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Case Report

Retrospective analysis of challenging treatment of mesh infection after open parastomal hernia repair: a case report

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Abstract: Parastomal hernia repair is still clinically challenging. The open surgery approach is associated with risk of mesh infection and the treatment of infected mesh is very difficult. We here report a special patient whose preoperative preparation was inadequate and we used the open surgery approach to repair his parastomal hernia. Postoperatively, his pulmonary infection was aggravated, and then wound hematoma, mesh infection, and sepsis occurred. After a series of comprehensive treatments, including respiratory and circulatory support, anti-infection treatment, Vacuum sealing drainage (VSD) application, his systemic and local infections were controlled, the mesh was preserved, and his parastomal hernia was no longer prolapsed. However now no guidelines help operators to determine whether to remove the infected mesh or not. The treatment process of the case was analyzed retrospectively here so as to provide hernia surgeons with clinical insights into the treatment of such challenging cases.

Keywords: Parastomal hernia, open repair, mesh infection, vacuum sealing drainage

Introduction

The recurrence rate of parastomal hernia after repair has been significantly reduced with the application of synthetic and biological materials [1-3]. However, open mesh repair is associated with the risks of mesh contamination and infection. Such complications are challenging and may lead to serious consequences [4-6]. There is only one previous case report [7] we can search about management of infection mesh after parastomal hernia repair, but there are some obvious differences between the two patients. Here, we report the retrospective analysis of a refractory parastomal hernia management.

Case report

A 69-year-old male patient underwent colostomy in the left abdominal wall 7 years previously due to surgery for low rectal cancer, and had begun to develop an enclosed mass that was gradually increasing in size near the orificium fistula 2 years previously. Physical examination showed an incision scar about 15 cm in length in the middle of the abdomen, and his abdomen was slightly distended. Mild edema was seen in the skin below the orificium fistula. Pigmentation and mild edema were seen in the skin below the orificium fistula. In the standing position, a 20 cm × 20 cm mass was seen below the orificium fistula. In the supine position, the mass could not be fully retracted (**Figure 1**) and showed tenderness. Computed tomography (CT) showed parastomal hernia in the abdominal wall. Chest radiography indicated the infection in the lower left lung. Diagnosis was parastomal hernia incarceration complicated by incomplete intestinal obstruction. The anti-infection treatment was performed for 1 week. Surgery was performed after 3-day bowel preparation.

Intraoperatively, a longitudinal incision about 10 cm in length was opened at the orificium

Figure 1. Contour of the parastomal hernia.

Figure 2. Surgical wound hematoma.

Figure 3. Mesh involved by wound infection.

fistula; obvious edema was seen in the subcutaneous tissue. The content in the hernia sac consisted of mutual adhesion of small intestine. After separation of intestinal adhesion and restoration of hernia content, the hernia sac was closed with absorbable surgical sutures. Thereafter, the external oblique aponeurosis was repaired and sutured to reduce the diameter of the hernia ring to about 2.5 cm to allow passage through the ostomy colon. The mesh (Johnson UMM3 mesh; 15 cm × 15 cm in size) was trimmed to the corresponding size, and then placed in both the superficial and deep layers of the external oblique aponeurosis, around the ostomy colon to repair the defect in a "sandwich" manner. And a drainage catheter was placed at the wound around the orificium fistula.

Postoperatively, the periphery of the wound showed swelling that gradually became worse. Because of obstruction, the drainage catheter only extracted a small amount of bloody fluid, however about 300 mL of dark red hematocele drained out through the loose drainage catheter on the 4th day, and then the drainage catheter disengaged spontaneously. The swelling of the wound periphery became even worse with skin ecchymosis gradually emerging on the left abdominal wall (**Figure 2**). The patient suffered cough and increased temperature. His white blood cell count increased to 12 × 10^9/L and the neutrophil count increased to 82%. The patient's hemachrome, fibrinogen, and blood albumin levels decreased with lowest values of 71 g/L, 0.81 g/L, and 26.20 g/L, respectively. One week after the operation, the surgical wound showed empyema with culture of Escherichia coli. On the 10th day, combined respiratory failure resulted in transfer of the patient to the intensive care unit (ICU) for endotracheal intubation and other comprehensive treatment. In the ICU, the treatment focused on respiratory and circulatory support, anti-infection treatment, etc. The critical treatment involved adequate drainage and changing of the dressing for the infected wound. The mesh was found to have been exposed to the air during changing of the dressing (**Figure 3**). After 1 week, the patient's vital signs became stable and the ventilator was removed. Thereafter, he was transferred to a local hospital for further treatment. VSD was applied to provide continuous irrigation and negative pressure drainage, and the wound infection was successfully managed (**Figure 4**). Fresh granulation tissue covered the mesh and was gradually epithelized, which was conducive to healing of the wound (**Figure 5**). The orificium fistula was unobstructed, and the parastomal hernia was no longer prolapsed (**Figure 6**).

Discussion

Parastomal hernia forms due to continuous prolapse of the content of the abdominal cavity at the colostomy site. This type of hernia has a

Figure 4. Wound after VSD drainage.

Figure 5. Wound after multiple VSD drainage.

Figure 6. Status quo of the parastomal hernia.

high morbidity rate, with some studies reporting an incidence of 78% and higher [1], with about 20%-30% of these patients requiring surgical treatment due to an enlarged parastomal hernia, incarcerated hernia, intestinal necrosis, etc. Surgical treatment of parastomal hernia is difficult; the process can be divided into suture repair of tissue and tension-free repair with application of synthetic or biological mesh [2, 8]. Mesh repair is useful to reduce the recurrence rate of postoperative parastomal hernia. However, mesh repair is associated with a risk of a mesh infection. Infection may be due to the mesh itself, the non-absorbable sutures, residual dead space after suturing, etc. It may also be associated with the early occurrence of postoperative effusion and hematoma at the surgical site [5]. The likely causes of infection in this case were as follows. First, preoperative disease assessment and preparation may have been inadequate. The Child-Pugh classification of the preoperative liver function was Class B. Despite albumin infusion, the quantity was insufficient and the hepatic functional reserve was still poor. There was no imaging evidence for the control of preoperative pulmonary infection. These two factors may have reduced the healing ability of the wound. Second, there was inadequate drainage at the early stage for the hematoma in the surgical wound, or of a timely or effective approach to expel the hematocele after disengagement of the drainage catheter. The effusion and hematoma in the wound contributed to the occurrence of infection. Third, orificium fistula care was inappropriate. The loose pasting of the colostomy bag and the overflow of liquid, coupled with poor drainage of hematoma and wound contamination, led to infection of the wound. In addition, the massive amount of bacteria in the wound further resulted in mesh infection.

Treatment of infected mesh is very challenging, and is accompanied by the dilemma whether to remove the infected mesh or not. It is truth what the standard surgical approach is to remove the mesh material [9]. Sometimes, the retention of infected mesh may induce chronic infection and sinus formation as well as bacterial biofilm formation on the mesh, making it more difficult to control the infection [10]. However, some authors have suggested that at the early stage, the infected mesh can be retained by local negative pressure drainage and antibiotic therapy [11]. In this case, we conducted a complex and comprehensive treatment and successfully retained the mesh. First, the patient's systemic condition was improved by pulmonary infection management, strengthening of hepatic functional reserve, correction of anemia, etc. Core measures involved drainage and changing of the dressing for the infected wound as well as orificium fistula care. The application of VSD significantly improved the

quality of drainage for the infected wound. VSD works along the following principles. First, it acts as artificial skin, allowing better wound closure and isolation of the drainage area and orificium fistula, and prevents recontamination by fluid from the colostomy bag. Second, the enclosed high negative pressure may maintain continuous flushing over the drainage wound to expel the exudate, slough, bacteria, and toxins, etc. Third, the VSD material has good oxygen and moisture permeability, allowing for improved local blood circulation and delivery of the necessary nutrients for granulation tissue growth. Fourth, it is also reduced the edema around the wound and vascular permeability [12]. Through repeated application of the VSD device, the wound infection was successfully managed, and granulation tissue covered the mesh.

The infection resistance ability of the mesh may also play a role in retention of the infected mesh. The ideal mesh should have a large pore size, a hydrophilic monofilament structure, and absorbability [13, 14]. This mesh used in the patient had some of these qualities. For example the large pore size of the mesh is conducive to the negative pressure drainage and the entry of phagocytic cells to kill bacteria; The hydrophilic monofilament structure prevents bacterial adhesion; Partial absorbability of the mesh reduces polypropylene content in the mesh and is beneficial for infection management.

No firm conclusion can be reached from the results of a single case study, although it does suggest that the repair of a large parastomal hernia and successful treatment of the infected mesh may provide insight for hernia surgeons into the treatment of such challenging cases. The preoperative preparation in such cases must be adequate, perioperative nursing must be appropriate, and active treatment should be applied in cases of mesh infection. The use of VSD and the mesh factors are also conducive to retention of the infected mesh.

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Disclosure of conflict of interest

None.

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