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Case Report

Successful control of high-flow output enterocutaneous fistula wound with an innovative self-manufactured plug

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Abstract: Background: Meticulous wound care is necessary for relieving the suffering of enterocutaneous fistula (ECF) patients and improving the quality of life. Although many approaches to treat the fistula wound have been attempted, wound care before definitive surgery remains a challenge, especially for high-flow output ECF. Cases: In the present study, we report a case of a 77-year-old female with a diagnosis of jejunal fistula 14 days after the Miles surgery. The traditional vacuum assisted closure (VAC) device was initially applied to the patient's wound care. However, the residual enteric fluid out from the fistula irritated skin and brought great pain (Visual Analogue Score 8). Morphine (20-30 mg daily) was used. Besides, the VAC system was replaced nearly every day because skin exudation led to poor airtightness and the evacuation tube was often blocked. In the following month, the wound size didn't change significantly. To reduce bowel fluid irritation and promote wound healing, we established a self-manufactured plug to occlude the fistula, collect enteric fluid, and protect the wound. The patient did not complain any severe discomfort. No pain killer was used any more (Visual Analogue Score 3). The catheter of the plug collected 500-800 ml enteric fluid per 24 hours without blockade. In addition, all the materials to make the plug are cheap and available in the wards. After approximately 2 weeks of regular wound dressing changes, the fistula wound formed scabs and healed well. Conclusions: We present a case of successful control of high-flow output enterocutaneous fistula wound using an innovative self-manufactured plug. We highly recommend this pain-relieving and cost-effective approach for fistula wound care.

Keywords: Case report, high-flow output enterocutaneous fistula, wound care, self-manufactured plug

Introduction

Enterocutaneous fistulas (ECF) are abnormal connections between the intestinal cavity and the skin, which occur as a postoperative complication in 0.8%-2% of abdominal operations. Prior to the implementation of repair surgery, meticulous wound care is necessary for relieving the patients' suffering and improving the quality of life. Especially for the high-flow output ECF, the enteric fluid from the fistula irritates the surrounding skin, decelerates the healing process, and leads to unbearable pain of the wound [1].

A number of specific techniques for ECF wound treatment and skin protection have been developed in the past decades, including vacuum assisted closure (VAC), also called vacuum sealing drainage (VSD), and cyanoacrylate glues [2]. However, VAC could not avoid the contamination of wound by enteric fluid, and its high cost brings a huge economic burden for the patient [1, 3]. Cyanoacrylate glues are mainly suitable for low-flow output ECF of the large bowel while high-flow output ECF can drag the glue easily and reopen the fistula [1, 4]. Therefore, the wound care continues to be a significant challenge. A cost-effective technique that can promote the wound healing before surgical repair will be highly beneficial from a long-term perspective. In this case, we introduce a self-manufactured plug which is inserted percutaneously to facilitate a high-flow output ECF wound healing.

Case report

A 77-year-old Chinese female was admitted to our hospital because of a high-flow enterocuta-

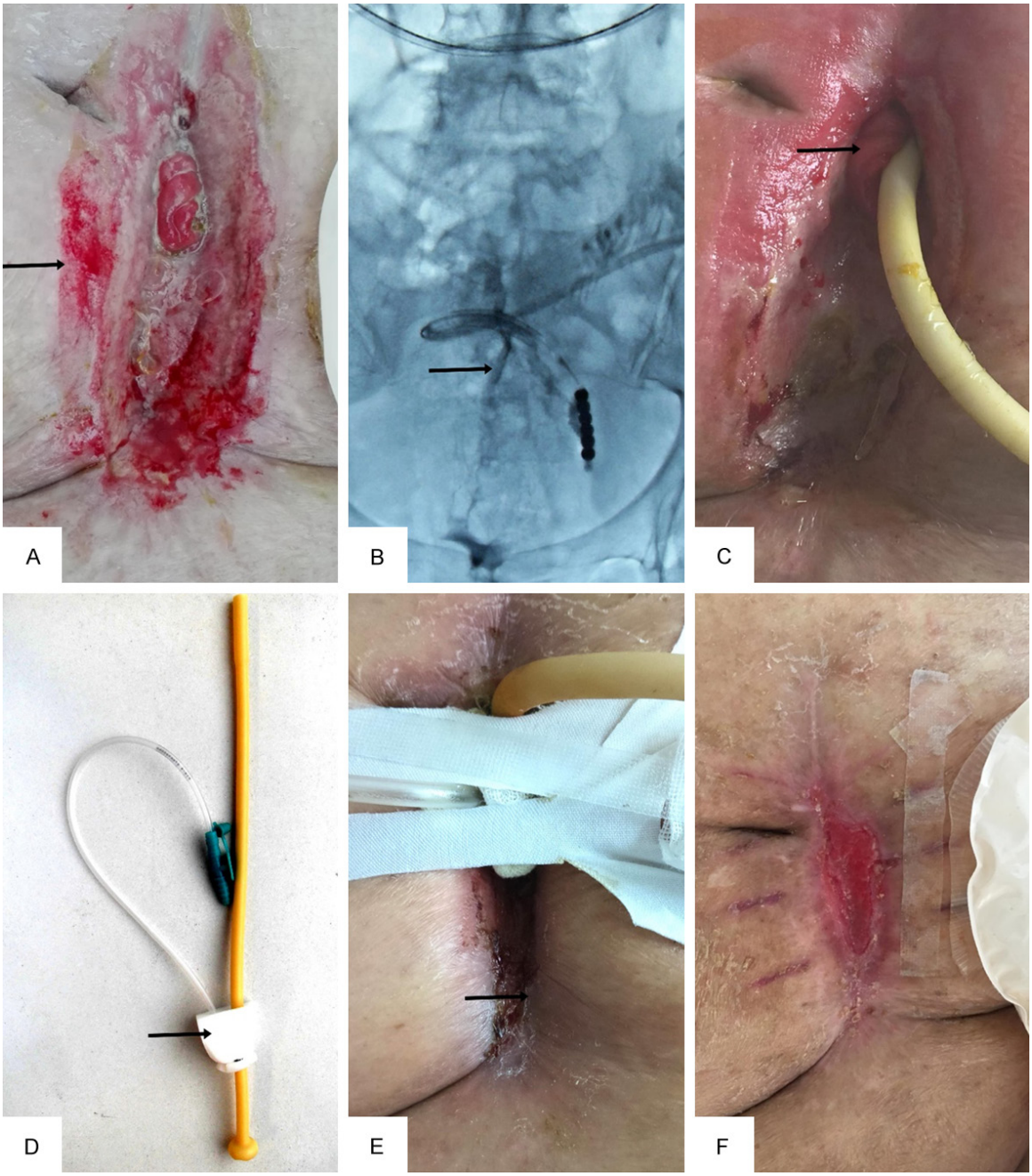

Figure 1. An innovative self-manufactured plug treating high-flow output enterocutaneous fistula wound. A. The enterocutaneous fistula and wound appearance on admission. The arrow shows the inflammatory and swollen skin, irritated by bowel fluid leakage from vacuum assisted closure. B. The upper gastrointestinal radiography image showing jejunal perforation. The arrow points to the extravasation of the contrast. C. The enterocutaneous fistula and wound appearance after 1 month application of vacuum assisted closure. The 22F plum-blossom-head catheter was put into the intestinal cavity. The arrow shows the afferent loop of jejunum. D. The self-manufactured plug containing a piece of sponge, a catheter, and a sputum aspiration tube. The arrow points to the sponge base fixing both catheter and aspiration tube. E. The whole image of the wound two weeks after application of the plug. The arrow indicates the neonatal scabs. F. The wound two weeks after the repair of fistula.

neous fistula (500-800 mL/24 hours). She accepted the Miles surgery 21 days ago with a diagnosis of rectal cancer (T3N1M0). On post-operative day 11, she felt gradually severe abdominal pain and wound pain with a continuous fever (38.8°C, 101.8 F). The white blood

cell was 17.91×10^9/L, the neutrophilic granulocyte percentage was 88.1%, and albumin was 28 g/L. The infection of abdominal cavity and wound was suspected and the antibiotic was given. Enteric fluid was found out of the abdominal wound 3 days later (**Figure 1A**), when the patient came to our hospital. The abdominal wound suppurated, and a jejunal fistula was confirmed by an upper gastrointestinal radiography (**Figure 1B**). The repair surgery was not performed immediately because of potential post-operative intestinal edema, intra-abdominal adhesion and uncontrolled sepsis of abdominal wound. The patient was fasting and VAC was applied. The sponge of VAC was directly put on the wound with a vacuum unit providing subatmospheric pressure (typically 100-500 mmHg below ambient pressure). Nevertheless, the patient suffered great pain, turning on the vacuum system, as the vacuum-assisted aspiration sponge 'sucks' the wound brutally. Besides, the residual enteric fluid in the sponge continuously irritated the granulation tissue and peripheral skin, which brought lasting great pain (Visual Analogue Score 8). Morphine (20-30 mg/day) was used to kill the pain. Besides, the VAC system was replaced nearly every day because skin exudation led to poor airtightness and the evacuation tube was often blocked. It was a huge economic burden for the patient (200 dollars per set of VAC). During the following 1 month, the wound size didn't change much (**Figure 1C**).

To achieve less cauterization of bowel fluid and better wound healing, we established a plug to occlude the fistula percutaneously. The plug was made up by a 22 F plum-blossom-head catheter, 12 F sputum aspiration tube and one third piece of sponge from scrub brush (**Figure 1C**). The plum-blossom-head catheter was inserted into the afferent loop of jejunum to deliver gastrointestinal juice (**Figure 1D**). The well-shaped sponge could occlude the fistulas, and the sputum aspiration tube fastened in the sponge could draw off the residual gastrointestinal fluid. The sputum aspiration tube was linked to a vacuum pump. All the procedures were conducted by the bedside under local infiltration anesthesia of Lidocaine. And it only cost 10 dollars per set of plug.

The patient did not complain any severe discomfort such as intense wound pain (Visual Analogue Score 3), flatulence, local swelling or tenderness after dealing the fistula with our self-manufactured plug. No pain killer was used any more. The catheter collected approximately 300-500 ml insoluble enteric discharge, and the sputum aspiration tube drew off 200-300 ml pellucid fluid every day. This new technique reduced the frequency of wound dressing changes (every 4 days on average) and simplified wound care. As a result, the wound narrowed from 6 inches to 4 inches and formed scabs about 2 weeks after application of the plug (**Figure 1E**). The patient accepted the fistula repair surgery at postoperative month 3, and recovered well (**Figure 1F**).

Discussion

The innovation of the self-manufactured plug is to reduce bowel fluid irritation, relieve the patient's pain and promote wound healing. The new self-manufactured plug includes two strategies of effluent management: one is the drainage through the plum-blossom-head catheter in intestinal lumen; the other one is the sputum aspiration tube in the sponge. The sponge serves as a shaped and fastened base which retains aspiration tube and catheter in place and keeps the plug anchored to the enterocutaneous fistula. In this way, most fistula effluent is drained through the plum-blossom-head catheter, and residual spillage fluid in the sponge is aspirated instantly by the sputum aspiration tube. The combined two draining passages achieve effective drainage without blockade and protection of granulation tissue and skin from the deleterious irritation of continuous exposure to intestinal fluid. In addition, this plug relieves pain to a great extent during the dressing change. As the vacuum device aspirates the jejunum at the fistula site instead of the wound, there is no direct sponge adhesion to the granulation tissue like VAC. Furthermore, compared to VAC, this plug cuts off most of the spending because all the materials are cheap and available in the wards, and the new technique reduced the frequency of wound dressing changes and promoting wound healing. Therefore, we recommended this new self-manufactured plug for treatment of high-flow output enterocutaneous fistula wound.

Disclosure of conflict of interest

None.

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