



## Original article

## Negative pressure therapy in wounds with enteric fistulas

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## A B S T R A C T

**Objective:** Negative pressure therapy (VAC, vacuum assisted closure) is a method used still in our country. It consists of a system of aspirating a wound by means of a piece of foam and a few adhesive films. It allows the treatment of complex wounds, included (although this is still controversial) those with intestinal fistulas. We present 3 cases of treatment with VAC in this situation and a review of the published literature.

**Patients and method:** We have treated 10 patients, since VAC therapy was introduced into our centre of which 3 of whom had a fistula in the bed of the surgical wound. We describe the clinical information of the patients and the therapy that followed in each of the cases.

**Results:** Significant local clinical improvement of the disease, with control of the symptoms, was achieved in all 3 cases. We were able to re-operate to close the fistula in one of the patients, with subsequent good progression of the wound. In the other 2 cases it gave them a better quality of life although both died due to the overall complexity of their situation. **Conclusions:** VAC therapy, although controversial in the treatment of intestinal fistulas, can help to improve the local situation of the wounds, the comfort of the patients and their general situation.

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## Uso de terapia con presión negativa en heridas con fístulas entéricas

## R E S U M E N

## Palabras clave:

Fístula enterocutánea

Herida quirúrgica

Terapia con presión negativa

**Objetivos:** La terapia con presión negativa (VAC, vacuum assisted closure) es una modalidad poco utilizada aún en nuestro país. Consiste en un sistema de aspiración sobre la herida por medio de una esponja y unos adhesivos plásticos. Permite el tratamiento de heridas complejas incluidas aquellas con fístulas intestinales, aunque este punto es controvertido. Presentamos 3 casos de tratamiento con VAC en esta situación y un resumen de los estudios publicados.

**Pacientes y método:** Desde la introducción de la terapia VAC en nuestro centro, hemos tratado a 10 pacientes, 3 de los cuales presentaban una fístula en el lecho de la herida

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quirúrgica. Describimos los datos clínicos de los pacientes y el tratamiento que se siguió en cada uno de los casos.

**Resultados:** En los 3 casos se consiguió una significativa mejoría clínica local de la enfermedad, con control de los síntomas. En uno de los pacientes pudimos realizar una nueva cirugía para cierre de la fístula con buena evolución de la herida. En los otros 2 casos se consiguió una mejor calidad de vida, aunque ambos fallecieron por la complejidad de la situación general.

**Conclusiones:** El tratamiento con VAC, aunque controvertido en las fístulas intestinales, puede ayudar a mejorar la situación local de las heridas, el confort de los enfermos y su situación general.

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## Introduction

Negative pressure therapy (VAC, vacuum assisted closure) is becoming an instrument that is being used more and more to treat complex wounds, including infected wounds, traumatic wounds, pressure ulcers, wounds with bone exposure, diabetic foot ulcers, and those from venous ectasia in extremities, aside from being used to facilitate the viability of cutaneous grafts. It consists of aspirating a wound, either continuously or intermittently, by means of a piece of foam placed in the cavity and secured with a plastic adhesive film.

The treatment of enterocutaneous fistulas depends on the daily output, that comes from the affected intestinal segment, the size of the continuity solution, if there is abdominal sepsis or not and if there is distal obstruction or not. In general, it is usually conservative, with parenteral nutrition, somatostatin analogues to decrease secretion, and it frequently requires numerous daily changes of the dressing, above all, if it is a high fistula with an important amount of output (>500 mL/day).

Various studies have been published where this aspirative treatment is used for enteric fistulas, with good results, according to their authors; although this point is controversial given that there are various publications that recommend using great caution with the use of this treatment in this type of patient.

We present 3 cases where negative pressure was used to treat open laparotomic wounds with enteric fistulas and we have reviewed published literature.

## Patients and method

Since we began to use the VAC treatment in our centre, in 2005, 10 patients have been treated, 3 of which presented complex injuries with enteric fistulas in the bed of the wounds. We present these cases below.

### Case 1

A 67-year-old woman with chronic nephropathy from analgesics use, in haemodialysis, with ischemic cardiopathy and obesity, operated on in various occasions for eventration with insertion of supra-aponeurotic mesh 2 years before. She seeks healthcare for an open wound that is infected by *Pseudomonas* with the mesh exposed. She is operated on to

remove the mesh and close the wound. In the immediate postoperative period, she presents an infection of the surgical wound and an enteral fistula with high output is observed. After poorly controlling the wound, with habitual curing techniques during some 10 days with gauze and protective creams, we decide to apply VAC therapy; the fistulous content is derived using a Foley catheter and a white sponge is placed around the Foley catheter, and a black sponge is placed around the rest of the wound. This system helped the wound to improve sufficiently so that 1 month after the first intervention we could re-operate to resect the affected intestinal segment. The skin was left open to continue applying the VAC therapy until the patient was discharged, with negative cultures for *Pseudomonas*. Figure 1 shows the situation of the wound curing process before starting the VAC therapy.

### Case 2

Seventy-five-year-old women with arterial hypertension, morbid obesity, and a long history of abdominal surgical interventions. Appendectomy, cholecystectomy, caesarean section, various hernias operated on by laparotomy, the last of which, 12 years before, was covered with a mesh. She arrived to the emergency room for an intestinal fistula with low output that could not be controlled with conservative treatment. A segment intestinal resection was performed and the origin of



**Figure 1 – Situation of the wound before initiating VAC therapy (vacuum assisted closure), with a Foley catheter the output is collected from the bed of the wound. Skin is protected with aluminium paste.**



**Figure 2 – Exposed wound with fistula in its bed. Derivations of the proximal and distal openings of the fistula are tried with a Penrose drain.**

the fistula was confirmed in a zone of the intestine over the mesh. Dehiscence of sutures in the immediate postoperative period and re-intervention with segment resection of the small intestine. After this second intervention, a dehiscence of the suture was again produced, opening the skin and the fistula with high output that produced an intense burning sensation on the skin, with continuous changes of the dressing by the nursing staff, and an important worsening of the patient (Figure 2). After one week of wound curing procedures, VAC therapy is started, with a black sponge and protection for the bed of the wound with gauze soaked in vaseline, to improve the quality of life of the patient as the studies carried out do not allow for a new re-intervention when detecting a very short intestine after repeated surgeries. The result is the disappearance of the burning sensation and great discomfort suffered by the patient. Given that the wound curing procedures are now carried out every 48 h, the skin improved spectacularly in only a few days, the work of the nurses was greatly alleviated, and the patient's situation stabilised until she died from a respiratory infection approximately 2 months after the last intervention.

### Case 3

Sixty-nine-year-old woman, with liver transplant for secondary cirrhosis from hepatitis C virus, later operated on for intestinal obstruction, an ileostomy was performed. The patient arrived for dehiscence of sutures, after the intervention to restore intestinal transit, with an open wound and intestinal loops in the bottom of the wound and a fistulous orifice with high output (Figure 3). We found a poorly controlled situation of the wound with continuous dressing changes during 2 weeks, the skin surrounding the wound was in bad condition and the patient needed high doses of analgesics for the burning sensation in the wound. We applied VAC therapy with derivation using a Foley catheter in the fistula, with a black sponge and protection of the loops of the bed of the wound with gauze soaked in Vaseline and a plastic film (Figure 4).



**Figure 3 – Exposed intestinal loops in the bed of the wound. The Foley catheter sits in the fistula located in the bottom of the wound.**



**Figure 4 – VAC Therapy (vacuum assisted closure) applied to the mentioned wound. The aspiration system was placed protecting the loops of the bottom and it collects the normal secretions of a wound, while it keeps the Foley catheter in place where the output of the fistula is collected.**

The results were a significant improvement of the local situation of the wound, which required lower doses of analgesics and wound dressing changes every 48 h, with the added benefit for the nursing staff. Subsequently, the patient suffered cardiac failure with pulmonary oedema and died approximately 5 weeks later.

## Discussion

This type of therapy was developed at the end of the eighties in the United States and Germany, simultaneously. It consists of a continuous or discontinued aspiration (usually, between 75 and 125 mm Hg) over a sponge placed in the acute or

chronic wound while maintaining the vacuum seal when covering everything (wound and sponge) with an adhesive film.<sup>1,2</sup>

Maintaining a negative continuous pressure in the wound makes the perilesional oedema decrease, it improves the vascularisation of the wound and mobilises the excessive secretions, which allows for more creation of granulated tissue, facilitating the mobilisation of the bacteria in the wound and isolating the wound from infection from other germs.<sup>3</sup> Because it is a closed system, it maintains hygiene and avoids unpleasant odours from the infected wounds or fistulas; also, it avoids the continuous drainage of secretions to gauze that can stain the patient's clothing or bed linens.

It is easy to use and decreases the number of wound curing procedures that have to be carried out by the nursing staff, that can surpass, as in the cases presented, 7 or 8 daily cures to cures done every 48 to 72 h, which entails a good amount of time saved by the nursing staff and more comfort for the patient. It allows the patient to move, walk (thanks to the fact that the equipment has batteries), and even being discharged with ambulatory equipment. Of our cases, only the first patient benefited as, although she did not walk, she did have to go to her dialysis sessions every other day.

All of this involves a perception of well-being by the patient and autonomy in their hygiene, and it can also shorten hospital stays.

In a study carried out by Joseph et al,<sup>4</sup> where they compare this system with the classic wound curing procedures with humid gauze, they conclude that wounds close faster with the VAC system and that the amount of healthy granulated tissue increases, making it possible, in large chronic wounds, to reach 80%-90% closures in 3 to 6 weeks. However, a recently published meta-analysis reveals that, although there appears to be improvements in wound closure with this therapy, there is no scientific evidence.<sup>5</sup>

Although the cost of the equipment and the fungibles (equipment with sponges, adhesive films, and aspirating tube, on one hand, and secretion collector, on the other) is clearly higher than just a few pieces of gauze with saline solution, it seems, according to existing literature, regarding the number of cures required, and fundamentally, because of the decrease in hospital stay that, in a general manner, the VAC therapy may be cost-effective.<sup>6</sup>

There are a series of contraindications for this therapy, such as unexplored fistulas or non-enteric fistulas, wounds with necrotic tissue or scabs, tumour cells or in patients with non-treated osteomyelitis, and a series of precautions, such as not applying the treatment over actively-bleeding tissues, with anticoagulant therapy, in contact with exposed blood vessels or organs, and with special care in previously radiated or sutured vessels or organs.

Rao et al,<sup>7</sup> and later, Fisher,<sup>8</sup> call attention to the use of this therapy in open abdomens, in the sense that an elevated risk should be considered of causing fistulas and increasing mortality. Of the series commented by Rao et al, of 29 patients, 6 developed fistulas, and 4 died. It is necessary to know how many would have died or even how many would have developed fistulas with habitual curing techniques, given that they were severe patients (65.6% required intensive

care). We, the authors, agree with Rao et al that we must be very careful when using this therapy in open abdomens or with laparostomies, and in our cases, our patients already had fistulas when we applied the VAC system and in no case did we use it to close the fistula.

We can think that an open fistula that is continuously aspirated will only get larger; however, various publications<sup>1</sup> study fistulas treated with this system with positive results. Of 7 publications collected, we found a total of 26 cases treated, the largest series was published by Nienhuijs et al<sup>9</sup> with 10 cases, the average duration of treatment was 25 days, in 4 cases the fistulas closed, and in 5 cases they had to be operated on for their closure. All of the publications report good results, of the complete closure of fistula, a decrease in output or of the possibility to isolate the output of the fistula from the wound, causing the wound to improve concerning itchiness and odor, all of the content can be collected from the fistula, which allows for an effective measurement of the output.

Although this therapy is relatively new, it is widely used in certain countries (United States, Germany) and, gradually, also in our country; possible applications of the technique<sup>6</sup> and problems that it could cause continue to be studied. The results obtained up to today's date and the literature published make us keep this therapy in mind, with great confidence in its utility and, in the concrete case of fistulas, for the improvement in comfort for patients.

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