

## Original Article

# Emergency surgery for perforated gastric malignancy: An institution's experience and review of the literature

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### ABSTRACT

**Objectives:** The aim was to evaluate the outcome of patients who underwent surgery for perforated gastric malignancies.

**Methods:** A review of all patients who underwent surgery for perforated gastric malignancy was performed.

**Results:** Twelve patients (nine gastric adenocarcinoma and three B-cell lymphoma) formed the study group. Ten (83.3%) had subtotal gastrectomy performed, while two (16.7%) underwent total gastrectomy. All eight patients with adenocarcinoma who survived the initial operation fared poorly. The two patients with lymphoma who survived the surgery underwent subsequent chemotherapy has no disease recurrence currently.

**Conclusion:** Surgery in perforated gastric malignancy is fraught with numerous challenges.

### KEY WORDS

emergency, surgery, perforation, treatment outcome, malignancy

J Gastrointest Oncol 2011; 2: 13-18. DOI: 10.3978/j.issn.2078-6891.2011.001

## Introduction

Perforated gastric malignancy is a surgical emergency fraught with numerous challenges. Although the diagnosis of a perforation can be easily achieved, the differentiation between a malignant and benign aetiology remains elusive (1,2). This has serious implications as it often determines the extent of the operation.

The aims of surgery in these patients are two-fold: to manage the peritoneal contamination and the underlying malignancy. While managing the peritoneal contamination could be easily handled, the ideal operation in treating the malignancy is perplexing as it is dependent on various factors such as the haemodynamic stability of the patient, the surgical expertise and the stage of the malignancy (3-6). To perform a complete oncologic resection may be too hazardous for the patient, whereas a limited procedure could significant impact the long-term survival of these patients.

The short-term outcome in these patients is often poor due to the septic complications from the perforation and may be further contributed by any concurrent resection surgery (3-6). Moreover, the long term outcome in these patients may be unfavourable due to the likely advanced stage of the gastric malignancy and the possibility of tumour seeding of the peritoneal cavity through the perforation (3-6).

Due to the relative rarity of this topic being discussed in the literature, this review was performed to evaluate the presentation and the short- as well as the long-term outcome of patients who underwent urgent surgery for perforated gastric malignancies.

## Methods

### Study population

Tan Tock Seng Hospital is a 1400 bed hospital, the second largest in Singapore and provides secondary and tertiary medical care for about 1.5 million people. A retrospective review of all patients who underwent emergency surgery for perforated gastric malignancy from October 2003 to March 2009 was performed. Patients were identified from the hospital's diagnostic index and operating records. All malignancies were confirmed upon histological evaluation.

The data collected included age, gender, ASA (American Society of Anesthesiologists) score and co-morbid conditions. In addition, operative findings

No potential conflict of interest.

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Submitted Nov 11, 2010. Accepted for publication Jan 05, 2011.

Available at [www.thejgo.org](http://www.thejgo.org)

ISSN: 2078-6891

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and interventions, length of surgery, peri-operative complications, mortality and length of hospital stay were also documented.

Prior to the surgery, fluid resuscitation, nasogastric tube, parenteral antibiotics and proton pump inhibitor would be administered to every patient. Intra-operatively, all patients underwent copious lavage of the peritoneum and mass closure of the fascia. The extent of resection was determined by the primary surgeon intra-operatively and all cases were operated by a surgeon of at least Consultant grade.

Disease recurrence was confirmed through radiological and/or pathological evaluation, while the overall survival duration was documented from the date of surgery until the date of death. All gastric cancers were staged according to the guidelines of the American Joint Committee of Cancer (AJCC) (7). The grades of complications (GOC) were in concordance to the classification proposed by Clavien and group (8-10) (Table 1).

## Results

During the study period, twelve patients ( $n = 8$ , 66.7% males) underwent surgery for perforated gastric cancer. Gastric adenocarcinoma and B-cell lymphoma were responsible for the perforation in nine (75.0%) and three (25.0%) patients respectively. Three had their gastric malignancy diagnosed prior. The median age of the study group was 75 (30~84) years, with the majority ( $n = 10$ , 83.3%) having an ASA score of 3 or 4.

All patients presented with severe abdominal pain. Pneumoperitoneum on erect chest radiographs was seen in five (41.7%) patients while emergency confirmatory computed tomographic (CT) scans were performed in the rest. Majority ( $n = 9$ , 75.0%) of patients underwent surgery within 24 hours of presentation. Table 2 highlights the various characteristics of the study group.

Intra-operatively, seven (59.3%) patients have severe peritoneal contamination. Ten (83.3%) had partial or subtotal gastrectomy performed with Bilroth II

anastomosis, while the remaining two (16.7%) underwent total gastrectomy with a resulting Roux-en-Y anastomosis.

Two patients died from septic complications contributed by pneumonia and intra-abdominal sepsis, one of whom had a duodenal stump leak which necessitated a subsequent laparotomy, drainage of the intra-abdominal collections and repair of duodenal stump dehiscence. The remaining ten patients were discharged well after a median length of stay of 16 (range: 8~100) days. Table 3 illustrates the surgical observations, procedure and outcome.

Apart from the duodenal stump leak above, three other patients had duodenal stump leaks that were managed conservatively. Almost all the patients had either pulmonary or cardiovascular complications post-operatively.

## Adenocarcinoma

Nine patients had adenocarcinoma. All had T3 disease and the only patient with N0 disease was one of the fatalities, the rest of the patients all had involved lymph nodes. Three patients had metastatic disease diagnosed concurrently with peritoneal ( $n = 3$ ) and liver ( $n = 1$ ) involvement.

Eight patients survived the initial operation. In the three patients with metastatic disease, one foreign patient defaulted follow up and went back to his home country. The other two passed away from their advanced disease at three and ten months post-operatively, respectively. Both did not undergo any palliative chemo- or radio-therapy.

In the remaining five patients, one defaulted three months after the surgery. Two other patients had disease recurrence in the peritoneum causing intestinal obstruction within eight months of the initial surgery. Both perished within a few months subsequent to that. Both did not undergo any adjuvant chemo- or radio-therapy.

Only two patients in this group underwent adjuvant chemo- and radio-therapy in whom one had hepatic and pulmonary metastases ten months post-operatively and passed away seventeen months after. The other patient had spinal metastases diagnosed sixteen months after the surgery. He declined further chemo and radio-therapy and

**Table 1 Classification of surgical complications (8-10)**

Grade I: Any deviation from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic, and radiological interventions
Grade II: Requiring pharmacological treatment with drugs other than such allowed for grade I complications. Blood transfusions and total parenteral nutrition are also included
Grade III: Requiring surgical, endoscopic or radiological intervention
Grade IV: Life-threatening complication(s) requiring ICU management (including organ dysfunction)
Grade V: Death of a patient

**Table 2 Characteristics of the 12 patients who underwent surgery for perforated gastric malignancy**

	Adenocarcinoma group, n = 9	Lymphoma group, n = 3
Median Age, range (yrs)	76 (30-83)	47 (41- 84)
Male gender	5	3
ASA score		
1	0	0
2	1	1
3	6	1
4	2	1
Premorbid condition		
Hypertension	5	0
Diabetes Mellitus	4	0
Hyperlipidaemia	3	0
Ischaemic Heart Disease	3	0
History of cerebrovascular accident	0	0
Known malignancy pre-operatively	2	1
Pre-operative CT scan performed	5	3

**Table 3 Surgical observations and outcome of the study group**

	Adenocarcinoma group, n = 9	Lymphoma group, n = 3
Site of perforation		
Proximal stomach: Cardia or Lesser curve	7	3
Distal stomach: Incisura or Antrum	2	0
Surgical type		
Partial or Subtotal gastrectomy	7	3
Total gastrectomy	2	0
Staging of malignancy		
Tumour	All are T3	All are high grade
Nodal status	N0: 1 N1: 2 N2: 2 N3: 3	All have metastatic lymph nodes
Metastatic disease	3 M1 disease	None
Grade of Complications		
No complications	0	0
Grade I	0	1
Grade II	3	0
Grade III	0	1
Grade IV	5	0
Death or Grade V	1	1
Specific Complications		
Duodenal Stump leak	3	1
Pulmonary-related	7	2
Cardiovascular-related	4	1
Wound infection/dehiscence	5	0
Median length of stay (days)	24 (11-100)	16 (8-32)

defaulted follow up subsequently.

### **Lymphoma**

Two patients survived the initial surgery and both underwent subsequent chemotherapy and are still on strict surveillance under the medical oncologist. Currently, both are well with no evidence of disease recurrence.

### **Discussion**

Even though the incidence of malignant gastric perforation remains low, the consequences are considerable (1,2). Our series affirmed the dismal peri-operative outcome following surgery in these patients. Two patients (16.7%) died with another six (50.0%) having severe complications (GOC III and IV). Similar to other reports, the majority of these complications are attributed to cardio-respiratory and septic causes (11-15).

Though malignancy has been quoted as an independent factor predicting worse outcome in gastric perforation, other more commonly associated adverse factors would include pre-operative shock, poor pre-morbid condition, advanced age, delayed presentation and resection surgery (11-16). Over the years, several scoring systems have been advocated in the prognostication of patients with gastric perforation, with Boey score being commonly adopted and validated in several reports (15,16).

Boey score utilized three independent factors of concomitant severe medical illness, pre-operative shock and long-standing perforation with predicted mortality rate of over 80% if all three factors are present. However, one of its main criticisms has been its inability to consider other physiological and intraoperative parameters. This has resulted in the numerous other scoring systems such as the Mannheim peritonitis Index (MPI), ASA score and APACHE II being adopted, each with its advantages and limitations. Suffice to say, the outcome in these patients are dependent on a combination of patient, disease and surgeon factors.

To make matter worse, in the absence of a known pre-operative gastric malignancy, it may be difficult to accurately diagnose the presence of malignancy in any gastric perforation (1,2). Mistaking a benign ulcer perforation as malignant is not impossible given the significant surrounding induration and enlarged inflammatory lymph nodes. This may subject the patient to an unnecessary extensive and resection surgery with its numerous associated complications (1-6,17). Some of the clues suggestive of a malignant perforation would include advanced age, size of ulcer > 6cm and size of perforation > 0.5cm, raised white cell counts and longer duration of

symptoms (1). The importance of frozen section intra-operatively has been emphasised to clinch the diagnosis but it may not be always available and false negative is also possible. In our series, frozen section was not performed in any patients as it was either not available or deemed not necessary by the primary surgeon because of the size of the ulcer and perforation, or if the malignancy was clinically suspected or already diagnosed. These would have supported the decision for gastrectomy regardless of the outcome of frozen section.

Even when the malignant perforation could be accurately diagnosed, the surgical procedures of choice in these patients are often dependent on various factors. These would include the presence of metastatic disease, expertise of the surgeon in performing an oncologic resection, the degree of contamination and perhaps most importantly, the intra-operative haemodynamic status of the patient.

At one stage, malignant gastric perforation has been deemed as terminal disease due to the associated peritoneal dissemination and early recurrences (18-20). This had led to the practice of simple closure of the perforation (21,22). However, this technique has been associated with unacceptable peri-operative complications and hence abandoned. Perhaps this should only be considered when the patient is extremely haemodynamically unstable to withstand any resection.

Over the years, the morbidity following emergency gastrectomy has been improving due to improving surgical technique and advancement in critical care (23). This has become the preferred surgical option in patients with malignant gastric perforation. Not only is it able to tackle the perforation, it can also remove the underlying pathology. However, the extent of radical oncologic surgery is perhaps dependent on the aforementioned factors. While it may be dangerous to embark on a major radical oncologic resection, the implications of a limited procedure may seriously impact the long term survival in patients with potentially curable gastric malignancy. This had led to the adoption of a two-stage procedure in handling this perplexing situation (3,24). While the first stage aimed to tackle the peritoneal contamination and the gastrectomy, the second procedure would be performed at a later date to ensure adequate lymph node clearance. However, the problems of such a staged procedure would include the significant post-operative adhesions from the first surgery, and also the fitness of the patient to withstand another extensive surgery. In addition, this could delay the commencement of any chemo- and radio-therapy, especially if any complications were encountered.

Recent data have disproved the notion that gastric perforation often resulted in increased risks of recurrences

and peritoneal disease. The long term survival of patients with perforated gastric adenocarcinoma is actually comparable to patients performed electively (3-6). The only factor determining long term survival is the stage of the malignancy. As seen in our series, the majority of our patients had very advanced disease on diagnosis and fared badly subsequently with almost all the patients developing disease recurrences. Though several of our patients developed peritoneal disease subsequently, it could be related to the advanced staging and progression of the primary malignancy rather than contributed by the perforation. Unfortunately, large series is not available in the literature to shed more light into this.

The role of surgery in gastric lymphoma has been addressed by numerous reports and should only be performed as a primary radical treatment, palliative procedure or when emergency complications such as massive bleeding or perforation are encountered (25-28). The implications of the gastric perforation in the long term survival of these patients appear minimal with no reports of associated recurrence reported. The most important factor determining the long term survival is again the stage of the lymphoma. None of our patients had any systemic or peritoneal recurrence and both are currently well upon completion of their chemotherapy.

## Conclusions

Surgery in perforated gastric malignancy is fraught with numerous challenges. Short-term outcome is dismal and is dependent on the various patient and disease factors. Long-term survival in these patients is dependent on the underlying stage of the malignancy.

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