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New technique for treating abdominal surgical site infection using CT woundgraphy and NPWT: A case report

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ABSTRACT

INTRODUCTION: Negative pressure wound therapy (NPWT) for abdominal surgical site infection (SSI) is becoming increasingly common, although enterocutaneous fistula (ECF) has been reported as a complication. To avoid ECF, we used computed tomography (CT) woundgraphy to evaluate the relationship between the wound and the intestine, and then safely treated the abdominal SSI with NPWT.
CASE PRESENTATION: Following a laparoscopic intersphincteric resection for low rectal neuroendocrine tumor and covering ileostomy, a 59-year-old woman underwent stoma closure. Six days after surgery, we diagnosed SSI. We suspected ECF, because the wound was deep and the pus resembled enteric fluid. However, CT woundgraphy showed that the wound was separated from the abdominal cavity and the intestine by the abdominal rectus muscle. Accordingly, we performed NPWT. SSI was cured and the wound was well granulated. Twenty-three days after surgery, the patient was discharged. Eventually, the wound was completely epithelialized.
DISCUSSION: Although successful NPWT has been reported for open abdominal wounds, ECF is a common complication. ECF can be prevented by separating the wound from the intestine by the omentum or muscle fascia, protecting the intestinal serosa during surgery, and applying low vacuum pressure. The relationships among the wound, the fascia, and the intestine must be evaluated before abdominal SSI treatment. One good method is CT woundgraphy, which evaluates wound extent and depth, closure of muscle fascia, and the relationship between the wound and the intestine.
CONCLUSION: We report a case of CT woundgraphy before NPWT for abdominal SSI. CT woundgraphy is a good candidate for evaluating wound condition.

1. Introduction

Surgical site infection (SSI) is a common complication after lower digestive tract surgery. For wounds in the contaminated and dirty wound classes, the incidence rates are 10% to 17% and >27%, respectively [1,2]. In prior years, dirty wounds were treated using delayed primary closure with wet-to-dry dressing [3]. Negative pressure wound therapy (NPWT) for abdominal SSI is now becoming increasingly common, and many reports have confirmed its association with good outcomes [4,5]. Enterocutaneous fistula (ECF) has been reported as a complication of NPWT, and it is thus important to ensure that NPWT is correctly indicated [6]. An objective method to assess the risk and safety of NPWT has not yet been reported. In this report, we used CT woundgraphy to evaluate the relationship between the wound and the intestine, and then safely treated abdominal SSI using NPWT.

2. Case presentation

Our patient, a 59-year-old woman, had previously undergone laparoscopic intersphincteric resection for low rectal neuroendocrine tumor and covering ileostomy. The pathological diagnosis was neuroendocrine carcinoma, the invasion depth was submucosal, and there was no lymph node metastasis, lymphatic invasion, or vascular invasion. After the surgery, the patient developed anastomotic leakage and pelvic suppuration. We treated this complication without additional surgery by changing the intrapelvic drainage tube that had been placed during the surgery on a weekly basis. The patient was discharged from our hospital 40 days after the operation. Anastomotic stenosis was subsequently diagnosed. The patient underwent 19 rounds of stenosis by means of endoscopic balloon dilation, and a stoma closure operation was planned for one year after the first surgery. Under general anesthesia, a cir-

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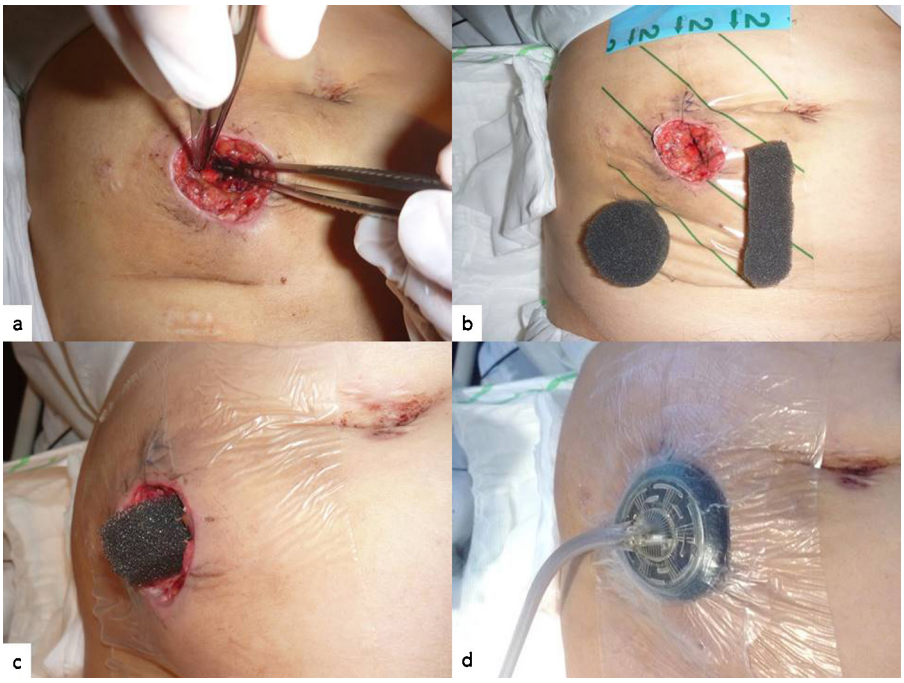

Fig. 1. (a, b) CT woundgraphy before NPWT showed that the wound was separated from the abdominal cavity and intestine by the abdominal rectus muscle. A subcutaneous pocket space around the wound was also observed. (c, d) CT woundgraphy ten days after NPWT showed that the wound had shrunk.

cular skin incision was made around the stoma with a 5 mm margin. A huge para-stomal hernia was observed with a hernia orifice of 30 mm × 48 mm. There was no adhesion in the abdominal cavity. Because the serosa of the intestine was injured, we resected 20 cm of the small bowel and reconstructed it using the functional end-to-end anastomosis technique. The thickness of the subcutaneous fat was 50 mm. The para-stomal hernia had created a large dead space under the skin. We closed the fascia of the abdominal rectus muscle with a class-1 absorbable monofilament fiber and the superficial fascia with a 3-0 absorbable multifilament fiber. We closed the skin with a purse-string suture using a class-1 absorbable multifilament fiber. The circumstomal skin incision was approximated and it was not closed completely because the wound was classified as a dirty surgical wound. The operation time was 71 min, and blood loss was 15 ml. Six days after the surgery, we diagnosed SSI based on the redness of the wound, fever, and discharge of pus. The pus culture was negative. We opened the infected wound and found a huge subcutaneous abscess. There were no foreign bodies. Because the wound depth was deep and the pus resembled enteric fluid, we suspected ECF or intestinal injury.

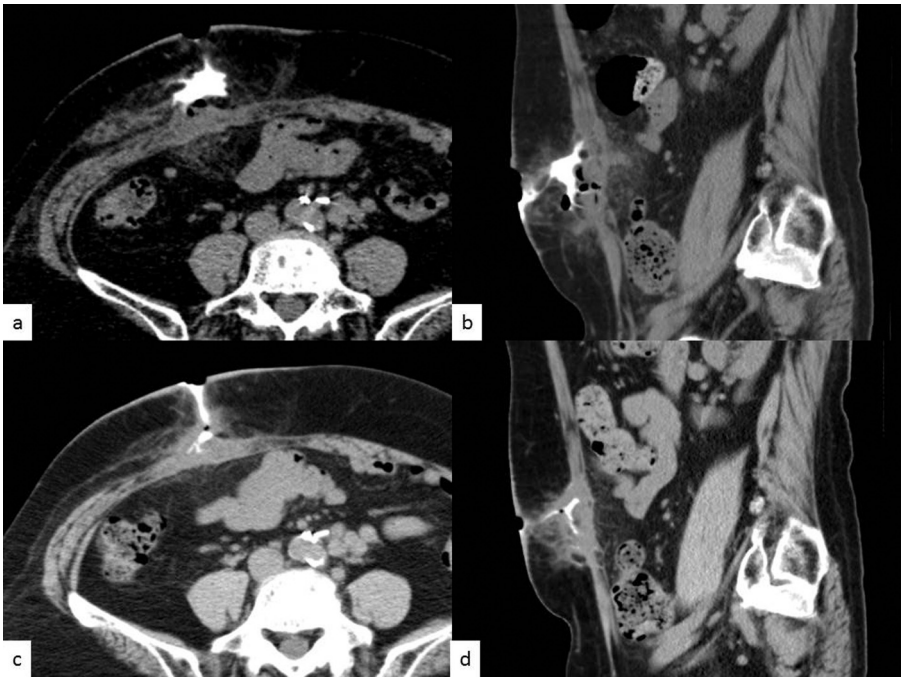

Fig. 2. (a) The thickness of the subcutaneous fat was 50 mm. (b–d) VAC® abdominal wound management system (KCI, San Antonio, TX, USA).