Case report

Narrowing of giant gastric perforation by purse-string suture before omental plugging

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HIGHLIGHTS

• A new technique for damage control surgery.
• Omental patching for gastric perforation.
• Narrowing perforation area.

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ABSTRACT

Introduction: Timely diagnosis of the gastroduodenal perforation usually allows primary repair or resection. Treatment of a large gastric perforation is more difficult than the common duodenal ulcer perforation by plugging and usually requires gastric resection. On the other hand, gastric resection for a hemodynamically compromised patient in sepsis has a high rate of anastomotic failure and mortality. Here, we described a practical surgical technique that can avoid emergency gastric resection in such situations.

Presentation of case: A 83 year-old female admitted with peritonitis, severe sepsis and hemodynamic instability. After the diagnosis of hollow organ perforation and supportive therapy, laparotomy revealed a delayed and large (7 cm) gastric perforation. Instead of gastrectomy, we downsized the large defect by means of a purse-string suture around the perforation and made it suitable for the application of omental plugging.

Discussion: The patients with poor performance status who are not suitable for the gastric resection, a free omental plug fixation to the narrowed perforation area by a purse-string suture can overcome the problem.

Conclusion: This method can be keep in mind as a damage control surgery technique in the non-traumatic abdominal emergencies due to large gastric perforations.

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1. Introduction

Perforation of a gastric tumor generally develops as a result of necrosis at the center of the tumor and the diameter of the perforation can be larger than a usual duodenal perforation caused by peptic ulcer. A gastric tumor leading to perforation is usually a medical and surgical emergency and this situation precludes a proper work-up and staging of the neoplasia. There are two treatment options for gastric cancer perforation, simple closure or resection and reconstruction. The type of the surgical procedure is usually decided peroperatively considering the location and size of perforation and general condition of the patient (sepsis, hemodynamic instability). If the patient has generalized peritonitis and septic shock dominating the clinical picture, simple closure should be the treatment option to prefer. When the defect size is not too large and the closure seems to be technically feasible, simple closure with or without omental support is an easy and an effective method [1,2]. Here we have described a simple occlusion technique by omental plug after narrowing down the defect, instead of resection in a severely ill patient.

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2. Presentation of case

A 83 year-old female, who had complaints of weight loss and dyspepsia for several months, admitted to the emergency department for abdominal pain lasting for three days. She had also fever for the last two days. She had no history of trauma, surgery, alcoholism or smoking. Hypertension and diabetes mellitus were her co-morbidities and both were under control with medications. Her blood pressure was measured as 110/70 mmHg. She had no history of coronary artery disease and her heart sounds were normal. There were diminished bowel sounds at abdominal auscultation. The abdomen was distended and had diffuse defense, rebound and sensitivity. Laboratory tests were as below: white blood cell: 10.8 $10^3$/ml, hemoglobin: 8.1 g/dl, Urea:38 mg/dL, creatinin:1.6 mg/dL and potassium 5.7 mmol/L. Blood amylase level was normal. Her electrocardiogram was in normal sinus rhythm. Plain abdominal X-ray demonstrated free air under the right diaphragm. Abdominal ultrasound in the emergency department showed widespread free abdominal fluid (perihepatic, in the lower quadrants and among the bowel loops). The patient was admitted to the intensive care unit and after a short supportive therapy, she went to the operating room with the preoperative diagnosis of a hollow organ perforation in the abdomen. After performing a midline laparotomy, we have observed a giant perforation, 7 cm in diameters at the anterior surface of the stomach. The proximal edge of the perforation was 3 cm distal to the cardia, and the distal end was 5 cm proximal to pylorus (Fig. 1). The abdomen was full of pus and fibrin. All the purulent material was aspirated and the peritoneal cavity was washed with warm saline. Her blood pressure decreased gradually and the anesthesiologists begun inotropic support with dopamine during the operation. We got multiple biopsies from the edges of the perforation and we decided that a gastric resection could not be suitable for this patient due to her critically ill condition. The perforation gap was narrowed down by means of purse-string sutures from the edges of perforation by a 2/0 polypropylene suture, not aiming to close this large defect (Fig. 2). Omental flap was prepared and transferred by 2/0 vicryl sutures the sides of perforation that has been narrowed down to approximately 4 cm in diameter (Fig. 3). The leaking areas were checked up on by giving methylene blue from the nasogastric tube and potential weak points were sutured over. We placed three drains to the Morrison pouch (right paracolic), left sub-diaphragmatic area and pelvis. The operation time was 40 min. The patient was taken into intensive care unit as intubated. She received Meropenem 3*1 gr/iv after Infection Diseases Department consultation. During the follow-up, her white blood cell count reduced and her pre-renal failure got better. Inotropic agents were gradually decreased and then given up in days. Her abdomen was smooth and free from distension or rigidity. On the 5th and 6th days, a methylene blue test was made through the nasogastric tube and there was no leakage. Abdominal drains were withdrawn. Despite the improvement of the peritonitis and the renal functions, pulmonary problems were not recovered. She was conscious and her sedation was given up for several times to wean from mechanical ventilator, but she could not tolerate it due to acquired pneumonia. Despite supportive therapies, she died of pulmonary failure on postoperative day 15. Histopathology examination of the stomach biopsies were reported as moderately differentiated adenocarcinoma.

3. Discussion

Gastroduodenal ulcer perforations are generally smaller than diameter of 1 cm. Simple closure method is preferred for these sizes perforations and patching through omental peduncle described by Cellan-Jones is the most effective method in order to close the defect safely [3]. The sizes of perforations from tumors, traumas or iatrogenic reasons could be larger. For the treatment of large gastric perforations with inflamed and fragile tissues usually constitutes an impediment for primary closure and generally gastric resections

Fig. 1. Large gastric perforation. 
Fig. 2. Downsized perforation to 4 cm in diameter.
are being preferred. According to the location of the large perforation, proximal partial, distal partial or total gastrectomy can be applied. However, urgent gastric resections to the patients with sepsis and hemodynamically instability are related with high morbidity and mortality [2,3]. Although some of these morbidities and mortalities are depending on the patients’ condition, significant part of them are directly related with the prolonged surgery and anesthesia. Kuwabara and co-workers observed in 3148 patients with perforated peptic ulcer surgery (gastric resection or simple closure) in emergency conditions that the duration of the surgery had directly an influence on the mortality of patients [1]. The duration of the surgical operation prominently extended in gastric resections and the amount of perioperative blood transfusion increased. In that study, as the mortality rate was 3.4% in simple closure operations, this figure was determined as 10% for urgent gastric resections. In our patient the cause of the perforation was not obvious during the surgery and the patient was hemodynamically unstable. We have decided to perform a procedure as short as possible. Resection and anastomosis using either sutures or stapler was not a good option because of relatively longer operation time. Diffuse peritonitis was the other reason for not choosing resection and anastomosis option.

We described a simple surgical technique without requiring a resection for a giant gastric perforation. Closing the gastroduodenal perforations by an omental patch or a plug has been well known. As the diameter of perforation increases, the risk of repair failure and the related morbidity and mortality also increases [2,4]. The classification of gastroduodenal perforations has been made according to the size of defect by Gupta and associates [4]. Perforation sizes up to 1 cm have been assessed as “normal”, 2–3 cm have been assessed as “large” and perforations larger than 3 cm have been assessed as “giant” perforations [2,4]. As the mortality rate was 6% for perforations smaller than 5 mm, this rate increased to 24% for the perforations larger than 1 cm [2].

Mukhopadhyay and colleagues compared the cases of which sizes were over 2 cm and that were applied omentopexy and omental plug [2]. It has been observed that the morbidity and mortality prominently decrease by omental plug. When omental plug was used for closure, the plug turns into granulation and fibrous tissue in time; and then it is integrated to the gastric or duodenal wall and finally replaces with normal intestinal tissue [5].

4. Conclusion

Consequently, the surgical operation for gastroduodenal perforations still preserves its significance. No consensus is available in the literature with respect to the treatment of large gastroduodenal perforations. Gastric resection or simple closure are the mostly known alternatives. As an alternative, in the patients with poor performance status who are not suitable for the gastric resection, a free omental plug fixation to the narrowed perforation area by a purse-string suture can overcome the problem. It does not requires an advanced surgical skill or equipment and can be easily applied under emergency situations.

Conflict of interest

We declare that, there has been no conflict of interest in this case report.

Authors contribution

Conception and design of study: Sertac Usta.
Acquisition of data(laboratory or clinical): Cuneyt Kayaalp, Orhan Gozeneli.
Data analysis and/or interpretation: Sertac Usta.
Drafting of manuscript and/or critical revision: Cuneyt Kayaalp, Orhan Gozeneli.
Approval of final version of manuscript: Cuneyt Kayaalp.

References

[1] K. Kuwabara, S. Matsuda, K. Fushimi, K.B. Ishikawa, H. Horiguchi, K. Fujimori, Reappraising the surgical approach on the perforated gastroduodenal ulcer: should gastric resection be abandoned? J. Clin. Med. Res. 3 (2011) 213–222.
[2] M. Mukhopadhyay, C. Banerjee, S. Sarkar, et al., Comparative study between omentopexy and omental plugging in treatment of giant peptic perforation, Indian J. Surg. 73 (2011) 341–345.
[3] C.J. Cellan-Jones, A rapid method of treatment in perforated duodenal ulcer, Br. Med. J. 36 (1929) 1076–1077.
[4] S. Gupta, R. Kaushik, R. Sharma, et al., The management of large perforations of duodenal ulcers, BMC Surg. 5 (2005) 15.
[5] G.I. Moussa, W.H. Gad, O.H. Khadrawy, et al., Omental plug technique in the treatment of large perforated peptic ulcer, Egypt J. Surg. 20 (2001) 638–643.