

Laparoscopic Gastro-jejunostomy: An Ideal Solution to the Problem of Gastric Outlet Obstruction Post-corrosive Intake

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ABSTRACT

Objective: To evaluate the outcome of Laparoscopic Gastro-jejunostomy in patients presenting with Gastric Outlet obstruction secondary to Corrosive intake at the Services Hospital.

Study Design: Case series.

Place and Duration of Study: Department of Surgery, Services Hospital, Lahore, Pakistan, from June 2013 to June 2021.

Methodology: Data was gathered from the patients who presented with gastric outlet obstruction with a pre-hospitalised history of corrosive intake. Consenting patients subsequently underwent laparoscopic gastro-jejunostomy and were followed up post-operatively at a 1-week time-point and 4-week time-point to monitor progress. Studied variables included duration of surgery, duration of hospital stay, complications, and mortality at the 1st and 4th weeks.

Results: A total of 30 patients participated in the study including 27 (90%) females and 3 (10%) males. The mean age was 27.2 ± 4.07 years. The mean duration of hospital stay was 9.3 ± 3.2 days. Complications were seen in 3 patients (10%) with 1 death (3.33%).

Conclusion: Laparoscopic gastro-jejunostomy appears to be safe and effective in corrosive intake patients presenting with gastric outlet obstruction.

Key Words: *Corrosive Intake, Gastric outlet obstruction, Laparoscopic, Gastrojejunostomy.*

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INTRODUCTION

Ingestion of corrosive elements causes a wide spectrum of injuries to the gastrointestinal tract which include extensive necrosis and perforation of the esophagus and stomach.^{1,2} While these injuries are mostly accidental in children³, while they are more likely to be self-inflicted or due to malicious intent in the adults. The World Health Organization (WHO) estimates that approximately 0.3 million people die due to various poisoning agents every year.⁴ The American Association of Poison Control Center reports nearly 175,000 instances of caustic poisoning in 2013.⁵ The approximate number of poisoning (caustic or otherwise) is unknown in Pakistan.

A large number of cases of corrosive intake in the Indian-Subcontinent are of acid ingestion due to the ease of availability in the form of common household cleaning agents. Ingestion of caustic alkaline substances is relatively rare.⁶

The damage caused by these substances depends on the type of agent, the time period of contact, and the amount ingested. The effects of acid ingestion are different from those of base or alkali ingestion. Alkali ingestion tends to cause liquefactive necrosis of esophageal mucosa. Acids have faster transmission from the esophagus to the stomach and mostly cause superficial damage to the esophageal mucosa. Due to acid-induced pyloro-spasm, they have longer contact period with gastric mucosa and damage it by coagulative necrosis.⁷ The patient generally presents with pain in the stomach, non-bilious vomiting, dysphagia and significant weight loss. The management depends on condition of the patient, extent of injury to esophagus, cicatrization of stomach, and hemodynamic stability.

Gastric outlet obstruction (GOO) is a troublesome sequela secondary to ingestion of corrosives. It is a late complication caused by fibrosis of the mucosa after the initial period of acute injury and inflammation. The traditional treatment of gastric outlet obstruction caused by corrosive intake is surgery.⁶ Further complications, such as emaciation and delayed healing can arise due to failure of passage and absorption of food in gastro intestinal tract. Fluid and electrolyte imbalances are commonly requiring patients to be placed on Total Parenteral

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Nutrition (TPN) or enteral feeding *via* gastro-stomae or jejunostomae.⁸

The aim of this study was to determine the results of using laparoscopic gastrojejunostomy to bypass the gastric outlet obstruction in the patients of corrosive intake.

METHODOLOGY

The study was conducted from June 2013 to June 2021 at the Department of Surgery, Services Hospital, Lahore. Patients, who had presented with gastric outlet obstruction after the ingestion of corrosives which had been documented by radiographic or endoscopic study, were included. Patients, having contraindications to laparoscopic surgery, presenting in unstable condition with co-morbidities or obstruction due to the cause other than corrosive intake, were excluded from the study. Eligible cases were studied in a prospective observational manner and follow-up was arranged for them at a 1-week time-point as well as 4-week time-point to monitor progress after discharge from the hospital. Long-term follow-up is also being carried out for all the patients.

All the patients' data was documented in files as well as the hospital's electronic medical records. Fluid and electrolyte imbalance was corrected. Total parenteral nutrition was also started to minimise the nutritional deficit. Baseline investigations were performed daily to monitor biochemical progress. Pre-operative radiological and endoscopic investigations were also done in all the patients. All the surgeries were done by a consultant surgeon having more than 5 years of post-fellowship experience. Patients were called for post-op follow-up after one week and then at 4 weeks. Solids were encouraged at the first follow-up.

After obtaining informed consent patients underwent laparoscopic gastro-jejunostomy. A pneumo-peritoneum was developed by a closed method. The first 10mm port was placed at infra-umbilical position. Two working 5mm ports were inserted in the mid-clavicular line in the supra-umbilical position. Another 5mm port was inserted in the anterior axillary line on the left side to help with retraction.

Two windows into the lesser sac were made. The first step was to enter *via* the greater omentum into the lesser sac, while preserving the vasculature of the stomach. For the second step, the duodeno-jejunal junction and segment of gut 30cm distal to it, were identified and marked. We retracted the transverse colon to identify its vasculature within the mesocolon and created a window on the left side of the mid-colic artery which also opened into the lesser sac.

The identified loop of jejunum was then taken up via this opening and anastomosed with the posterior surface of the stomach with endo-staplers. The opening for the staplers was closed by intra-corporeal suturing. The anastomosis was retro-colic iso-peristaltic following which the loop of gut and defect in meso-colon was stitched to prevent herniation.

Postoperatively a drain was placed in all the patients which was removed within 24 hours. Patients were kept NPO for 72 hours, started on TPN, and then allowed clear fluids if oral intake was tolerable at that point. If the patients tolerated the fluids, they were then discharged after switching them to semisolids.

All the data of the patients were recorded on Excel spreadsheets and analysed on IBM SPSS. Categorical variables were expressed as counts and percentages while quantitative variables were expressed as mean and SD. We measured the following parameters; duration of surgery in minutes, duration of hospital stay in days, whether there were any intraoperative complications, and whether there were any complications and mortality at 1 and 4 weeks. We also analysed serum albumin levels at admission as well as on a 4-week follow-up to assess nutritional status. All the patients are still on follow-up.

RESULTS

A total of 30 patients were included in our study. 27 (90%) of the patients were female whereas 3 (10%) were male. The duration of surgery in most cases was around 148.7 (SD 8.6) minutes with the average hospital stay being 9.3 days (SD 3.2). In this study, the most common age group was 20-25 years (13, 43.3%) whereas the 31-35 years (9, 30%) age group was the second most common. Although the authors had no intraoperative mortality, one patient developed postoperative herniation leading to obstruction and mortality. Two (6.6%) patients developed infection at 1-week follow-up. One patient developed herniation and 1 (3.3%) patient developed efferent loop syndrome at the 4-week follow-up.

DISCUSSION

The ingestion of corrosive substances is an alarming problem in Pakistan and the Indian subcontinent which causes a wide spectrum of injuries to the gastrointestinal tract.^{2,9} The unchecked access to strongly corrosive substances in the form of household cleaning items makes them an easy choice for those planning to inflict self-harm.

Patients typically present with the complaints of difficulty or discomfort in eating, vomiting, and weight loss. Strictures caused by fibrosis of the damaged tract are known to develop from 1 year to 6 years after the initial ingestion and form the basis of gastric outlet obstruction.¹⁰ The stomach is more commonly injured by acids due to severe pyloro-spasm that leads to the pooling of corrosive material. Stenosis then leads to severe nutritional deficiencies and electrolyte imbalance which, if left untreated, will ultimately result in the death of the patient.¹¹

The majority of the patients were females. Almost three-quarters of the cases were younger than 30 years of age which shows an alarming trend in younger population. It has been noted that amongst the victims of suicide-related corrosive ingestion, the majority tend to be women.^{1,9} The present findings are in line with the previous report.

On average the operation lasted 148.7 ± 8.6 min; a slightly longer duration compared to what has been reported with open surgery (115 minutes).¹² Zhang made use of laparoscopic gastrojejunostomy in 28 patients with benign and malignant diseases leading to gastric outlet obstruction. He noted an average operative time of 170 minutes.¹³ The average hospital stay was 4 days, which is comparable to reports in international literature.¹⁴ The present patients started eating semi-solid food on the 3rd post-operative day. Other studies also found that the patients started solid food on the 4th day after laparoscopic gastrojejunostomy.^{13,15} A complication rate between 0 and 31% was seen in a systematic review by Jeurnink. *et al.*,¹⁶ whereas in this series 10% of the patients experienced complications post-operatively. Two patients developed wound site infection during admission which was managed conservatively. These patients had herniation resulting in obstruction after 1 week. The patient had been discharged and presented later. Re-exploration was done but unfortunately, the patient failed to recover and expired after re-exploration.

These patients had a mean hospital stay of 9.3 ± 3.2 days. Although most patients recovered easily from the surgery we aimed to optimize their nutritional status before discharging them as 19 (63.3%) of the patients had serum albumin levels of <3.0 g/dl on admission. At 4-week follow-up only 4 patients (13.3%) had serum albumin levels of <3.0 g/dl. This reflects in a good increase in overall nutritional status of these patients.

Management options for gastric outlet include: Total parenteral nutrition, feeding jejunostomy, gastrojejunostomy or stomach resection with anastomosis for gut continuity. Total parenteral nutrition (TPN) nutrition, while it is non-invasive, has the disadvantage of being expensive, cumbersome, and unsatisfying for the patient. Parenteral application of nutritional solutions is associated with complications that make optimal nutrition difficult.⁸ Feeding jejunostomy although easy to perform and sustain for the patient but carries social stigmata and patient satisfaction is minimum. Endoscopic balloon dilatation although avoids surgery but long-term outcomes are still uninspiring. Repeat dilatation is often required and technical failure may necessitate surgery. Although stomach resection and further anastomosis carry the advantage of completely removing the diseased portion, carrying out such a complex procedure in an emaciated patient with depleted reserves and the risk of anastomotic breakdown make it an unsuitable proposition. Gastro-jejunostomy provides a simple and effective method to enable patients to resume eating and return to normal life within a few days. The laparoscopic method avoids unsightly scars and morbidity associated with open surgery. However, the diseased portion remains which in future may act as a seat of malignancy.

Despite an extensive literature review, the authors have not found another study documenting the use of laparoscopic gastro-jejunostomy for the purpose of bypass of gastric outlet obstruction due to corrosive intake in adults. One such case series was done by Kucuk *et al.* and it only included three cases which were managed with a laparoscopic gastro-jejunostomy.¹⁷ Ozcan carried out a retrospective review of pediatric patients

who had presented to them with corrosive intake between 1980 to 2002. Eight patients of pediatric age had developed gastric outlet obstruction for which gastrojejunostomy was done. No late complications were observed in the series.¹⁸ Similarly, Shetty *et al.* carried out a retrospective study of patients presenting with corrosive intake between January 2006 and April 2017. Of the 81 patients included in their study loop, gastro-jejunostomy was performed in 76 patients. After an average follow-up of 6.7 years in the 68 patients with simple bypass without resection, no reported malignancy was seen.¹⁹ Currently, the authors have a follow-up of up to 5 years for these patients and there seems to be no adverse effects or development of malignancy. However, long-term follow-up would be required to detect the presence of any malignant lesion in the diseased portion of stomach.

This study is limited by its small size and single-centre data. However, despite these, it appears that laparoscopic gastro-jejunostomy appears to be a safe and cost-effective procedure achieving an early return to life with minimal complications.

CONCLUSION

In the authors' experience, laparoscopic gastro-jejunostomy with proper patient selection is a safe procedure with fewer complications that offers patients with gastric-outlet obstruction due to corrosive intake a return to normal life, especially in poor socio-economic setting.

ETHICAL APPROVAL:

Obtained from the Institutional Review Board, Services Institute of Medical Sciences. Ref. No. IRB/2018/402/SIMS.

PATIENTS' CONSENT:

Consent was obtained from the patients using a standardised consent form translated into patient's native language for use of data in this study.

COMPETING INTEREST:

The authors declared no competing interest.

AUTHORS' CONTRIBUTION:

FMA: Data acquisition, analysis, and interpretation, drafting, revising paper critically, and final approval.

UIB: Conception and design, interpretation, drafting, revising paper critically, and final approval.

MA: Interpretation, drafting, revising paper critically, and final approval.

MUW, WF, WHK: Critical revision of the paper and final approval.

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