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VAC therapy with long term continuous saline infusion for secondary septic peritonitis: A new strategy for the reduction of perioperative risks?

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ABSTRACT

BACKGROUND: The management of a septic peritonitis open abdomen is a serious problem for clinicians. Open surgery is associated with several complications such as bleeding and perforation of the bowel.
CASE PRESENTATION: The authors report a case of a 59-years-old female who underwent a sigmoid resection with an latero-terminal (L-T) anastomosis for the perforation of a diverticulum. After a few days the patients developed a new widespread peritonitis. At the emergency re-laparotomy, surgeons found dehiscence of the posterior wall of the anastomosis with fecal contamination. At admission in ICU (Intensive Care Unit) the patient had open abdomen with dehiscence of cutaneous and subcutaneous layers.
CONCLUSION: Conservative therapy with antibiotic therapy and use of the Vacuum-Assisted Closure® (VAC) Therapy with a long term continuous saline infusion led to the resolution of the septic shock and to the wound healing.

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1. Background

Open surgery for damage control in critically ill patients with septic peritonitis open abdomen is associated with several complications such as bleeding and perforation of the bowel. There are four major indications for the use of the open abdomen technique: damage control for life-threatening intra-abdominal bleeding, prevention or treatment of intra-abdominal hypertension (IAH), management of severe intra-abdominal sepsis [1] and when a re-laparotomy is needed [2].

In the case presented, the medical team decided to use conservative therapy applying negative pressure therapy (NPT) techniques. The two most commonly used NPT techniques are Barker's vacuum pack technique (BVPT) and Vacuum-Assisted-Closure® Therapy [V.A.C.® Abdominal Dressing System (ADS); KCI USA] [1].

2. Case presentation

We describe the case of a 59-year-old female patient that was admitted to a peripheral hospital with diagnosis of peritonitis secondary to a perforation of a sigmoid diverticulum. She underwent a sigmoid resection with an L-T anastomosis. After 11 days, the patients developed a new widespread peritonitis. At emergency re-laparotomy, surgeons found dehiscence of the posterior wall of the anastomosis with fecal contamination of the abdomen. They carried out an ileostomy with careful toilet of peritoneal cavity, and they left the wound margins not juxtaposed for the high risk of complications. Due to the aggravation of the clinical features and after further 23 days, it was decided to transfer the patient at our ICU continuation of intensive care. On ICU admission, the patient was sedated, intubated and mechanically ventilated. She was hemodynamically unstable (invasive blood pressure of 80/50 mmHg), no fluid load responder and body temperature was 38 °C. The patient presented dehiscence of cutaneous and subcutaneous abdominal layers (Fig. 1). In her history, chronic obstructive pulmonary disease, gastro-esophageal reflux disease, and paroxysmal atrial fibrillation have been reported.

Culture tests were collected. Surgical wound swab was positive for E. coli, E. faecius, and Bacteroides Ovatum, meanwhile blood cultures had a negative outcome.

A CT scan of the abdomen showed free air in peritoneal cavity surrounding the liver and spleen, especially in the epigastrium

Abbreviations: L-T, latero to terminal; ICU, intensive care unite; VAC, vacuum assisted closure; IAP, intra-abdominal hypertension; NPT, negative pressure therapy; BVPT, Barker's vacuum pack technique; NPWT, negative pressure wound therapy.

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Fig. 1. Open abdomen after abdominal tissue dehiscence.

Fig. 2. Free air in peritoneal cavity.

and mesogastrium (Fig. 2). Multiple confluent abscesses were identified in the right and left hypocondrium (the largest measured 52 mm × 35 mm) and in the pelvic cavity (with the largest of 26 mm × 25 mm) (Fig. 3). Other findings indicated the presence of multiple nodules in the chest compatible, in the first hypothesis, with septic localizations and the existence of multiple ipodense areas within the spleen related to heart-failure.

An intervention of debridement was rejected because of the severe physical conditions of the patient and because abdominal abscesses were not considered treatable by surgery as they were multiple and disseminated. For this reason, we proposed a conservative treatment with broad-spectrum antibiotic therapy and the use of Negative Pressure Therapy (NTP). This treatment was at high risk of both hemorrhage and perforation because the loops were free of fascial closure and made fragile by infection.

We performed VAC therapy with the lowest possible continuous negative pressure (−15 mmHg) for the high risk of bleeding and perforation. We applied V.A.C. VeraFlo Cleanse™ in place of conventional medications (foam dressings of the V.A.C.® Therapy System). The material of this foam is black polyurethane ester, with a median hydrophobicity and pore size of 400–600 μm. This foam allowed us to perform intermittent cleaning cycles (of the approximate duration of 5 min) with saline infusion alternating suction phases (of duration of 50 min) during the day. Only after

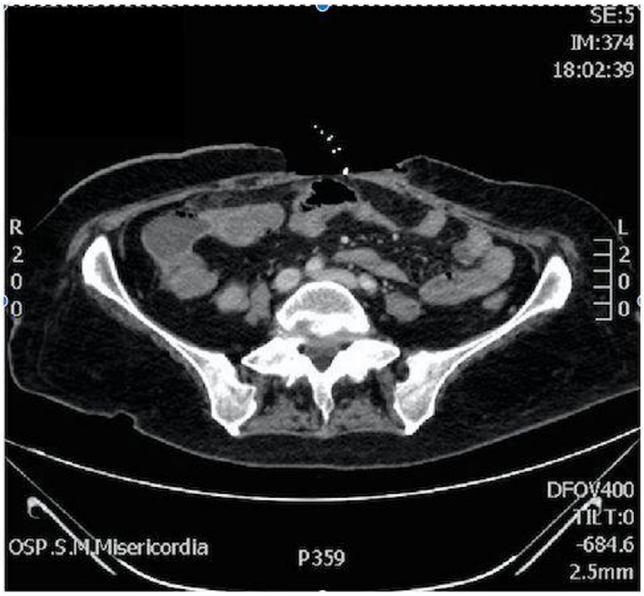

Fig. 3. Multiple abscesses in pelvic cavity.

4 weeks of NTP the patient achieved the formation of a clinically adequate granulation tissue (Fig. 4). This, combined whit the resolution of the septic state and a more stable hemodynamic status of the patient, allowed us to apply the conventional GranuFoam™ Dressings (black polyurethane ether) (Fig. 5) to prosecute the NTP, stopping the washing of the wound bed. Tissue repair, so accelerated by the NPT, permitted surgeons to shorten the time for the progressive juxtaposition of the flaps. After 35 days, the patient was discharged from the ICU. The patient was afebrile, clinically and hemodynamically stable, had spontaneous breathing with oxygen therapy and normal urine output. She continued VAC therapy for other 4 weeks on the ward until the complete closure of the abdominal wall (Fig. 6). After six months, the patient was alive and no complications occurred.

3. Conclusion

The VAC (Vacuum-Assisted Closure) therapy (also know as NPWT, negative pressure wound therapy) is a non-invasive active wound management technique which exposes wound bed to continuous or intermittent local sub atmospheric pressure [2].

Microdeformational Wound Therapy (MDWT) is a particular technique of VAC. The system consists of a unit which actuates the suction, an impermeable membrane and a soft and porous foam that is placed over the wound. The application of suction guarantees a negative pressure that exposes the wound margins to macro and micro deformations. The macro-deformation sustained through the foam allows the approximation of the margins and the removal of exudate. The micro-deformation instead acts at the cellular level, with the promotion of the proliferation and migration of cells. These physical interactions stimulate cell regeneration and the formation of granulation tissue [3].

The effectiveness of this technique has been documented mainly in patients with trauma or compartmental syndrome. There are few studies regarding the use of this technique in patients with peritonitis, but Horwood et al. asserted that an early use of the V.A.C.® Therapy may reduce complications compared to laparotomy in abdominal infections [4]. Patients who appear to benefit most of VAC® Therapy have been grouped into several categories [5]:

- patients with anastomotic dehiscence;

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