

Perforated gastric ulcer – reappraisal of surgical options

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Summary

Background. The available operative procedures for perforated gastric ulcer are gastrectomy, ulcer excision and omental patch closure. This study analysed the outcome of these operative options in a single institution.

Patients and methods. Seventy-two patients (mean age 43 years, 62 males) with perforated gastric ulcers were managed by laparotomy. There were 34 lesser curve (incisural) and 38 antral ulcers.

Results. Partial gastrectomy was performed in 27 patients, ulcer excision in 27 and simple patch closure in 18. Two ulcers were malignant. The mortality rate was 18% (26% for gastrectomy, 19% for ulcer excision and 5% for patch closure). Shock on admission ($p = 0.006$) and *Candida* ($p = 0.020$) in the histological specimen were predictive of poor outcome. Hospital stay was similar in the 3 groups.

Conclusion. Omental patch closure and ulcer excision are as effective as gastrectomy in the management of perforated gastric ulcer and merit consideration as first-line therapy in technically applicable cases.

Distal gastrectomy is generally considered to be the preferred surgical treatment for perforated gastric ulcer.¹ However, it has significant mortality (15 - 47%)²⁻⁵ and morbidity (35 - 48%)^{2,3} rates, which are higher in the elderly.⁶ Gastric ulcers are now curable by medical treatment. This therapeutic advance means that omental patch closure and ulcer excision are being increasingly employed as alternatives to gastrectomy.

In view of these changing concepts we wished to analyse our experience with perforated gastric ulcer in relation to how surgical options and other variables affected outcome

Patients and methods

Medical records of patients with perforated gastric ulcer admitted to King Edward VIII Hospital, Durban, between 1991 and 2000 were reviewed. Seventy-two patients with perforated gastric ulcers were identified. All patients were treated by laparotomy after appropriate resuscitation. Treatment was individualised according to surgeon preference and patient morbidity. The ulcer site was documented

and the size of the ulcer was estimated by the operating surgeon. Resected tissue specimens and peritoneal fluid were submitted for pathological and microbiological examination respectively. Prophylactic antibiotics were routinely administered during the induction of anaesthesia and a selective therapeutic antibiotic policy was followed. The one-way analysis of variance (ANOVA) test was used to determine significance in the groups. The chi-squared test was used to compare the effect of shock and treatment delay on mortality rates; where numbers were very small Fischer's exact test was used. A p -value of < 0.05 was considered significant.

Results

There were 72 patients (62 males) with mean age of 43 years. Clinical features included abdominal pain (100%), haematemesis (22%) and melaena (17%). Average delay before presentation was 4.97 ± 6.43 days. Only 27 patients (37.5%) presented within 24 hours of onset of symptoms. There was a history of prior peptic ulcer symptoms in 24 patients (33%). In 39 patients there was evidence of free intraperitoneal air on X-ray (54%). Eleven patients (15%) were shocked on admission (systolic pressure < 90 mmHg). Twelve patients (17%) had associated medical illness (hypertension in 3, chronic obstructive airways disease in 3, asthma in 2, congestive heart failure in 2, diabetes in 1 and mitral valve stenosis without heart failure in 1).

There were 34 lesser-curve (incisural) and 38 antral ulcers. The perforation had sealed in 5 patients and in 2 it was sealed by the surrounding structures (liver and gallbladder). In 4 patients the ulcer had penetrated into the pancreas. Peritoneal contamination was found in 57 patients, with frank pus in 49 patients and serous fluid in 8. Management was by gastrectomy ($N = 27$), ulcer excision ($N = 27$) and omental patch closure ($N = 18$). In 40 patients the perforation size was ≤ 1 cm; in 3 patients it was larger than 1 cm but less than 2 cm in size, and in 29 patients it was ≥ 2 cm. In patients with gastrectomy reconstruction was by gastrojejunostomy in 20 patients and by gastrojejunostomy in 7. Truncal vagotomy accompanied gastrectomy in 3 patients. The patient profile for the 3 treatment modalities is detailed in Table I. Gastrectomy was performed mainly on patients with lesser curve ulcers. Ulcer excision was performed as frequently for antral as for lesser curve ulcers whereas patch closure was used almost exclusively on antral ulcers. Fig. 1 shows the distribution of perforation size in relation to the

TABLE I. COMPARATIVE ANALYSIS OF PATIENTS UNDERGOING GASTRECTOMY, ULCER EXCISION AND OMENTAL PATCH CLOSURE

	Gastrectomy (N = 27)	Ulcer excision (N = 27)	Patch closure (N = 18)
Age (years) (mean ± SD)	45.52 ± 8.30	43.35 ± 14.80	41 ± 17.49
Duration of symptoms (days) (mean ± SD)	5.68 ± 7.53	5.45 ± 6.23	5.31 ± 7.07
Past dyspeptic symptoms (N(%))	12 (44%)	11 (41%)	1 (5%)
Shock on admission (N(%))	6 (22%)	4 (15%)	1 (5%)
Site			
Lesser curve (N = 35)	20	14	0
Antrum (N = 37)	7	13	18

type of procedure performed. Omental patch closure was performed for small perforations (0.5 and 1 cm perforations). Ulcer excision was performed mainly for smaller ulcers although there was an appreciable number of larger perforations. Gastrectomy was performed for the whole range of perforation sizes. The two patients with perforations into the surrounding structures underwent gastrectomy and their histology was malignant. All the patients undergoing patch closure underwent subsequent endoscopy and biopsy. Healing was confirmed in all and no malignant histology was returned. *Candida* species were isolated in the histological specimens of 19 patients with perforated gastric ulcer and the peritoneal fluid of 12 of these patients.

Table II shows the morbidity and mortality. Sixteen patients developed complications (overall complication rate

of 22%) and the complication rates for gastrectomy, ulcer excision and patch closure were 37%, 15% and 11% respectively. Four patients required re-operation in both the gastrectomy and ulcer excision groups. In the gastrectomy group, 3 patients had peritonitis (1 with an anastomotic leak), and the other had a laparotomy for a pedicle bleed and subsequently developed an anastomotic leak requiring another re-look laparotomy. In the ulcer excision group, 3 patients had postoperative peritonitis (1 with an anastomotic leak) and 1 had a subphrenic abscess. There were no intraperitoneal complications in patients with patch closure. The complication rate was significantly lower in the patch closure group than in both the gastrectomy and ulcer excision groups ($p = 0.044$). There was no difference between gastrectomy and ulcer excision ($p = 1.0$) and between ulcer excision and patch closure ($p = 0.283$).

Twelve patients died (17%), 7 following gastrectomy (26%), 4 following ulcer excision (15%) and 1 following patch closure (5%). The differences in mortality rates were not statistically significant (gastrectomy versus ulcer excision $p = 0.401$, gastrectomy v. patch closure $p = 0.073$ and ulcer excision v. patch closure $p = 0.182$, Fisher's exact test). Six of 11 patients admitted with shock died (55%) compared with 5 of the 61 admitted without shock (8%) ($p = 0.006$). Five of 19 patients (26%) with *Candida* died compared with 8 of 53 patients (15%) with no *Candida* isolated ($p = 0.020$). Four of the patients who died arrived in hospital within 24 hours of onset of symptoms while the other 9 had a delay of more than 24 hours, but this difference in mortality did not

reach statistical significance ($p = 0.413$).

Thirteen patients in the gastrectomy group (48%), 9 following ulcer excision (33%) and 2 following patch closure (11%) required ICU admission. Significantly fewer patients with patch closure required treatment in the ICU ($p = 0.027$). The mean hospital stay was 11.95 ± 7.55



Fig. 1. Bar graph showing perforation size and the type of operation performed.

TABLE II. POSTOPERATIVE MORBIDITY IN 72 PATIENTS WITH PERFORATED GASTRIC ULCER

Complication	Gastrectomy (N = 27)	Ulcer excision (N = 27)	Patch closure (N = 18)
Multiple organ dysfunction syndrome	3 (3) [†]	0	1 (1) [†]
Peritonitis (no leak)	2 (1) ^{††}	2 (2) ^{††}	0
Anastomotic leak	1 (1) ^{††}	1 (1) ^{††}	0
Pedicle bleed	1 (1) ^{††}	0	0
Subphrenic abscess	0	1	0
Chest infection	2	1	1
Wound infection	3	1	0
Shock	0	1(1) [†]	0
Complication rate (%)	10 (37%)	4 (15%)	2 (11%)
Deaths	7 (26%)	4 (15%)	1 (5%)

* Some patients had more than one complication.

[†] Numbers in parentheses denote number of patients who died.

^{††} Developed multiple organ dysfunction syndrome.

days for gastrectomy patients, 10.00 ± 6.69 days for ulcer excision and 7.82 ± 3.32 for patch closure. The difference in hospital stay was not significant ($p = 0.279$).

Discussion

The ideal surgical management of perforated gastric ulcer continues to stimulate debate. There are many problems with comparing the results of the 3 surgical procedures in the literature, which make it difficult to compare data or treatment conclusions. Very few studies include ulcer excision as a treatment option for perforated gastric ulcer. Some studies group patch closure and ulcer excision together as 'minimal' operations.⁷ Those studies that do report on ulcer excision have very small numbers of patients undergoing this operation.^{5,7,8} In the study by Hodnett *et al.*⁷ only 4 of 172 patients underwent ulcer excision. St Collier *et al.*⁵ performed ulcer excision on only 2 of 9 patients, the rest undergoing gastrectomy. Wysocki *et al.*⁸ performed ulcer excision on only 3 of 77 patients. Ulcer excision was performed on 27 of the 72 patients in this cohort and represents the largest reported series.

Further comparison of this series with others is also difficult as there are demographic differences and variations in the delay to surgical treatment. The mean age of 43 years at presentation is a decade lower than the age in most reported series.⁷ The male-to-female ratio in this series was very high at 5:1, with only a single other report⁹ detailing a similar male predominance. In the West it is usually lower, 2:1 - 3:1,^{2,6,7} or even equal.^{1,3-5,8,10,11} Delayed presentation was common (on average 5 days). This is much longer than in most series, in which the majority of patients presented within 24 hours, with only 6 - 36% presenting after 24 hours.^{2,3,10,11}

Shock on admission carries mortality rates between 53% and 66%^{4,7} and the 46% in this report attests to its profound effect on outcome. Shock also predisposes to *Candida* infection¹² which in this study increased the mortality threefold over uninfected individuals, a finding in keeping with other reports.^{13,14} Our high rate of *Candida* isolation may be due to this high prevalence. Although data on this cohort were not available, future studies should include HIV status and disease stage to analyse outcomes accurately.

Overall, the 22% complication rate and the 17% mortality in this report compare favourably with the 31 - 48% mortality reported in the literature.⁶ This reflects the benefits of our younger cohort, with less co-morbid illness outweighing the deleterious effect of delay.^{2,11} The trends in this report suggest that the simpler options are at least as safe as if not safer than gastrectomy, although these did not reach statistical significance.

Factored into this debate on the selection of surgical therapy is the fact that operative treatment is now being conducted in an era when ulcer diathesis is curable medically. The focus of surgical therapy is to manage the complication effectively and not necessarily to cure the ulcer. This makes simpler operations such as omental patch closure and ulcer excision worthy of re-evaluation for all comers, rather than being confined to elderly, unfit or unstable high-risk patients to limit mortality.^{1,11} The literature reports unacceptably high re-perforation, re-bleeding and recurrence rates following patch closure,^{2,5} but this was not true for this cohort of patients. In our hands patch closure of small antral ulcers

carried the lowest morbidity and mortality of all three treatment options. Simple ulcer excision had similar if not better endpoint data than gastrectomy. Advocates of gastrectomy^{6,9,10,15} cite the low incidence of ulcer recurrence, but with effective medical therapy to cure those treated by less radical surgery the argument in favour of routine gastrectomy is weakened.

With less radical surgery there are concerns that perforation of a malignant ulcer may be missed. Only 2 of our patients (3%) had malignant perforation, less than half the 8 - 14%⁷ frequency reported. Despite this low frequency we agree with Hodnett *et al.*⁷ that ulcer biopsy is mandatory, and in addition that endoscopy should be performed postoperatively to re-biopsy and follow up persistent ulcers until healed.

In an era when the ulcer diathesis is curable by medical therapy this study has shown that perforated gastric ulcer can be treated as safely with ulcer excision or patch closure as with gastrectomy. Considering the significant early and late morbidity associated with gastrectomy we recommend that it be reserved for giant, penetrating or atypically situated perforations that preclude patch or excision and repair for technical reasons.

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