CASE REPORT – OPEN ACCESS

International Journal of Surgery Case Reports 51 (2018) 352–357

Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Use of indocyanine green fluorescence imaging to determine the area of bowel resection in non-occlusive mesenteric ischemia: A case report

Yutaka Nakagawa [a,*], Kazuaki Kobayashi [a], Shirou Kuwabara [a], Hiroyuki Shibuya [b], Tadashi Nishimaki [c]

[a] Department of Digestive Surgery, Niigata City General Hospital, Japan
[b] Department of Pathology, Niigata City General Hospital, Japan
[c] Department of Digestive and General Surgery, Graduate School of Medicine, University of Ryukyus, Japan

ARTICLE INFO

Article history:
Received 31 July 2018
Accepted 13 September 2018
Available online 17 September 2018

Keywords:
Case reports
Non-occlusive mesenteric ischemia
Indocyanine green fluorescence imaging
Case report

ABSTRACT

INTRODUCTION: Non-occlusive mesenteric ischemia (NOMI) is a type of acute intestinal ischemia, and its associated mortality is very high. In laparotomy of NOMI, we often have difficulty determining the area of bowel resection. We herein describe a case in which we detected the area of bowel resection using indocyanine green (ICG) fluorescence imaging.

PRESENTATION OF THE CASE: An 89-year-old man diagnosed as having advanced gastric cancer underwent distal gastrectomy. On the night of postoperative day 4, he strongly complained of distention of the abdomen. The laboratory data indicated severe metabolic acidosis and dehydration. The abdominal computed tomography scan showed a dilated small bowel, but there were no specific signs suggestive of bowel necrosis. We suspected NOMI and decided to perform emergency laparotomy because we could not exclude the possibility of bowel necrosis. During the operation, we could not detect the necrotic bowel macroscopically. After injecting 2.5 mg of ICG, the ischemic area of the bowel became visible as a region with poor fluorescence emission using the Photodynamic Eye™ (Hamamatsu Photonics K.K.). We resected the ischemic bowel and performed anastomosis. We confirmed that he was alive at 4 months after the operation of NOMI.

CONCLUSION: Intraoperative ICG fluorescence imaging makes it possible to detect necrotic intestine that cannot be found with the naked eye. By using this method, planned reoperation to find any newly developed necrotic intestine might be unnecessary. Intraoperative ICG fluorescence imaging is useful for defining the area of ischemic bowel in a patient with NOMI.

1. Introduction

Non-occlusive mesenteric ischemia (NOMI) can be critical owing to its challenging diagnosis [1]. In the case that bowel resection is necessary, we often have difficulty determining the area of bowel resection because the ischemic bowel area in a patient with NOMI is unclear and not sectionalized in contrast to superior mesenteric artery occlusion [2]. We herein describe a survival case of NOMI in which we determined the ischemic bowel area using indocyanine green (ICG) fluorescence imaging, and the patient underwent resection and anastomosis during one surgery. This case report has been written in line with the SCARE criteria [3].

2. Presentation of case

An 89-year-old man was diagnosed as having progressive gastric cancer. He underwent distal gastrectomy, lymph node dissection, gastrojejunal anastomosis (Billoth II), and jejunostomy for nutrition. On postoperative day 3, he started eating meals. On the night of postoperative day 4, he complained of distention of the abdomen and gradually became in a state of agitation. Based on the laboratory data, dehydration was suggested because of the elevated levels of creatinine (1.96 mg/dL [reference range, 0.5–1 mg/dL]) and blood urea nitrogen (34.7 mg/dL [8–19.7 mg/dL]). An electrolyte abnormality was also revealed (sodium level, 120 mEq/L [140–146 mEq/L]; potassium level, 5.6

* Corresponding author at: Niigata City General Hospital, Department of Digestive Surgery, 463-7 Shumoku, Chuo-ku, Niigata 950-1197, Japan.
E-mail address: y.nakagawa.323@gmail.com (Y. Nakagawa).

https://doi.org/10.1016/j.ijscr.2018.09.024

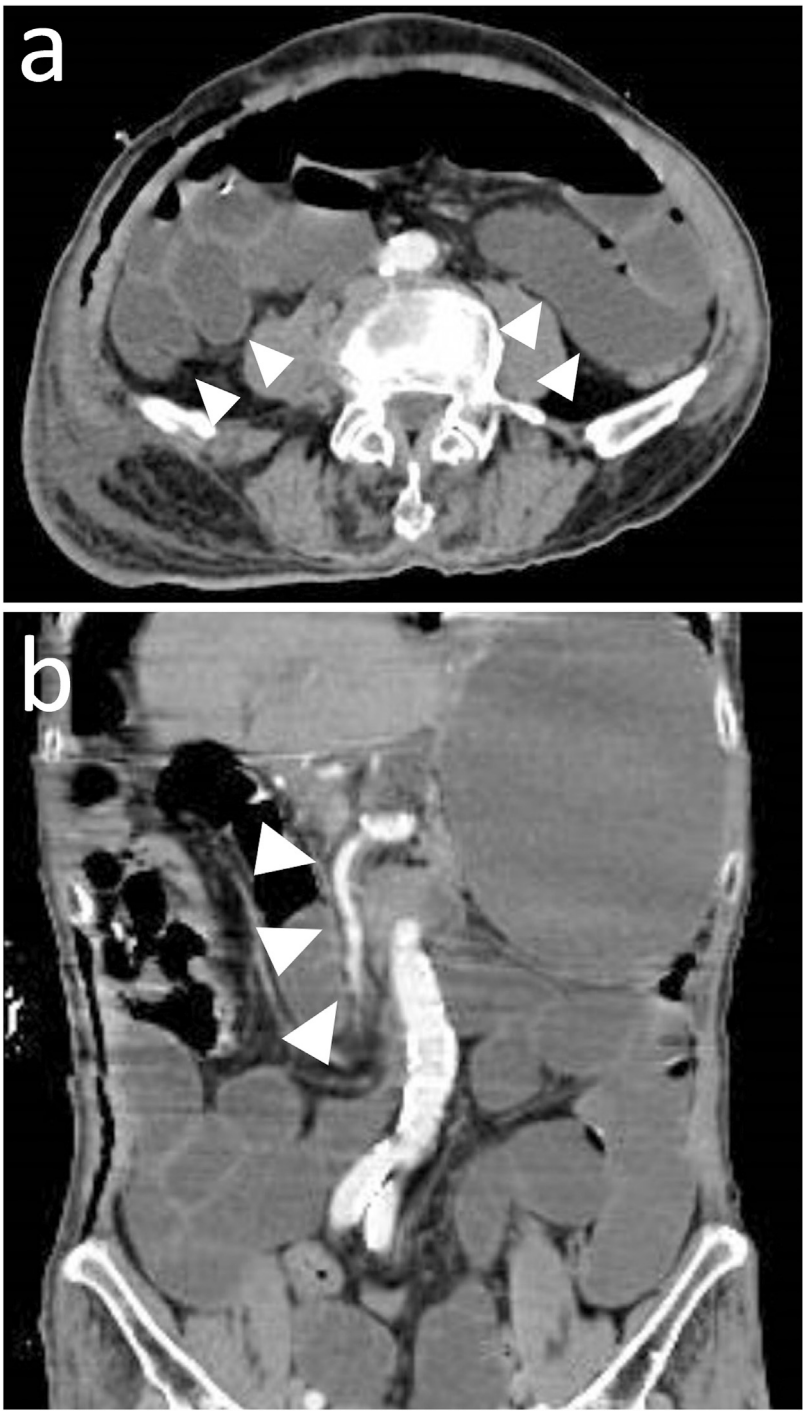

Fig. 1. Contrast-enhanced computed tomography (CT) scan. **a** The dilated small bowel is seen (arrowhead) in the axial postcontrasted CT image, but pneumatosis intestinalis or venous gas is not demonstrated. **b** Coronal reconstructed CT image shows no thrombus in the superior mesenteric artery (arrowhead).

mEq/L [3.5–4.8 mEq/L]). Moreover, severe metabolic acidosis (pH, 7.185 [7.35–7.45]; bicarbonate level, 6.9 mmol/L [21–27 mmol/L]; base excess level, −19.5 mmol/L [−2 to 2 mmol/L]) was indicated in the arterial blood gas analysis. The contrast-enhanced computed tomography (CT) scan showed dilatation of the small bowel. Obvious superior mesenteric artery occlusion or bowel strangulation was not observed. There were also no findings of bowel necrosis, such as pneumatosis intestinalis or venous gas (Fig. 1a, b). On the basis of nonspecific ileus-like findings detected with CT and metabolic acidosis, we suspected NOMI. Although there seemed to be no CT findings that indicated bowel necrosis, we could not rule out bowel necrosis because of severe acidosis. Therefore, we decided to perform laparotomy.

The operation revealed the dilated small bowel, but there seemed to be no necrotic bowel macroscopically, although a small area of the bowel was slightly ischemic. After injecting 0.25 mg of ICG, we observed the bowel using the Photodynamic Eye™ (PDE, Hamamatsu Photonics K.K.). The small bowel wall, measuring 40 cm in length, showed poor fluorescence emission, indicating ischemia (Fig. 2a, b). We decided to resect the ischemic lesion and