

Damage Control Surgery Saves Patient with Gastric Lymphoma from Radical Gastrectomy

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ABSTRACT

The concept of damage control surgery was first introduced in the 1990s. It has great significance in the treatment for critically ill patients, which not only greatly improves survival rate, but also helps doctors avoiding misdiagnosis and mistreatment. Herein, we present a case of gastric perforation caused by neoplasm with critical condition of the patient. According to the concept of damage control surgery, the patient was subjected to perforation repair and tumor biopsy instead of conventional radical gastrectomy. Then, diffuse large B cell lymphoma was diagnosed on pathologic examination. After surgery, the patient received R-CHOP chemotherapy according to the clinical guidelines and is alive till now. Our experience might be helpful for understanding the value of damage control surgery in avoiding misdiagnosis and mistreatment for critical emergency patients.

Key Words: Lymphoma, Stomach, Perforation, Damage control surgery.

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INTRODUCTION

In the early 1980s, Stone *et al.* proposed the concept of damage control surgery as treatment strategy and timing of surgery for severe trauma patients.¹ In 1993, Rotondo *et al.* put forward the concept of damage control surgery.² The essence of this concept is staged surgery protocol, by giving simple but effective treatment before radical surgery to correct the physiological imbalance and internal milieu disorder. The concept is not only useful for complex trauma and war wounds, but also has a significant role in non-traumatic critically ill patients.^{3,4}

In this case, we would like to provide evidence that damage control surgery can help doctors to avoid misdiagnosis and mistreatment.

CASE REPORT

A 60-year man was admitted to hospital for sudden onset upper abdominal pain with progressive worsening and accompanied by fever for 6 hours. For the past year, he has had intermittent upper abdominal pain, which was relieved by taking omeprazole orally.

Physical examination results were as follows: passive flexion position, temperature 38.6°C, pulse 125 beats/m, respiratory rate 30 breaths/m, blood pressure 130/80 mmHg, board-like abdomen, abdominal muscle tension, tenderness and rebound tenderness, and no audible bowel sounds. Laboratory tests showed abnormal chemical indicators: white blood cell count (WBC) $10.40 \times 10^9/L$, platelets $78 \times 10^9/L$, prothrombin time (PT) 12.2s (Table 1), D-dimer 1.01 mg/L, glucose (GLU) 9.66 mmol/L, total bilirubin (TBIL) 34.4 $\mu\text{mol/L}$, direct bilirubin (DBIL) 15.7 $\mu\text{mol/L}$, and indirect bilirubin (IBIL) 18.7 $\mu\text{mol/L}$. Chest radiograph and abdominal computed tomography (CT) showed free gas in the abdominal cavity and a mass in the anterior wall of the gastric antrum (Figure 1A, B, C). The provisional diagnoses made were: acute upper gastrointestinal perforation acute diffuse peritonitis, and suspected gastric cancer.

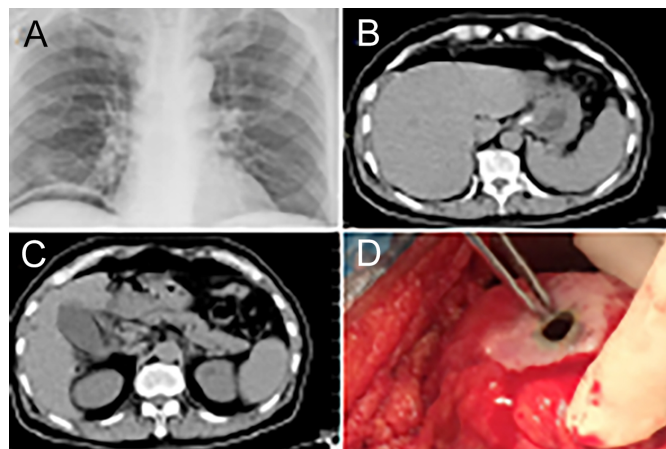


Figure 1: Preoperative examinations and intraoperative images. Chest radiograph showed free gas in the abdominal cavity (A); Abdominal CT scan showed free gas and peritoneal effusion (B, C); Antrum anterior wall tumor was found with perforation (D).

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Table I: Routine blood examinations. 2017.10.13, WC $10.4 \times 10^9/L$, NE% 88%, PLT $78 \times 10^9/L$. It is a sign of a serious infection, they gradually returned to normal after the operation. In the course of postoperative chemotherapy, WC was significantly reduced and stabilised at the normal level after the lymphoma was cured (2018.5.4-2019.1.16).

Date	NE (%)	LY (%)	MO (%)	EO (%)	BA (%)	WBC ($\times 10^9/L$)	NE ($\times 10^9/L$)	LY ($\times 10^9/L$)	MO ($\times 10^9/L$)	EO ($\times 10^9/L$)	BA ($\times 10^9/L$)	RBC ($\times 10^{12}/L$)	PLT ($\times 10^9/L$)
2017.10.13	0.88	0.05	0.07	0	0	10.4	9.17	0.54	0.68	0	0.01	5.83	78
2017.10.14	0.84	0.1	0.06	0	0	9.4	7.88	0.9	0.6	0.01	0.01	4.5	56
2017.10.15	0.85	0.08	0.06	0	0	8.1	6.93	0.68	0.49	0.06	0.01	4.07	64
2017.10.16	0.8	0.12	0.07	0.01	0	5.4	4.4	0.66	0.37	0.05	0.01	3.78	87
2017.10.18	0.72	0.19	0.07	0.01	0.01	6.3	4.51	1.21	0.46	0.06	0.03	3.48	128
2017.10.27	0.73	0.16	0.09	0	0	6.69	4.89	1.1	0.62	0.03	0.01	3.88	252
2017.11.22	0.39	0.51	0.08	0.02	0	3.2	1.26	1.63	0.27	0.07	0.01	4.26	104
2017.12.13	0.49	0.42	0.09	0	0	2.8	1.36	1.17	0.26	0	0	4.53	85
2018.01.18	0.47	0.38	0.15	0	0	2.3	1.09	0.88	0.33	0	0	4.04	84
2018.02.27	0.72	0.16	0.11	0	0	3.59	2.61	0.58	0.4	0	0	4.41	88
2018.03.26	0.66	0.18	0.16	0	0	2.83	1.88	0.5	0.44	0	0.01	3.63	169
2018.04.09	0.76	0.13	0.1	0.01	0.01	1.87	1.41	0.24	0.19	0.01	0.01	2.8	71
2018.05.04	0.76	0.13	0.11	0	0	4.01	3.04	0.53	0.43	0	0.01	3.49	116
2018.12.04	0.64	0.27	0.07	0.01	0	4.1	2.6	1.11	0.3	0.03	0.01	5.54	94

NE: Neutrophile granulocyte, LY: Lymphocyte, MO: Monocyte, EO: Eosinophili granulocyte, BA: Basophilic granulocyte, WBC: White blood cell, RBC: Red blood cell, PLT: Platelet.

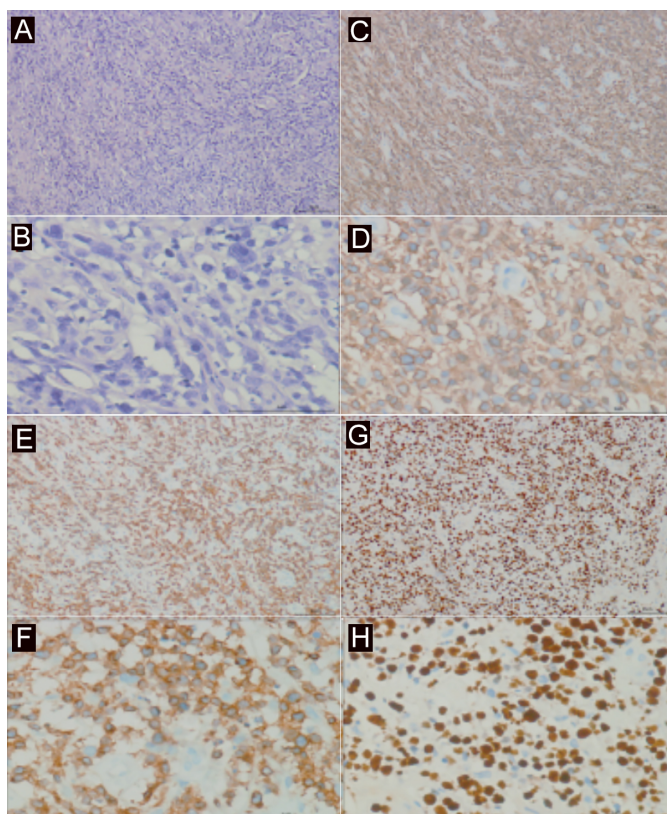


Figure 2: Pathological examinations. Extensive lymphocyte infiltration in HE staining (A 10 \times , B 40 \times), immunohistochemical examination showed CD20 (+), C 10 \times , D 40 \times ; CD79a (+), E 10 \times , F 40 \times ; Ki67(+, 80%).

An emergency laparotomy was performed. Results of intraoperative exploration were as follows: (1) removal of 1100 ml greyish white pus in the abdominal cavity, (2) two small hemangiomas in the liver, about 2 \times 4 cm and 3 \times 3 cm in size, (3) highly edematous and thickened greater omentum, gastrointestinal tract and mesentery, and (4) a tumor in the anterior wall of the gastric antrum, 5 cm in diameter, with a

perforation of 1.5 cm in diameter (Figure 1D). Therefore, the intraoperative diagnosis was gastric neoplasm (pathology undetermined) with perforation, diffuse peritonitis, abdominal infection, and hepatic hemangioma. Meanwhile, the patient's condition was cumulatively assessed as follows: (1) affirmative gastric tumor with perforation, but the pathology result was unclear, (2) severe abdominal organ edema, massive fluid loss, unstable hemodynamics, diabetes, and viral hepatitis, which disabled the patient for radical gastrectomy.

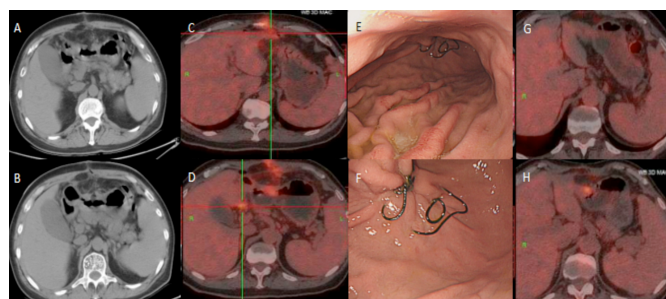


Figure 3: Follow-up examinations. 2017.10.20, abdominal CT scan showed local thickening of the antrum(A, B); 2018.5.7, PET-CT showed mild localized thickening of the antrum anterior wall, increased uptake of FDG drugs, SUVmax was 5.1, glycometabolism increased(C, D); 2018.5.8, gastroscopy showed that the shape of the stomach was normal, sutures were visible on the anterior sinus wall of the gastric body, with smooth surface and good peristalsis (E, F); 2019.2.15, PET-CT showed no obvious thickening of gastric wall and abnormal uptake of FDG drugs; compared with PET/CT on May 7, 2018, the high metabolic lesions in the original gastric antrum disappeared (G, H). (Abbreviations: PET-CT positron emission tomography-computed tomography).

A decision of damage control surgical protocol was considered as better treatment strategy. Thus, the patient was subjected to gastric perforation repair and gastric mass biopsy. Postoperative pathological examination showed diffuse infiltration of atypical lymphoid cells in the stomach

wall (Figure 2A, B). Immunohistochemistry staining showed CD20 (+), CD79a (+), BCL-6 (+), MuM-1 (-), CD10 (-), BCL-2 (-), Cyclin D1 (-), CD38 (-), CD117 (-), Dog-1 (-), CD34 (-), Vimentin (-), S-100 (-), SMA (-), Desmin (-), CK (-), CK8/18 (-), Villin (-), Synaptophysin (-), STAT6 (-), TLE1 (-), and Ki-67 (+, 80%)(Figure 2C, D, E, F, G, H). The patient was finally diagnosed with gastric non-Hodgkin's diffuse large B-cell lymphoma (DLBCL), of germinal center origin.

The patient was transferred to the hematology-oncology department after the postsurgical condition improved, and he received R-CHOP regimen chemotherapy (Figure 3). The patient achieved good clinical outcomes and he is still alive till now.

DISCUSSION

Acute gastric perforation is one of the most common abdominal emergencies that is characterised by sudden onset, complex clinical condition and rapid progression.⁵

It could easily cause abdominal infection, electrolyte imbalance, internal milieu disorder, liver and kidney failure and coagulation disorder, and in severe cases, can even lead to death. When a patient has malignant tumor with perforation, it is even more difficult to make surgical plans.⁶

The concept of damage control surgery was initially established for patients with complex and severe trauma during war times, and in peace time, it is important salvage technique for the treatment of severely ill patients. The usage of standard and radical surgery for secondary diffuse peritonitis depends on the severity, duration, age and complications of abdominal sepsis.⁷ A study of 455 patients showed that after the physiological recovery, brief laparotomy and subsequent surgery to delay the final repair are effective clinical strategies for critically ill patients. Thus, extending the concept of damage control surgery from severe trauma to the secondary diffuse peritonitis and secondary intraperitoneal sepsis caused by gastrointestinal perforation is logical and has been widely accepted by surgeons globally.⁸

In this study, we report a patient with gastric lymphoma and acute gastric perforation, which was quite difficult to diagnose and treat, especially in making surgical plan. Damage control surgery has been widely accepted nowadays which has proved to significantly improve the survival of critically ill patients. When admitted into our hospital, the patient's condition was deteriorating with severe infection, abnormal hemodynamics and deranged coagulation parameters. Given that the patient was in critical condition and could not tolerate radical gastrectomy, we planned, according to damage control surgery, gastric perforation repair and gastric tumor biopsy, which we thought were most appropriate steps to reduce trauma and shorten operation time. There was no opportunity to complete full set of examinations and improve his general condition for surgical toler-

ance. The intraoperative exploration confirmed gastric tumor with perforation, but further pathological diagnosis was needed. Herein, damage control surgery was helpful to avoid unreasonable radical gastrectomy and postoperative complications, and more importantly, to win the time for patients to recover and obtain pathological diagnosis. Finally, the patient achieved good clinical outcomes after 4 cycles of R-CHOP regimen chemotherapy (Figure 3G, H). Our report provides insight into the value of damage control surgery in avoiding misdiagnosis and mistreatment.

PATIENT'S CONSENT:

Informed consent was obtained from the patient for publication of this case report and accompanying data.

CONFLICT OF INTEREST:

The authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:

GC: Conceived and designed the study, acquisition of the data; drafted and revised the work; performed the operation; finally approved version to be published; agreed to be accountable for all aspects of the work.

MZ: Postoperative follow-up, analysed the data; drafted and revised the work; finally approved of the version to be published; agreed to be accountable for all aspects of the work.

JZ: Performed the operation, drafted and revised the work; approved the version to be published; agreed to be accountable for all aspects of the work.

JM: Performed the operation; postoperative follow-up, analysed the data; approved the version to be published; agreed to be accountable for all aspects of the work.

YL: Performed the operation, conceived and designed the work; revised the work; approved the version to be published; agreed to be accountable for all aspects of the work.

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