Case Report

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A New Technique for The Therapy of Complicated Deep Tissue Infection (with 4 Cases)

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Abstract

Objective: The objective of this study was to discuss the effect of double perfusion cannula accompanied with low negative pressure drainage in the treatment of complexity of abdominopelvic and perineal infections.

Methods: The technology of the double perfusion cannula accompanied with low negative pressure drainage was used to treat complexity of abdominopelvic and perineal infections.

Results: Double perfusion cannula accompanied with low negative pressure drainage can be applied to the treatment of complexity of abdominopelvic and perineal infections. It has an obvious effect on infection control and reduces recovery time.

Conclusion: Double perfusion cannula accompanied with low negative pressure drainage has a good effect on complexity of abdominopelvic and perineal infections; it can be used in wider surgical fields to prevent infections.

Keywords: double perfusion cannula accompanied with low negative pressure drainage, infection, case report

1 Introduction

Since the application of Li's double perfusion cannula combined with nutritional support treatment in 1970s, the treatment strategy of the intestinal fistula has changed dramatically. The surgical treatment has become the final choice for intestinal fistula, and the cure rate has increased from 30%–40% to 90% [1]. On this basis, double perfusion cannula accompanied with low negative pressure drainage was used gradually for the improvement of various surgical fields widely. The authors of this study has accumulated rich experience, not to repeat, of using this technique in the treatment of intestinal fistula in recent years and here describe the experience with rare complexity of abdominopelvic and perineal infections using 4 cases.

2 Case 1

2.1 Information

The patient Li XX, male, 20 years old, was obese because of poliomyelitis. The longtime usage of wheelchair instead of walk made the perianal abscess, the pelvic cavity and the large area of perineal region infected.

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The skin defect in the buttocks was about 113 cm², which covered the sacrum, the hip joint, the bilateral scrotum and the gap of sartorius in right limb. A large amount of pus flowed out, and the body temperature reached 39.5°C.

2.2 Methods

A total of 5 self-made double perfusion cannulas were cut into the required lengths and placed at the lowest point of the standing position and the lateral position, while rinsing with normal saline to keep low negative pressure suction. The drainage tube was replaced every 2 days.

2.3 Results

On the second day, the patient's body temperature returned to normal; on the seventh day, the scrotum and the sinus of the sartorius gap returned to normal; on the tenth day, the infection foci were only 63 cm³ and the growth of granulation was rapid. On the fourteenth day, the double perfusion cannula was removed and the surface was cured.

3 Case 2

3.1 Information

The patient Zhang, male, 23 years old, was admitted to the hospital for infection after cystectomy because of huge sacral mass. The volume of the pus cavity was about 70 cm³, deep to the sacrum. The bilateral gluteus maximus was distended, and the body temperature was 38°C.

3.2 Methods

The self-made double perfusion cannula was cut into the required lengths, placed at the deepest point of the prone position and washed continuously by saline water to keep negative pressure suction. Residual cavity was filled with a hypertonic saline gauze loosely, and the drainage tube was replaced every 2 days.

3.3 Results

From the third day, the septic cavity began to be cleaned and contracted; on the fifth day, the growth of granulation was good and the double perfusion cannula was removed; the patient recovered after a fresh dressing for the wound was changed.

4 Case 3

4.1 Information

Zhang, male, 54 years old, was admitted to the hospital because of dehiscence of the perineum due to anterior sacral infection after transabdominal perineal resection for rectal cancer, with symptoms of infection, poisoning and a high fever of 39°C.

4.2 Methods

The necrotic tissues were scavenged moderately, and three double perfusion cannulas were placed at the lowest point in the supine position and the lateral position. The cannulas were washed continuously with the normal saline to keep low negative pressure. Residual cavity was filled with a hypertonic saline gauze loosely and replaced every 2 days.

4.3 Results

On the second day, the body temperature returned to normal; only a small amount of pus was found in the affected area, and the stink disappeared. On the fifth day, the residual cavity of the pelvic wall and pus disappeared; the granulation grew well. All the double perfusion cannulas were removed on the seventh day, and the patient had a hip bath.

5 Case 4

5.1 Information

Tuya, female, 24 years old, had intestinal fistula caused by gynecological surgery. She had severe abdominal infection after the failure of the 4 remedial operations. There were multiple skin defects in the abdomen; a large number of feces and pus secretions were left in the abdominal cavity. Two of the small intestinal stoma were separated from the skin and invaginated. The patient was in septic shock with a temperature of 38.5°C.

5.2 Methods

The feces and necrotic tissues in the abdominal and pelvic cavities were removed. Seven double perfusion cannulas were placed in the supine position and the lowest point of each residual cavity separately and washed with the normal saline continuously to keep low negative pressure. The larger residual cavity was filled with a high-permeability saline gauze and changed daily.

5.3 Results

On the third day, the infection was basically controlled, the body temperature was restored to normal and the whole-body symptoms were relieved. On the fifth day, partial double perfusion cannulas were removed; only the drainage tube of the stoma, the right hepatic and renal recess and the pelvic cavity were retained; the patient's condition was stable. However, the patient was transferred due to her own reason.

6 Discussion

Deep tissue infection is concealed, sinus tortuous and rapidly progressive; therefore, the doctor must have a clear understanding of the situation surrounding the infection area before the placement of double cannula. Contrast fistulography and computed tomography(CT) examination of the infection area are necessary. Of course, in addition to the situation of emergency control of the infection or the situation that the patient is unable to move in the critical condition, we can first place the drainage tube in the main visible infection area

and then find the opportunity to check as soon as possible so as not to leave the infection area and affect the treatment effect.

When the local infection can not be controlled after 2–3 days contrast fistulography and computed tomography examination must be carried out again so as to evaluate whether the position of the double cannula is suitable, and to determine whether there is any recurrent focus and residual focus that need further treatment.

For complex deep tissue infections, in our experience, the strategy of “the lowest position drainage” is useful, *i.e.*, to place the double cannula into the deepest gap of the patients in natural rest states, such as the lowest point of the standing position, supine position or prone position.

The most suitable replacement time is 2 days according to our experience. Daily replacement can damage the newly generated granulation tissue and increase the chance of bleeding. Replacement more than 2 days will increase the possibility of obstruction of the tube and the purulent substance attaching to the wall and thus cannot lead to smooth drainage; the treatment effect is not good.

Infection is the main cause of the major pathological and physiological changes in the whole body. Double perfusion cannula accompanied with low negative pressure drainage has been used in the treatment of intestinal fistula in our previous experience; negative pressure drainage has also been used in foreign countries in recent years [2]. If the infection is controlled and becomes a localized lesion, percutaneous drainage can be used. However, if the scope of infection in some deep tissue is extensive, the purpose of rapid and effective drainage is still not possible although the drainage can be handled in multiple places. The abscesses should be opened as far as possible according to the “damage control principle” developed in recent years. The purpose of more effective drainage and control of infection can be achieved based on the negative pressure drainage [3,4]. Of course, we use a hypertonic saline gauze for loose covering and packing, with the exception that large wounds may cause loss of fluid and low protein. Hypertonic saline can not only lead to bacteriostasis but also stimulate the growth of granulation in the wound.

Broad-spectrum antibiotics should be sufficiently applied in time and even sometimes used in combination, when infection causes systemic symptoms, especially systemic inflammatory response syndrome (SIRS), sepsis and septic shock. The use of broad-spectrum antibiotics should be adjusted to reduce the number of drugs and the range of antibiotics, once the results of germiculture and drug sensitivity test are made clear. The anti-infection treatment of pathogenic bacteria should be limited to 4–7 days in general, unless the source of infection is difficult to control [5].

The imbalance of water and electrolytes is an early factor in the failure of treatment when the infection appears to be systemic symptoms, and malnutrition is the main cause of the failure of later treatment. The loss of high metabolism and a large amount of tissue fluid caused by infection can aggravate the decrease of circulation blood volume, aggravate shock and lead to the imbalance of electrolyte in the whole body. It is the necessary means to save life to understand the patient's serum ions timely, infuse liquid properly, have a blood filtration and protect viscera function when necessary. Hemofiltration is an effective method for regulating water and electrolytes, regulating body temperature and removing creatinine and urea nitrogen at present. It is also found in recent years that hemofiltration can adjust the function of dialysis membrane and exclude inflammatory cytokines so as to reduce the inflammatory reaction of the body, for example, AN69ST-CHDF film separates out IL-6, IL-10, *etc.* [6]. Therefore, hemofiltration can not only be used in the treatment of renal dysfunction but also is an auxiliary method for the treatment of systemic inflammatory response.

The body has a negative nitrogen balance when an infection occurs, and hypoalbuminemia is the most common symptom. Hence, it is necessary to give the necessary nutritional support. The guidelines for nutritional support of the American Society for Parenteral and Enteral Nutrition indicated in 2009 that the critically ill patients need enteral nutrition within 24–48 hours after admission [7], and enteral nutrition is given when parenteral nutrition cannot be given or is inadequate after 5 days. Therefore, adequate enteral nutrition should be given to the patients who can eat to support the treatment until the infection is healed; however, those who are not able to eat by mouth can be fed by tube and supplied with essential parenteral nutrition.

The active movement of the patient getting off the bed has a positive effect on deep infection. The double cannula cannot drain all of the small and tiny sinus. However, due to the active movement of the patient, muscles are used to squeeze the pus and exudate from the gap to the areas of the double cannula involved so

that the pus and exudate can be drained clean. Our experience is to set up the time and way of the patient's activity of getting out of bed daily according to the physical ability of the patient, such as getting off the bed and moving 4 times 3 hours on the ground. This quantitative activity will increase the compliance of the patient compulsively and achieve a good therapeutic effect finally.

7 Conclusions

The long-term successful experience of intestinal fistula has led us to extend the double perfusion cannula flushing technique to various fields. In these abovementioned cases, complicated infections of the pelvic floor, perineum and abdominal cavity, the traditional methods such as rubber tube drainage, cigarettes drainage and gauze drainage were inadequate. The doctors felt tired and helpless because they changed the medicines several times a day but there was no obvious effect. The problem is well solved by the continuous application of **double perfusion cannula accompanied with low negative pressure drainage**. This method is not only simple in production and convenient in placement but also reduces the number of dressing change, greatly relieves pain that patients endure because of dressing change and improves patient's tolerance and comfort. The most important thing is to control infection and save life in a short period of time and to shorten the time of recovery to a great extent.

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