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Thirty-day postoperative outcome of patients with non-traumatic gastroduodenal perforations in southwestern Uganda

Ronald Okidi¹ , Vanusa D Sambo¹, Martin D Ogwang¹, David Mutiibwa², Noralis P Benitez² and Felix Bongomin³ 

Abstract

We studied our 30-day postoperative outcomes in patients with non-traumatic gastroduodenal perforation (NTGDP) in Mbarara Regional Referral Hospital, southwestern Uganda. We conducted a one-year prospective study of patients who underwent exploratory laparotomy for suspected NTGDP between June 2016 and July 2017. Twenty-nine patients had NTGDP, the male-to-female ratio was 3:1 and median age was 60 years (range = 13–80 years). Most (83%) patients were negative for *Helicobacter pylori* on histology. One patient had a gastric adenocarcinoma. A total of 26 (90%) patients had Graham's omentopexy performed. The 30-day mortality rate was 34%. Pyrexia at hospital admission, pre-surgical delay (> 72 h), preoperative shock and peritoneal contamination, were associated with higher mortality rates with preoperative shock being an independent predictor of mortality. *H. pylori*-negative NTGDP presents a unique challenge in our setting, affecting mainly middle-aged and elderly patients. One-third of our patients did not survive one month.

Keywords

Non-traumatic gastroduodenal perforation, 30-day outcome, southwestern Uganda

Introduction

Gastroduodenal perforation (GDP) is a highly lethal surgical emergency with previously reported morbidity and mortality as high as 50% and 30%, respectively.¹ Worldwide, approximately 250,000 deaths are related to peptic ulcer disease (PUD), of which 70% are accounted for by GDP.² The prevalence of gastroduodenal ulcer perforation is high in low- and middle-income countries (LMICs),³ and worse still is its high death rate in the range of 10%–40%, irrespective of the availability of acid suppressive therapy which have reduced the occurrence of gastroduodenal ulcer.⁴

PUD is the most common aetiology of GDP, which for many years appeared to affect only young men but now is prevalent in both sexes regardless of age. This change in trend may be related to smoking and the use of ulcerogenic drugs.⁵ GDP, however, also occurs in neonates although the cause is still poorly understood.⁶ Acid hyper-secretion, *Helicobacter pylori*, ulcerogenic drug use (non-steroidal anti-inflammatory drugs and

corticosteroids) and cancer of the stomach or duodenum remain the usual culprits.⁷

Following a perforation, the contents of the stomach and duodenum leak into the peritoneal cavity resulting initially in a chemical peritonitis, which is quickly followed by sepsis.⁸ Urgent surgical treatment is mandatory in most cases (except where the perforation has self-sealed), the most commonly performed procedure being Graham's omentopexy.⁹ More extensive intervention is rarely indicated in acutely ill patients unless the anatomy demands it in *H. pylori*-negative patients.¹⁰ Poor surgical outcome has been linked to perioperative shock, treatment delays > 24 h, larger

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perforation size, old age and the presence of major comorbidity.¹¹

There is a paucity of studies on GDP in low-resource settings and the pattern of perforated gastroduodenal ulcer disease is known to vary from one geographical area to another.

Awareness of the factors associated with poor treatment outcome may enable clinicians to change approaches to management appropriately, while determining the histopathological characteristics of perforation should reduce the inappropriate use of antibiotics for eradication of non-existent *H. pylori*.

The aim of the present study was therefore to determine the clinical profile, histopathological characteristics and factors associated with poor surgical outcomes in patients with gastroduodenal perforations in south-western Uganda.

Patients and methods

We conducted a 12-month prospective case series between June 2016 and May 2017 at the Department of Surgery of Mbarara Regional Referral and Teaching Hospital. Participants were followed postoperatively daily until discharge and thereafter every two weeks for 30 days or earlier in the event of death.

Consecutive patients presenting at the emergency unit with clinical suspicion of GDP based on clinical signs and symptoms, erect plain chest radiography and abdominal ultrasound scanning were enrolled. Consent for their study was obtained individually. Exclusions were those with GDP with primary repair performed in another health unit, where other intestinal perforation was diagnosed intraoperatively in the absence of a gastroduodenal perforation, and those where consent had not been obtained. Preoperatively, all patients were resuscitated with 30 mL/kg body weight of intravenous crystalloids within the first 3 h of presentation in order to promote a urine output of >0.5 mL/kg/h, were administered a single dose of 2G ceftriaxone intravenously and were investigated by ascertaining a full blood count, urea and electrolyte levels.

An exploratory laparotomy was performed on every patient by the surgeon and resident on call, with biopsy samples being taken from perforation sites. Intraoperatively, 3 L normal saline was used for peritoneal lavage after suctioning of the free fluid in the abdomen. Postoperatively, all patients were kept nil orally with a freely draining nasogastric tube in situ. Intravenous ceftriaxone 2G b.i.d. and metronidazole 500 mg t.i.d. were continued postoperatively with standard 3 L/day fluid regimes for at least 72 h.

Data collection was carried out using predesigned and pretested semi-structured questionnaires and data collection sheets, which were completed preoperatively.

Data collection continued up to a period of 30 days after surgery. All collected data were entered into Epi Info v7. Mortality within the first 30 postoperative days was determined.

The principal investigator worked together with supervisors and research assistants. Tissue biopsies were analysed by a senior pathologist. Ten percent of biopsies were sent to a control laboratory for quality assessment.

The Department of Surgery, Faculty Research Committee, Hospital Director as well as Institutional Research and Ethics Committee approved our study. Recruited patients' data were kept confidential. No patient was denied medical care in the interest of altering the outcome of the study and all were free to withdraw from the study at any time.

Statistical analysis was performed using STATA v12. Univariate analysis was carried out for sociodemographic factors and clinical profiles. Continuous data were summarised in terms of mean and standard deviation or median and range, as deemed appropriate, and categorical variables were summarised in terms of frequencies and percentages. Continuous variables were categorised, and bivariate and multivariate logistic regression analyses were used to analyse for factors associated with poor surgical outcome. $P < 0.05$ was considered statistically significant.

Results

A total of 34 patients were diagnosed clinically with GDP, of whom five with intraoperative findings of small bowel perforations were excluded. There were 22 men in the remaining 29 who had a median age of 60 years (interquartile range [IQR] = 35–63 years). Table 1 summarises the sociodemographic characteristics of the participants. The average length of hospital stay was 6.93 ± 2.96 days (range = 1–13 days).

Gastric perforation contributed to 18 (60.1%) cases. A leucocytosis of >10 cells/cm³ was seen in 24 (82.8%) cases, as shown in Table 2.

One patient was found to have both jejunal and antral perforations; no perforations were found to have been sealed off by omentum and the amount of free peritoneal fluid was in the range of 600–1800 mL with a mean of 1222 ± 595 mL. Intraperitoneal frank pus was demonstrated in 8 (27.6%) patients.

A majority ($n = 26$, 89.7%) of patients underwent Graham's omentopexy closure of the perforations. During this procedure, full thickness interrupted sutures were placed across the perforation site, and a patch of greater omentum was brought without tension, positioned over the perforation and the sutures successively tied from the superior to the inferior aspect across the patch to anchor it in place.

Table 1. Sociodemographic data.

Variable	n	%
Age category (years)		
< 35	8	27.6
36–49	5	17.2
≥50	16	55.2
Sex		
Male	22	75.9
Female	7	24.1
Marital status		
Married	26	89.7
Single	3	10.3
Occupation		
Peasant farmer	20	69.0
Business	8	27.6
Others	1	3.4
Address		
Isingiro	9	31.0
Ntungamo	5	17.2
Mbarara	2	6.9
Others	13	44.8
Referral status		
Non-referral	18	62.1
Referral	11	37.9

Gastrectomy was only performed on one patient who had a clear gross appearance of a malignant perforation, while Graham's omentopexy plus gastrojejunostomy, a drainage procedure without gastric resection, was performed on a patient with giant antral perforation (> 2 cm in diameter), thus relieving pressure at the site of repair.

Biopsies proved negative for *H. pylori* in 24 (82.8%) patients and were only positive in 4 (13.8%) patients. One patient had ulcerated invasive well-differentiated adenocarcinoma. The one concomitant jejunal perforation seen showed non-specific inflammation.

Death ensued in 10 (34.5%) patients within 30 days, of whom 7 (70%) were attributed to septicaemia and 3 (30%) to severe pneumonia. Gastric perforations accounted for 70%. All remaining 19 survivors had at least one of the complications shown in Table 3.

Two (10.5%) patients had second laparotomies performed, one to repair a persistent leak and one a burst abdomen secondary to surgical site sepsis. Peritoneal lavage with 3 L of 0.9% warm normal saline solution and gastrojejunostomy, with a feeding jejunostomy tube placing was carried out for the former, while tension sutures were placed for the latter. We heard of no mortality after patient discharge, and no one was lost to follow-up within the 30-day period.

Table 2. Clinical profile of patients with gastroduodenal perforations.

Variable	n	%
Abdominal pain	29	100
Abdominal tenderness	29	100
Abdominal distension	28	96.6
Ileus	11	37.9
Pyrexia	10	34.5
Preoperative shock	11	37.9
Vomiting	6	20.7
Duration of symptoms (h)		
≤72	13	44.8
>72	16	55.2
Co-morbid illness		
Pneumonia	3	10.3
HIV	2	6.9
Malaria	1	3.5
Cigarette smoking	12	41.4
Alcohol consumption	19	65.5
Pneumoperitoneum	11	37.9
Site of perforation		
Gastric	18	62.1
Duodenum	11	37.9
Peritoneal contamination		
Serosanguinous	21	72.4
Pyoperitoneum	8	27.6
Perforation size (mm)		
≤5	10	34.5
>5	19	65.5
ASA		
I	0	0.0
II	13	44.8
III	13	89.7
IV	2	96.6
V	1	3.5
Urea >9.2 (mmol/L)	1	13.9
Leucocytosis >10 cell/cm ³	24	82.8

Table 3. Postoperative complications and mean duration of hospital stay.

Postoperative complications	n	%	Mean duration of hospital stay (days) ± SD
Surgical site infection	7	36.8	9 ± 2.24
Septicaemia	7	36.8	3 ± 1.26
Pneumonia	3	15.8	6 ± 3.46
Repair leak	1	5.3	13
Burst abdomen	1	5.3	10

Table 4. Bivariate logistic regression analysis for factors associated with poor surgical outcome.

Characteristics	cOR (95% CI)	P value
Age (years)		0.06
≤50	1	
>50	5.5 (0.91–33.184)	
Pyrexia at admission		0.007*
No	1	
Yes	12.4 (2.00–77.60)	
Presurgical delay (h)		0.018*
≤72	1	
>72	5.4 (1.60–148.82)	
Presence of co-morbidity		0.079
No	1	
Yes	5.7 (0.82–39.27)	
H. Pylori status		0.464
No	1	
Yes	0.4 (0.04–4.33)	
Preoperative shock		0.003*
No	1	
Yes	42 (3.71–475.04)	
Peritoneal contamination		0.001*
No	1	
Yes	34 (4.03–286.83)	

CI, confidence interval; crude odd ratio (cOR)*. Statistically significant.

Table 5. Multivariate logistic regression analysis of risk factors for poor surgical outcome of gastroduodenal perforation.

Characteristics	aOR (95% CI)	P value
Pyrexia at admission	2.0 (0.10–37.38)	0.650
Presurgical delay (h)	1.3 (0.03–62.67)	0.900
Preoperative shock	22.0 (1.05–46.46)	0.046
Peritoneal contamination	16.0 (0.51–502.00)	0.115

aOR, adjusted odds ratio; CI, confidence interval.

Pyrexia at admission, presurgical delay of > 72 h, perioperative shock and peritoneal contamination were found to be significant factors associated with poor surgical outcome (Table 4).

The significant factors were analysed in a multivariate model and only preoperative shock remained a significant predictor of poor surgical outcome (Table 5).

Discussion

In Uganda, patients tend to present late for health-care.¹³ Delays were attributed to distance from

our surgical centre or delay at health facilities before referral to Mbarara Regional Referral and Teaching Hospital.

Most of our patients presented with a grossly contaminated peritoneum, which is inevitably infected by this time. This rapidly results in septicæmia and leads to multi-organ failure,¹⁶ which demands reversal of this process as early a stage as possible. The primary necessity is thorough peritoneal lavage with copious amounts of fluid. This may need to be repeated within 48 h of the first laparotomy. Relying on antibiotics alone is a false hope.

Declaration of conflicting interests


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