



Gastric Outlet Obstruction in Western India– A Retrospective Analysis

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KEYWORDS

Corrosive, GOO, Gastro-jejunostomy, Malignancy, UGI Endoscopy.

ABSTRACT

Background

Gastric outlet obstruction (GOO) or pyloric obstruction is not a single entity. The clinical and pathophysiological consequence of many disease processes produces a mechanical obstruction to gastric emptying.

Methods

Total patients 89 patients attending the Surgical Gastroenterology Department of NHL Municipal Medical College, Ahmedabad, from December 2016 to December 2019 with chief complaints of projectile vomiting, visible gastric peristalsis or palpable distended stomach, diagnosed as GOO from UGI endoscopy and barium meal study were included in this study. Cases of the functional non-mechanical causes of GOO were excluded along with the pediatric age group. Only patients of 12 years and above were included in this study.

Results

Out of 89 cases studied, 46 were due to corrosive ingestion, 24 with malignant causes, out of which 20 were due to Carcinoma stomach, another three were due to GIST, and 1 case was due to carcinoma gall bladder infiltrating duodenum. 11 cases were due to cicatrizing duodenal ulcer and rest 8 cases due to pseudocyst of the pancreas. Most of them belong to low socioeconomic status. The average age of GOO due to corrosive was 31.2 yrs, for gastric neoplasia 53.6 yrs, for peptic ulcer disease 41.3 yrs, and 30.4 yrs for pseudocyst of the pancreas. GOO due to corrosive ingestion was more common in females, but



in the case of neoplasia, male preponderance was seen. Radical D-2 gastrectomy was performed for adenocarcinoma of the stomach and nonradical surgery for the rest; palliative GJ was done in 1 case. Morbidity in this study was 11.2 %, and mortality was 1.2 %.

Conclusion

Due to corrosive ingestion, GOO is common in western India; good clinical outcomes are seen if the patients are managed in a staged manner, i.e., improvement of nutritional status followed by definitive surgical management. Diversion gastrojejunostomy without resection of the cicatrized stomach gives acceptable outcomes.

INTRODUCTION

GOO occurs due to partial or complete obstruction of the pylorus, distal stomach, or proximal duodenum. (1) This may occur as an extramural, mural, or intramural, combination of the same. In olden days, goo was described as "The stomach you can see, the stomach you can feel, and the stomach you can hear."(1, 2)

As part of the initial workup, the possibility of functional non-mechanical obstruction causes, such as diabetic gastroparesis, should be excluded. Once a mechanical obstruction is confirmed, it is essential to define the benign and malignant processes causing it because definitive treatment depends upon the cause of the obstruction.

Diagnosis and primary treatment should be made early because treatment delay may further compromise the patient's nutritional status. Until the introduction of effective ulcer therapy, cicatrizing duodenal ulcers was the most typical cause of GOO, and malignancy was attributed to only 20% of the cases. However, now, in the era of H2 blockers and proton pump inhibitors, the incidence of duodenal ulcers has decreased as symptomatic ulcers respond to medical treatment, although this has not been reflected in changes in complications like bleeding and perforation. (3) Corrosive injury resulting in GOO is also uncommon. (4) The damage following corrosive ingestion may be acute as perforation or necrosis of the stomach or may result in progressive scarring, which may lead to GOO. Although cicatrization of the stomach following

corrosive ingestion is rarely seen, it remains one of its main long-term complications. Patients may develop symptoms of GOO within three months of corrosive ingestion, and strictures may develop in a delayed manner from 1 year to 6 years after the initial ingestion of a corrosive. (4) The majority of such patients with late sequelae require surgery.

OBJECTIVES

In this article, we present our experience managing patients with GOO at our tertiary level at a hospital in Ahmedabad. We aim to identify the changes in aetiology and presentation of GOO given changing trends in the treatment management

To evaluate diagnostic methods and management strategies of GOO in adults

To study the socio-demographic variables of patients who present to us with corrosive ingestion, surgical procedures performed on these patients, and complications experienced by these patients postoperatively.

MATERIALS AND METHODS

This retrospective study was done in all patients with clinical features of gastric outlet obstruction due to various aetiologies who were surgically treated in the Department of Surgical Gastroenterology, NHLM Medical College, and Ahmedabad from April 2016 to April 2019. Patient's details from the MRD were extracted after initial approval from the institutional



ethical committee was obtained. The information compromised of patients on demographic data, intent of ingestion of corrosive acid, immediate and late management the patient received indications of the surgery, details of surgical procedure done, and complications faced by the patient. We also collected patients' other parameters, e.g., surgical details, body weight, and nutritional status pre- and postoperatively, including follow-up details. Collected data was compiled and entered into Microsoft Excel sheets. Using graph pad.com statistical software, we analysed the data for descriptive statistics using appropriate statistical techniques. Patients with corrosive ingestion with dysphagia and odynophagia for 8-10 days were treated with initial feeding jejunostomy to maintain nutrition, and definitive treatment was planned six months after the final UGI endoscopy and barium meal study reports.

INCLUSION CRITERIA

Clinical Features

History-----projectile vomiting

Inspection-- visible gastric peristalsis [VGP]

Palpation----presence of a palpably distended and hypertrophied stomach

Auscultation--- gastric succussion splash heard

3-4 hours after the last meal

Overnight fasted gastric aspirate more than 200ml.

Saline load test of Goldstein

Upper Gastrointestinal endoscopy demonstration

Radiological demonstration of gastric outlet obstruction.

Demonstration at the operation of gross narrowing of the gastric outlet

EXCLUSION CRITERIA

- 1) Age \leq 12 YRS(PAEDIATRIC AGE)
- 2) Cases of functional non-mechanical causes of GOO
- 3) Pt The oesophageal stricture not responding to endoscopic therapy
- 4) Patients not willing for surgery

RESULTS

Out of 89 cases of GOO, 46 had corrosive injury, 24 had gastric neoplasia, 11 had PUD, and 8 had pancreatic pseudocyst. The tables and charts below depict the age, etiology, sex, occupation, symptoms, signs, type of corrosive gastric strictures, type of surgery, morbidity, and follow-up.

Table 1 shows the sex distribution.

Sl no	Cause	Total cases	Male (%)	Female (%)	Male: female	Percentage (wrt to 89 cases)
1	Corrosive	46	22(47.8%)	24(52.1%)	1: 1.09	51.685
2	Neoplasia	24	15 (62.5%)	9 (37.5%)	1.6 : 1	26.966
3	PUD	11	3 (27.27%)	8(72.7%)	1: 2.6	12.359
4	Pancreatic pseudo cyst	8	6 (75%)	2(25%)	3:2	8.98
		89	46 (51.6%)	43 (48.3%)	1.06 : 1	100



Chart 1 shows the sex distribution

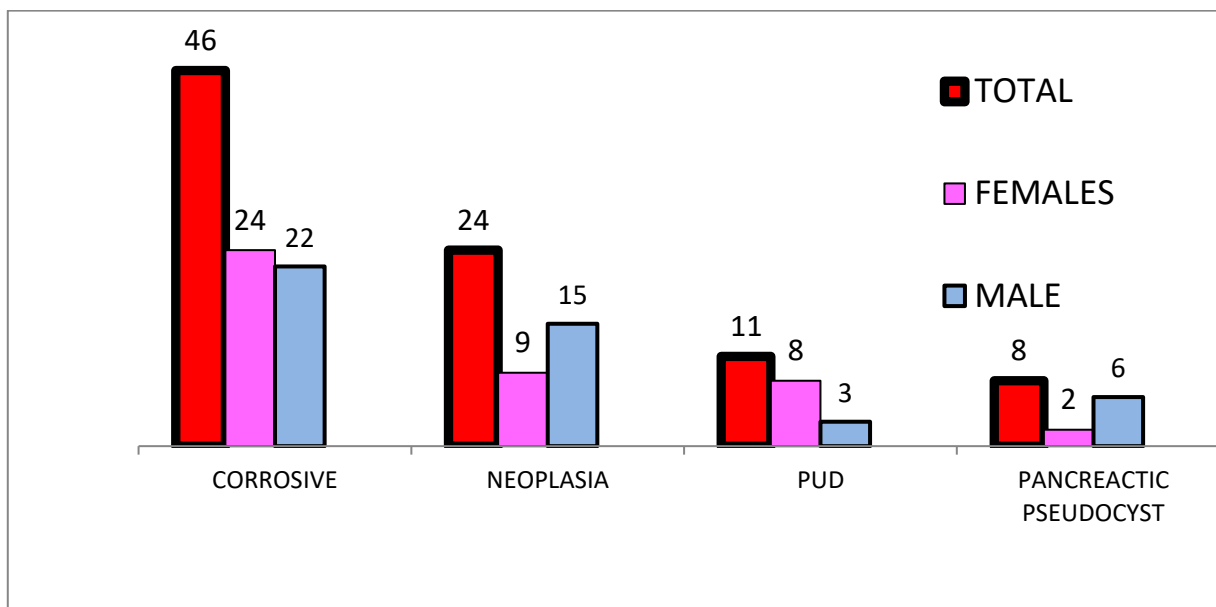


Table 2 shows the occupation distribution

occupation	Number	Percentage
labours	35	39.3
farmers	24	26.9
students	15	16.8
businessman	10	11.2
house wife	5	5.6

Chart 2 shows the occupation distributions

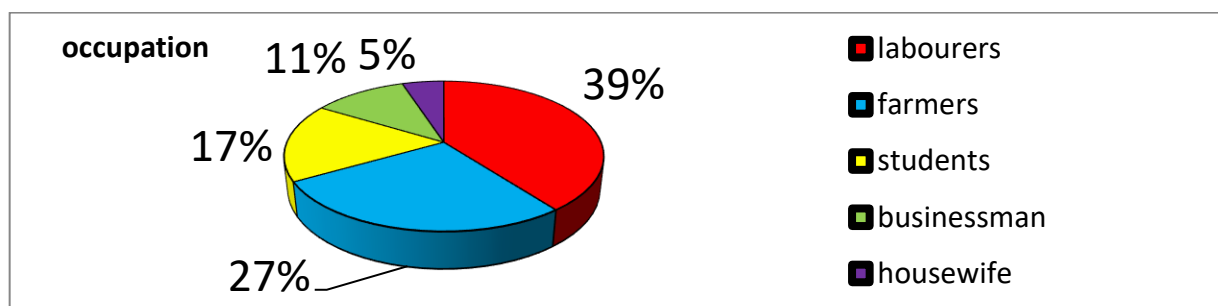


Table 3 shows the Age group distribution

Age in years	number	percentage
11-20	9	10.11236
21-30	18	20.22472
31-40	28	31.46067
41-50	7	7.865169
51-60	7	7.865169
61-70	15	16.85393



71-80	5	5.617978
>80	0	0
total	89	100

Chart 3 shows the Age group distributions

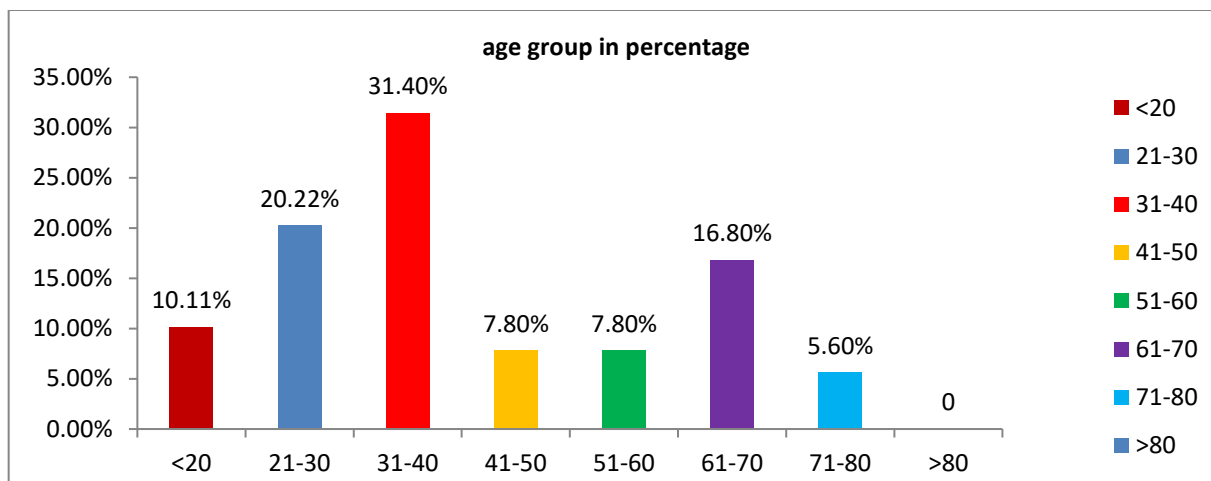


Table 4 shows the average age distribution

Sl no	disease	Average age in years
1	Corrosive	31.2
3	Neoplasm of stomach	53.6
4	PUD	41.3
5	Pancreatic pseudo cyst	30.4

Chart 4 shows the average age distribution

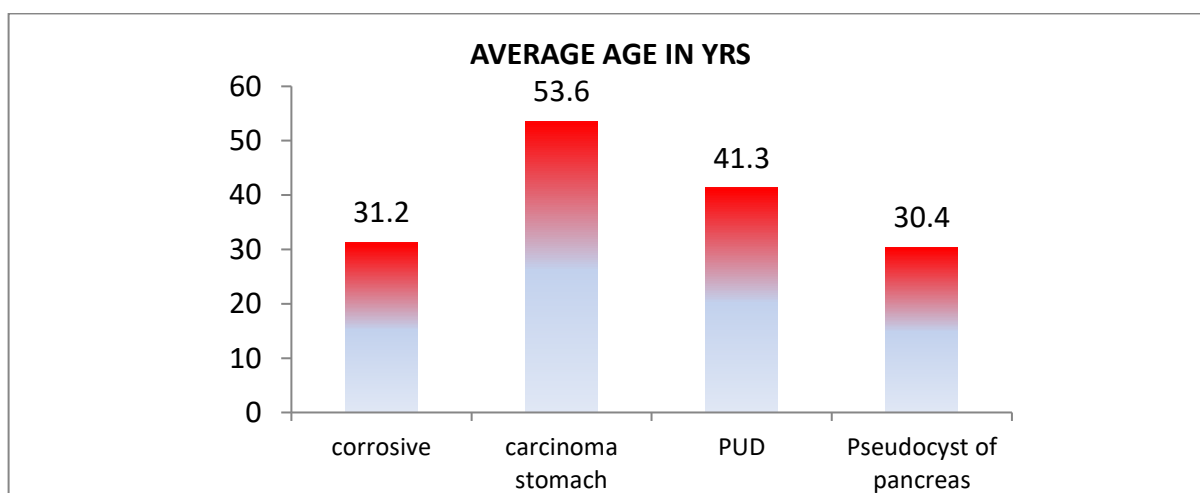


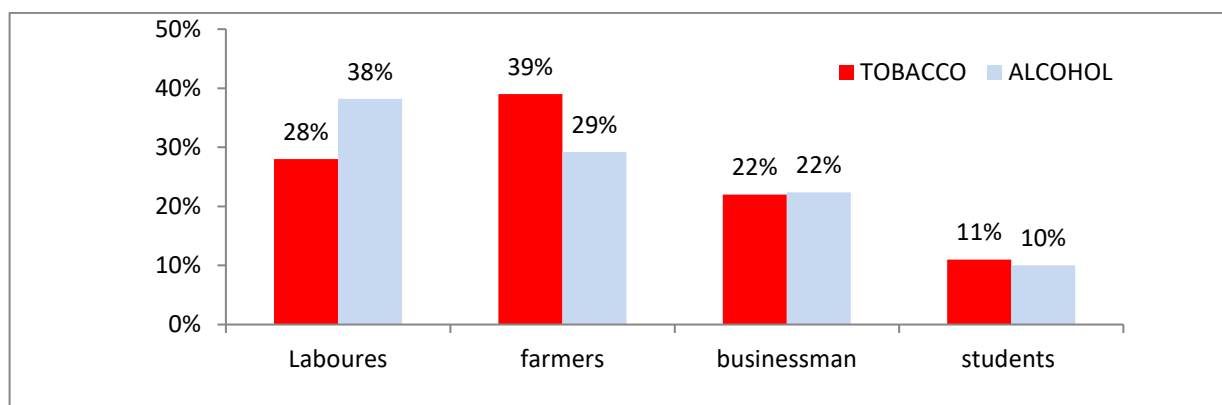


Table 5 shows the alcohol and tobacco consumption distribution

The habit of tobacco consumption was seen in 39% patients and alcohol consumption in 43% patients.

Sl number	Tobacco consumption		Alcohol consumption	
	No of cases	percentage	No of cases	Percentage
Farmers	35	39	26	29.2
Labourers	25	28	34	38.2
Students	10	11	9	10.1
Businessman	19	22	20	22.4
total	89	100	89	100

Chart 5 shows the alcohol and tobacco consumption distribution



The association of smoking and alcohol was consistently seen amongst all patients (100%) of Ca pyloric antrum and cicatrizing duodenal ulcer. Blood group O (80.8%) was the most common, followed by blood group A (12.3%).

Table 6 shows the blood group distribution

Aetiology	Blood group O	Blood group A	Blood group B	Blood group AB
Corrosive	40	1	4	1
Neoplasia	5	17	2	0
PUD	8	2	1	0
Pancreatic pseudo cyst	5	2	0	1
TOATAL	58	22	7	2



Table 7 shows the symptoms distribution

ETIOLOGY	TOTAL CASES	PAIN		VOMITING		ANOREXIA		WT LOSS		UGI BLEED		MALENA		FULLNESS	
		TOTAL CASES	%	TOTAL CASES	%	TOTAL CASES	%	TOTAL CASES	%	TOTAL CASES	%	TOTAL CASES	%	TOTAL CASES	%
CORROSIVE	46	0	0	46	100	41	89.13	41	89.13	4	8.69	1	2.17	44	95.65
NEOPLASIA	24	6	25	24	100	20	83.33	20	83.33	11	45.83	6	25	20	83.33
PUD	11	11	100	11	100	6	54.54	6	54.54	4	36.36	2	18.18	7	63.64
PANCREATIC PSEUDOCYST	8	8	100	8	100	8	100	8	100	0	0	0	0	8	100

Chart 6 shows the symptoms distribution

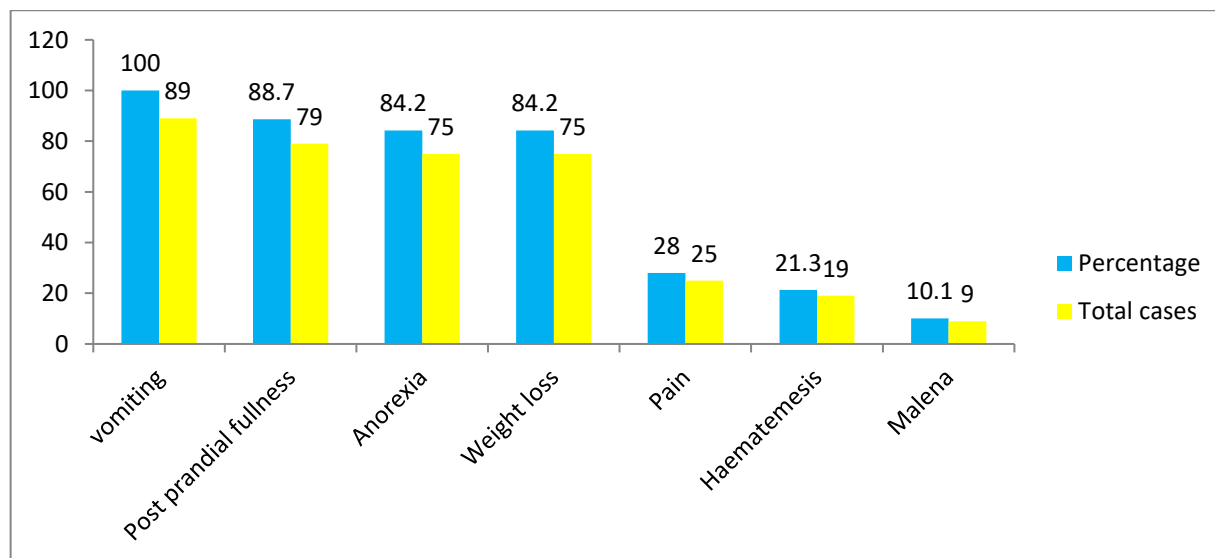


Table 8 shows the signs distribution

Aetiology	Total Cases	Pallor		dehydration		Pedal oedema		VGB		Succussion splash		Mass		Tenderness	
		cases	%	cases	%	cases	%	cases	%	cases	%	cases	%	cases	%
Corrosive	46	34	73.9	29		19		4	8.6	4	8.6	0	0	0	0
Neoplasia	24	24	100	21		11		6	25	6	25	4	16.6	3	12.5



PUD	11	3	27.7	10		3		11	100	11	100	0	0	0	0
Pancreatic pseudo cyst	8	3	37.5	3		2		2	25	6	75	8	100	2	25

Chart 7 shows the signs distribution

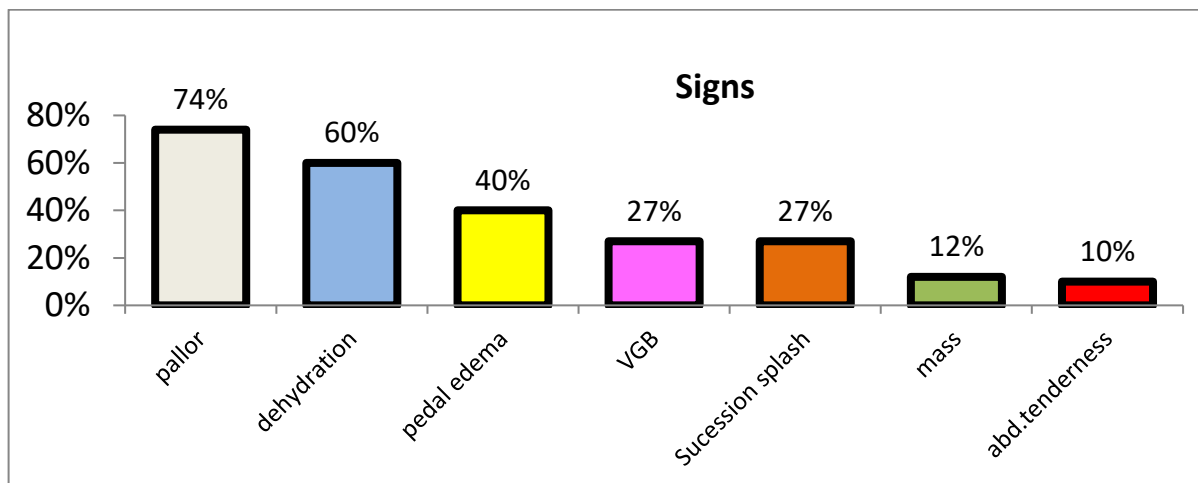


Table 7A shows the table showing ct scan findings

Sl no	Aetiology	Ct scan findings	cases	percentage
1	Corrosive	Stricture of pyloric region with dilated stomach	36	78.2%
		Stricture of antral region	7	15.2%
		Stricture involving body of stomach	3	6.5%
2	Neoplasia	Irregular polypoidal mass of antrum causing luminal narrowing	24	26.966
3	PUD	changes of wall thickening and luminal narrowing in outlet obstruction	11	12.359
4	Pancreatic pseudo cyst	Cystic mass compressing 2nd and 3rd part of duodenum	8	8.98

Table 9 shows the pre-operative albumin, haemoglobin & BMI distribution

Sl number	Aetiology	Pre op average albumin	Pre op average haemoglobin	Pre op average BMI
1	Corrosive	2.9	8.5	18.1
2	Neoplasm	2.7	7.4	16.5
3	PUD	3.9	10.2	19.4



4	Pancreatic pseudo cyst	3.7	10.8	20.3
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Chart 8- shows the pre-operative albumin, haemoglobin & BMI distribution

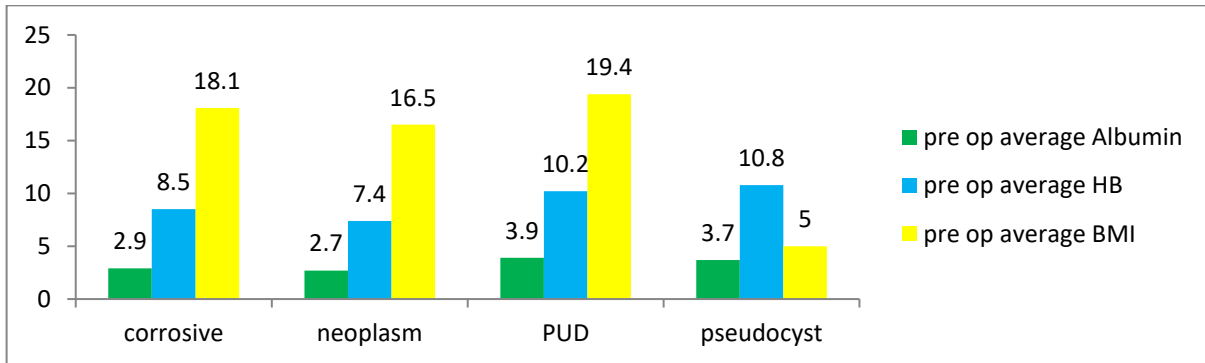
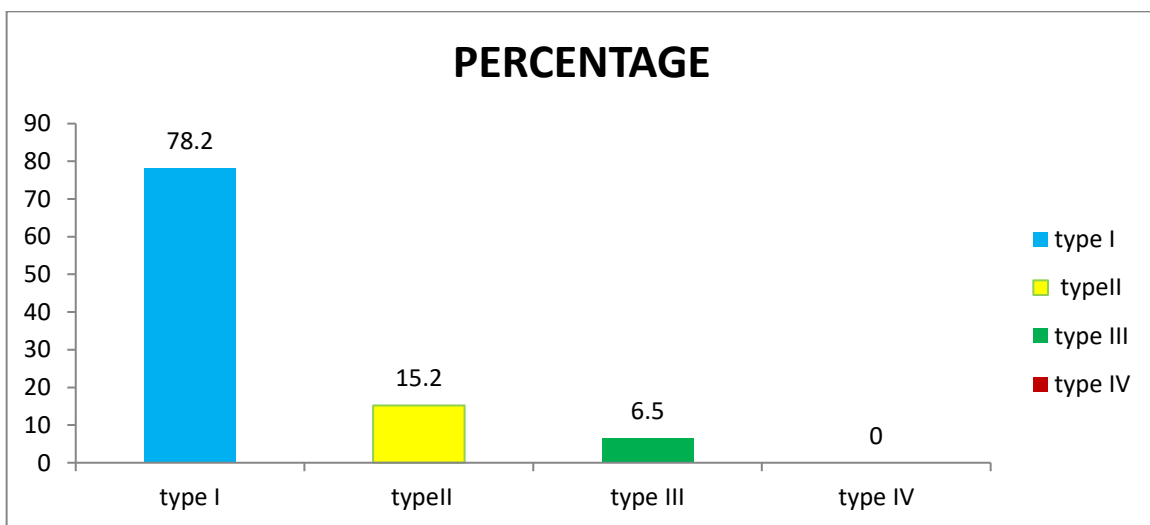


Table 10 shows the endoscopic corrosive gastric stricture grading distribution

Sl no	Type of endoscopic corrosive gastric stricture	Cases	Percentage (total 46 cases)
1	Type I	36	78.2%
2	Type II	7	15.2%
3	Type III	3	6.5%
4	Type IV	0	0

Chart 9 shows the endoscopic corrosive gastric stricture grading distribution



**Table 11 shows the corrosive gastric stricture surgeries distribution**

Sl no	Type of surgery in corrosive	Cases	Percentage (total 46 cases)
1	distal gastrectomy + B II	3	6.5%
2	Antrectomy + B II	7	15.2%
3	Retrocolic GJ	36	40.4%

Table 12 shows the overall type of surgeries distribution

Sl no	Over all Type of surgery	Cases	Percentage
1	Retrocolic GJ	36	40.4
2	Distal gastrectomy + B II	6	6.7
3	TV+GJ	11	12.5
4	Cystogastrostomy	8	8.9
5	Antrectomy + B II	7	7.8
6	D 2 gastrectomy + B II	20	22.4
7	Palliative ante-colic GJ	1	1.1

Post-operative oral feeds were started in the form of clear fluids from POD. The morbidity seen in this series was 11.2 % and one patient died on POD 10 due to GJ leak and sepsis as she was having advanced carcinoma gall bladder infiltration the duodenum mortality

Table 13 shows the post-operative complications

Sl number	Post-operative complication	No of cases
1	Post-operative fever	3
2	Surgical site infection	2
3	PONV	2
4	DGE	1
5	Pulmonary complication	1
6	Anastomotic leak	1

All 20 gastric carcinoma patients received chemotherapy postoperatively, cisplatin, and a 5-fluorouracil regimen in resectable diseases; unresectable disease received epirubicin, cisplatin, and a 5-fluorouracil (5fu) regimen for 6 cycles at an interval of 21 days; and 3 patients with GIST received imatinib for 2 years.



Table 14 shows the follow up distribution

FOLLOW UP	1 ST MONTH	3 RD MONTH	6 TH MONTH	REMARKS
CORROSIVE	46	46	46	6 patients had gastritis, medical management Was done
NEOPLASM OF STOMACH	23	23	23	All Underwent successful chemotherapy
PUD	11	11	11	All were symptom free
PANCREATIC PSEUDOCYST	8	8	8	2 patients continued to have recurrent pain Abdomen

Table 15 showing average weight gain after 2 months of surgery

Aetiology	Average weight gain (2 months after the surgery)
Corrosive	3.1 kgs
Carcinoma	2.7 kgs
PUD	4.2 kgs
Pancreatic pseudo cyst	4.9 kgs

Discussion

The discussion is mainly on observations made from etiology, presenting symptoms, signs, investigations, surgeries performed, and follow-up of 89 cases of GOO who attended the Surgical Gastroenterology Department, NHL Municipal Medical College Ahmedabad for 3 years. The most typical cause of GOO was corrosive gastric strictures, seen in 46 cases (51.6%), and the second common cause was gastric malignancy, seen in 24 cases (26.9%), of which 20

(83.3%) were due to Ca stomach and 3 (12.5%) due to GIST, 1 (4.1%) due to carcinoma GB.

AETIOLOGY

Before the PPI era, duodenal ulcers were the most common cause of GOO. Regarding individual incidences, carcinoma of the stomach was the most common cause of GOO in various studies after the PPI era. However, corrosive gastric stricture was the most common cause in our study.

Table 16 etiological comparisons between other studies

Study name	year	Most common cause of GOO	Percentage
Godadevi TSRSV, Reddy RA et al. ⁽⁶⁾	2016	Ca stomach > PUD	52% > 46%
Kumar PN, Lakshmi RM. et al. ⁽⁷⁾	2017	Ca stomach > CDU	51% > 36%
Clement SH, Cherukumalli RP et al. ⁽⁸⁾	2017	PUD > Ca stomach	52% > 25 %
Tejas AP, Jade R et al. ⁽⁹⁾	2018	Ca stomach = PUD	41.5%
PRESENT STUDY	2019	Corrosive > Ca stomach	51.6% > 26.9%



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AGE

In this study, the mean age for stomach malignancy is 53.6 years, and for benign causes, it is 34.3 years. In malignancy stomach with GOO, the youngest age of presentation is 22 years (GIST), and the oldest is 68 years. The majority of malignant cases were in the age group 50-60; however, the majority of cases were due to corrosive gastric strictures, being 31-40 years.

Table17 shows the age comparisons between other studies

Study	year	Average age of GOO	Most common cause with average age of presentation
Godadevi TSRSV, Reddy RA et al ⁽⁶⁾	2016	6 th - 7 th decade	Ca stomach > PUD (54.3 yrs) (47.7 yrs)
Kumar PN, Lakshmi RM. Et al ⁽⁷⁾	2017	5 th decade	Ca stomach > CDU (57.4 yrs) (47.5 yrs)
Clement SH, Cherukumalli RP et al. ⁽⁸⁾	2017	5 th - 6 th decade	PUD > Ca stomach (53 yrs) (42.5 yrs)
Tejas AP, Jade R et al. ⁽⁹⁾	2018	3 rd -4 th decade	Ca stomach = PUD
PRESENT STUDY	2019	3 rd -4 th decade	Corrosive > Ca stomach (31.2) (53.6)

Of the 89 cases studied, 43 were female and 46 were male. The male to female ratio of 1:1.06. Regarding individual aetiologies, the male-to-female ratio (M: F) in the case of corrosive gastric strictures was 1: 1.09 (table 1). Most of the sub-continental studies have shown that men have outnumbered women as a whole, from a ratio (M: F) varying from 2.7: 1(7), 3.5:1(8), 5:2(6), and 5.5:1(10) as aetiologies. The almost equal ratio of the GOO seen in our series and increasing PUD cases in females can be explained by increasing working culture in females and increasing mentally stressful life, including home violence leading to more cases of corrosive ingestion.

OCCUPATION

GOO was most commonly seen in laborers with low socioeconomic status due to irregular dietary habits, which contributed to the disease process, followed by farmers; this observation was similar to other Indian studies (6-9).

SYMPTOMS

Similar to other Indian studies, vomiting was the most common symptom (100%), which was usually spontaneous and projectile-type, containing partially digested food particles. Pain has been the second predominant symptom in the other studies, but it was less commonly observed in our study as most cases were corrosive gastric strictures. In patients with GOO, due to malignant causes, the duration of abdominal pain varied from 2 months to 7 months. 14 of 20 patients having



GOO due to carcinoma stomach gave prior history suggestive of acid peptic disease suggesting malignancy developing in gastric ulcer. Abdominal pain was mainly present in the upper abdomen, and in 8 patients, there was radiation to the back-suggesting involvement of the pancreas. Duration of abdominal pain in chronic duodenal ulcers varied from two months to five years.

Those patients with a long history gave history suggestive of APD. 2 cases were previously operated for duodenal perforation. 10 of 11 cases gave a positive history of previous acid peptic disease and used proton pump inhibitors as over-the-counter medication. None out of 11 cases had taken anti-Helicobacter pylori treatment.

Table 18 symptoms comparisons between other studies

Symptoms	Godadevi et al ⁽⁶⁾	Kumar PN et al ⁽⁷⁾	Clement SH et al. ⁽⁸⁾	M.S. Sushruta et al ⁽¹¹⁾	Present study
	%	%	%	%	%
Pain	96	89	96.6	92.5	28.08
Vomiting	-	100	100	100	100
Anorexia	84	56	80	77.05	84.2
Weight loss	72	60	73.3	54.15	73.0
Ugi bleed	24	29	30	-	21.34
Melena	64	22	50	-	10.11
Fullness	68	-	-	-	88.7

Table 19 signs comparisons between other studies

Signs	Kumar PN et al ⁽⁷⁾	Clement SH et al. ⁽⁸⁾	Tejas AP et al ⁽⁹⁾	M.S. Sushruta et al ⁽¹¹⁾	Present study
	(%)	(%)	(%)	(%)	(%)
pallor	53	90	65.9	77.9	71.9
dehydration	54	70	-	94.07	70.7
Pedal oedema	-	-	-	-	39.3
VGB	63	96.6	75.6	52.25	25.8
Succusion splash	36	80	70.7	41.8	30.3
Mass	25	36.6	36.6	28.1	13.4
tenderness	-	-	-	-	5.61

In agreement with other studies, the diagnosis of GOO in this study was based on clinical presentation, radiologic, and esophagus-gastro-duodenoscopy findings, which were confirmed by histology and intra-operative findings. Other diagnostic investigations

included abdominal ultrasound and computerized tomography (CT) scan.

BLOOD GROUP

Most commonly, patients had blood group O followed by A. In cases of GOO due to stomach malignancy and



PUD, the blood group distribution was similar to other studies. However, in the present study, GOO, due to corrosive gastric stricture, had blood group O > B.

Table20 blood group comparisons between other studies

Study	M/C blood group over all (%)	M/C blood group PUD	M/C blood group Ca Stomach	M/C blood group Corrosive/ others
Godadevi et al ⁽⁶⁾		O > A (52%) > (26.08%)	A > other blood groups (50%)	-
Tejas AP et al ⁽⁹⁾	O > A (56.1% > 24.4%)	O > A (76.5%) > (23.5%)	O > A (47.1%) > (35.3%)	-
M.S. Sushruta et al ⁽¹¹⁾	O > A (42%) > (30%)	O > A (77.7%) > (11.1%)	A > O (40.6%) > (21.8%)	-
Present study	O > A (65.1%) > (24.7)	O > A (8.9%) > (2.2%)	A > O (19.1%) > (5.6%)	O > B (44.9%) > (4.49%)

SURGERY

The most common type of corrosive gastric stricture seen in this study was the type I (36 cases) > II(7 cases) > III (3 cases), which were treated by retro colic GJ, antrectomy+ B II and distal gastrectomy + B II, respectively. One palliative ante colic g j was done in advance ca GB, which expired on POD10. Twenty patients with gastric adenocarcinoma underwent D2

gastrectomy, and three patients with GIST had distal gastrectomy, all of which had more intraluminal than extra luminal components. All patients with PUD had TV + retro colic GJ, as they were using PPI on a long-term basis. Eight patients with pseudocysts of the pancreas as the cause of GOO underwent open cystogastrostomy.

Table21 operative procedure comparisons between other studies

Operative procedure	Kumar PN et al ⁽⁷⁾	Clement SH et al. ⁽⁸⁾	Tejas AP et al ⁽⁹⁾	M.S. Sushruta et al ⁽¹¹⁾	Present study
Retrocolic GJ	25 (palliative)		4.8 (palliative)		40.4
D2 gastrectomy + B II	23	16.6	12.1	36	22.4
TV+GJ	34	70	39.0	36	12.5
Cystogastrostomy					8.9
Antrectomy			2.4		7.8



Total gastrectomy	2				-
GJ+ HJ	10 (palliative)				
Distal gastrectomy + B II			24.3		6.7
Antecolic GJ (Palliative)		13.33		16	1.1

MORBIDITY

10 patients had post operative complication, hence in the present study the morbidity was 11.2 %,

Table 22 morbidity comparisons between other studies

Morbidity	Kumar PN et al (7)	Clement SH et al.(8)	Tejas AP et al (9)	M.S. Sushruta et al(11)	Present study
	(%)	(%)	(%)	(%)	(%)
Post operative fever			8		3
Surgical site infection	6	4		12	2
PONV					2
DGE					1
Pulmonary complication		3	6	6	1
Anastomotic leak					1
Bile leak	1			1	

MORTALITY

Table 23 mortality comparisons between other studies

Sl no	Study	Mortality	
		Cases	percentage
1	Kumar PN et al (7)	3	5.45
2	Clement SH et al.(8)	1	2.5
3	Tejas AP et al (9)	1	2.4
4	M.S. Sushruta et al(11)	3	6
5	Present study	1	1.2



CONCLUSION

The present study gives an insight into the presentation of GOO and its etiology. Apart from carcinoma being the most typical cause of GOO in adults, followed by a cicatrizing duodenal ulcer, morbidity due to corrosive gastric strictures cannot be neglected. Corrosive consumption and corrosive gastric strictures were more commonly seen 3rd -4th decade of life. UGI endoscopy and barium meal were the investigations of choice for diagnosing GOO. Delayed definitive surgery showed good clinical improvement and fewer complications in corrosive gastric strictures. Resection of cicatrized is well accepted in type II and III corrosive gastric strictures.

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