.8. These findings are consistent with JAKA et al.'s study, where the mean age for GOO was 52 years and for chronic duodenal ulcers, it was 34 years, while malignant GOO was observed at 56 years.

In cases of carcinoma of the stomach with GOO, the youngest age at presentation was 30 years, and the oldest was 73 years, with the majority falling within the 50-60 age group. Regarding duodenal ulcers, the highest incidence was noted in the 5th decade, followed by the 3rd decade. The youngest age of presentation was 18 years, and the oldest was 70 years, with a mean age of 46 years, comparable to the findings of FISHER et al.'s study, where the mean age was 54 years.

Gastric Outlet Obstruction (GOO) predominantly affects males, accounting for 80% of cases, with females comprising 20%, aligning with Essoun & Dakubo's study, where males constituted 68.22% and females 57.14%. Examining specific causes, the incidence of stomach cancer in males is 76%, compared to 59.3% in our study, while peptic ulcer incidence in males stands at 42.8% versus 21.8% in our study. In cases of duodenal ulcers, men outnumber women by a ratio of 7:1, diverging from Yogiram & Chowdhury's study (2:1) and JAKA et al.'s study (1.2:1). The prevalence of GOO in males (80%) versus females (20%) in our study mirrors findings by JAKA et al. This higher male incidence globally may be attributed to greater consumption of gastric irritants compared to females.

In this study, vomiting (100%) and epigastric pain (72.5%) emerge as the most prevalent symptoms, akin to findings of 100% and 70% respectively in the study by JAKA et al. Keith A. Kelly, in his study, noted vomiting and weight loss in 54% of patients, compared to 60% in our present study, with upper gastrointestinal bleeding observed in 34% compared to 30% in our study. Vomiting manifests as spontaneous, projectile, and non-bilious in all patients with cicatrizing ulcer and stomach cancer. Bilious vomiting is characteristic of GOO secondary to periampullary cancer and cancer of the head of the pancreas. Additionally, many patients report nausea and postprandial epigastric fullness.

Other symptoms noted include anorexia (65%) and weight loss (70%), which align closely with findings of 52% in the study by Michael L. Schwartz. Weight loss is observed in 59.55% of patients in the series by Donald D. Kozzol and Karl A. Meyer, 32% in the series by Harvey J. Dworken and Harold P. Roth, and notably 93% in the study by JAKA et al. Despite maintaining a good appetite, many patients are malnourished due to increased abdominal pain upon food intake.

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One case had previously undergone surgery for duodenal perforation. Among the 8 cases, 6 reported a positive history of previous acid peptic disease and had used proton pump inhibitors as over-the-counter medication. None of the 8 cases had received anti-helicobacter pylori treatment.

Symptoms commonly associated with periampullary carcinoma include pain, vomiting bile-stained contents, progressive jaundice, itching, anorexia, and weight loss. In pancreatic cancer, symptoms of gastric outlet obstruction (GOO), such as nausea and vomiting, are reported in 11% to 50% of patients at the time of diagnosis (DiMagno et al., 1999). Jaundice was noted in one case of stomach cancer but not observed in duodenal ulcer cases, likely due to periportal nodes compressing the common bile duct or infiltration. Pallor was present in 69% of stomach cancer cases and 25% of duodenal ulcer cases, which aligns with findings of 62% in stomach cancer cases in the study by Michael L. Schwartz et al. and 80% in another study by JAKA et al. Dehydration was observed in 55% of cases, similar to findings in the study by JAKA et al.

Visible gastric peristalsis (VGP) was observed in 60% of GOO cases, with 75% of duodenal ulcer cases and 60% of stomach cancer cases exhibiting VGP, compared to the findings of Yogiram and Chowdhary, where it was seen in 74% of duodenal ulcer cases. A succussion splash was noted in 45% of cases in the present study, differing from observations in the study by Harold Ellis (64% of GOO cases) and JAKA et al. (78.3% of cases).

Electrolyte disturbances were observed in 22 cases (55%), aligning with the findings of Michael L. Schwartz et al. (30%) and JAKA et al. (57.6%). Regarding electrolyte imbalance in GOO, the current study found dyslectrolytemia in 75% of cases of cicatrizing duodenal ulcer, comparable to findings by M.S. Sushruta et al. (61.1%) and Dr. P. Vanathi (67%). Dyslectrolytemia was less common in malignant causes, observed in 50% of cases in the present study, similar to Dr. P. Vanathi's findings (40%) but differing from M.S. Sushruta et al. (28%). The higher incidence in the present study may be attributed to late presentation and lack of awareness among the predominantly impoverished population in this region. A palpable mass was found in 9 cases (22.5%) of GOO, consistent with findings in the study by JAKA et al. (25%).

In the current study, all cases of cicatrizing duodenal ulcer underwent truncal vagotomy with posterior retrocolic loop gastrojejunostomy. Among cases of stomach cancer, 18 underwent a Billroth II procedure, 2 received palliative anterior gastrojejunostomy, and 4 required feeding jejunostomy due to the advanced stage of the disease. Only one case necessitated a total gastrectomy because the tumor extended onto the lesser curvature and achieving a tumor-free margin was not feasible with distal gastrectomy alone. The most common procedure performed was gastrojejunostomy in 20 cases (80%), consistent with findings in the study by JAKA et al. (61.9%).

All 7 cases of periampullary carcinoma and carcinoma of the head of the pancreas presenting as GOO were deemed inoperable. Among these, 6 cases underwent palliative hepaticojejunostomy and gastrojejunostomy, while one case of periampullary carcinoma underwent cholecystojejunostomy and palliative gastrojejunostomy. Gastrojejunostomy should be included in every case, along with biliary bypass, for patients with unresectable periampullary adenocarcinoma. The presence of GOO is not an independent factor for poor prognosis but rather reflects the aggressive biological behavior of pancreatic head adenocarcinoma.

Three cases of stomach carcinoma developed wound infections with discharge, which were treated conservatively. During the 3 month follow-up of gastrojejunostomy for duodenal ulcer, no complications were observed. One case of stomach carcinoma presented with abdominal pain in the postoperative period, and upper gastrointestinal endoscopy revealed a GJ stomal ulcer. In one case of periampullary carcinoma, bile leak occurred, which was managed conservatively for two weeks until it subsided. Unfortunately, two cases of stomach carcinoma and one case of cholangiocarcinoma resulted in mortality during the early postoperative period.

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All cases of stomach carcinoma were referred to the radiotherapy department for adjuvant chemotherapy treatment with injections of 5FU and leucovorin for three cycles. Patients with cicatrizing duodenal ulcers were discharged postoperatively after 8-10 days and advised to follow an anti-H. pylori regimen along with proton pump inhibitors.

CONCLUSION

The most prevalent cause of Gastric Outlet Obstruction (GOO) is malignancy, accounting for 80% of cases, with Stomach Cancer comprising 62.5%, followed by Periampullary Carcinoma (10%), Carcinoma of the Head of the Pancreas (5%), and Cholangiocarcinoma (2.5%). The primary benign cause is duodenal ulcer, constituting 20% of cases. Males are more frequently affected than females, with a ratio of 4:1. Common presenting symptoms include vomiting and abdominal pain, while signs often include anemia, dehydration, and visible gastric peristalsis. Smoking and alcohol consumption are associated with Stomach Cancer. Visible gastric peristalsis (VGP) and succussion splash are more frequently observed in benign diseases than in malignant ones. The presence of a palpable abdominal mass suggests malignancy. Electrolyte imbalance is more pronounced in benign cases, potentially due to a lack of awareness. Of the 19 cases of Stomach Cancer deemed operable, surgery was performed at the time of presentation, while palliative measures were pursued for inoperable cases. Truncal vagotomy and gastrojejunostomy were performed in all cases of cicatrizing duodenal ulcer, with no recurrence of symptoms noted. Periampullary carcinoma and pancreatic cancer resulting in GOO are typically inoperable and require palliative treatment, with poor prognosis.

In conclusion, this study provides insights into the presentation and aetiology of GOO, highlighting Stomach Cancer as the most common cause in adults, followed by cicatrizing duodenal ulcer. GOO predominantly affects males in the fifth decade of life. Upper gastrointestinal endoscopy is the preferred diagnostic investigation. Malignant GOO carries a poor prognosis, often requiring palliative care. The study underscores the importance of early detection, suggesting upper gastrointestinal endoscopy as a potential screening modality for identifying the condition in its early stages that will add to prompt management and improve patient outcomes.

CONFLICT OF INTEREST

Authors declare that they have no conflict of interest.

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