

Intermittent Vacuum-Assisted Closure (VAC) Therapy In Sacral Pilonidal Cysts

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Abstract: This study evaluates the effectiveness of intermittent vacuum-assisted closure (VAC) therapy in treating sacral pilonidal cysts in pediatric patients. Twenty-one patients underwent VAC therapy using an intermittent negative pressure mode for a duration of 14 days. Rapid granulation tissue formation and absence of infection were observed in all patients, indicating accelerated wound healing. The intermittent mode demonstrated advantages in terms of patient comfort, especially in younger children, while reducing the risk of skin irritation commonly associated with continuous suction. These findings suggest that intermittent VAC therapy is both effective and safe for use in pediatric practice. However, further studies are needed to explore long-term outcomes and determine the optimal frequency and duration of intermittent therapy sessions.

Keywords: Intermittent vacuum-assisted closure, VAC therapy, pilonidal cyst, pediatric wound care, negative pressure wound therapy, granulation tissue, wound healing.

1. INTRODUCTION

In the last decade, there has been widespread interest in the treatment of acute and chronic wounds with negative pressure (VAC therapy, NPWT) [1]. The principle of the method is based on the use of a closed drainage system that maintains controlled negative pressure in the wound area. As a result, favorable conditions are created for the wound healing process in the damaged area, contributing to the rapid cleaning of the wound bed and the formation of "healthy" granulation tissue. Negative pressure wound therapy (NPWT) is typically used in a continuous mode. The intermittent mode of vacuum therapy (IPT) leads to faster wound healing, but often causes discomfort and pain to the patient [6]. When negative pressure is turned on and off repeatedly (for example, alternating values between 0 and -80 mm Hg), this is called intermittent vacuum therapy for wound healing (IPT). This therapy is not commonly used clinically because the sudden pressure changes cause the foam to expand and contract repeatedly over the wound bed and granulation tissue, causing pain. Therefore, variable pressure therapy (VPT) was introduced to provide a smooth transition between two different levels of negative pressure (e.g., -10 and -80 mm Hg), thus maintaining an average level of negative pressure throughout the therapy. Figure 1 illustrates the different modes of applying negative pressure. It has been proven that the amount of granulation tissue in the wound bed increases dramatically during IPT [3]. This may result from both the mechanical stimulation of tissues (massage effect) and improved blood flow to the edges of the wound. The effects of VPT on granulation tissue formation have not yet been studied in a detailed and controlled study. Intermittent VAC therapy is quite an efficient method in treatment of surgical wounds post pilonidal cyst excision [5].

2. METHODS

Over a five-year period, from 2020 to 2024, VAC therapy with intermittent negative pressure mode was used in 21 patients with wounds resulting from surgical treatment of pilonidal cysts in the sacral area. In these patients, the cyst was excised, and the wound defect was too large to be closed with the patient's own tissue. VAC therapy was then applied. After thorough hemostasis in the wound bed, a dressing with nanocrystalline silver was placed, with a release time for the silver clusters lasting for 7 days. A polyurethane foam was applied

on top, along with a centrally positioned tubular drain, hermetically sealed with foil. Negative pressure of -125 mmHg and intermittent aspiration mode were used. The duration of VAC therapy was 14 days for all patients. During this period, the dressing was changed at seven-day intervals. After the termination of VAC therapy, treatment continued with the local application of Intrasisite gel, and the wound dressing was changed daily.

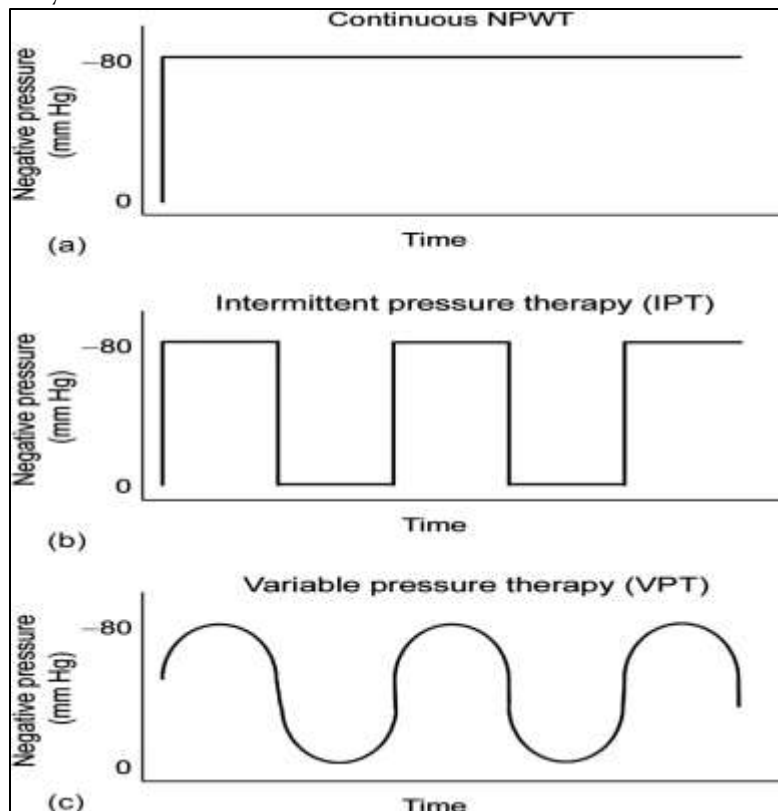


Figure 1

Fig.1 Schematic illustration of the different modes of applying negative pressure. (a) In continuous VAC therapy, the pressure is kept constant, for example, at -80 mm Hg. (b) In intermittent pressure therapy (IPT), the negative pressure is repeatedly switched on and off (for example, alternating between 0 and -80 mm Hg). (c) In variable pressure therapy (VPT), the pressure is varied smoothly between 2 levels (for example, -10 and -80 mm Hg), thus maintaining a negative pressure environment throughout the therapy.

3. RESULTS

Over a period of five years, two female patients and 19 male patients were treated. All patients were hospitalized during treatment. The hospital stay was 15 days. Surgical treatment was performed following the appropriate preoperative preparation. The surgical method used was the excision of the pilonidal cyst and all fistulous tracts, if present. After thorough hemostasis, a vacuum dressing with nanocrystalline silver was applied, with a release period for the silver clusters lasting seven days, followed by polyurethane foam and a centrally positioned tubular drain connected to a VAC therapy device. Negative pressure of -125 mmHg was applied. Therapy lasted for 14 days in all patients. The dressing was changed at seven-day intervals. Analgesic therapy was not administered except on the first day after the surgical treatment for all patients. Observation showed rapid development of granulation tissue, with no signs of infection in the surgical wound area [2]. No fibrinous deposits were observed in the wound. The deformation of the wound and the reduction in its size were noticeable, which created a favorable condition for quick filling of the defect and subsequent epithelialization [4].



Picture 1 The surgical wound after cyst excision



Picture. 2 The polyurethane sponge placed in the wound



Picture 3 The vacuum wound dressing

4. DISCUSSION

Since its inception in 1997, NPWT (Negative Pressure Wound Therapy) has been used to treat a wide range of wounds, including pressure ulcers, open abdominal wounds, diabetic foot ulcers, chest wounds, skin grafts, and traumatic wounds of the lower extremities. It has increasingly been applied in pediatric patients for the treatment of various types of wounds. Although the exact mechanism of NPWT in wound healing is

unknown, a large body of research has demonstrated its multifaceted benefits. By facilitating the removal of excess fluids and waste products from the wound area, NPWT reduces interstitial edema and bacterial counts, while promoting the formation of granulation tissue and increasing local blood flow [10].

The traditional VAC system uses one of two modes: “intermittent” or “continuous.” The intermittent mode creates negative pressure of -125 mmHg for a period of 5 minutes, followed by a resting phase of 0 mmHg for 2 minutes, whereas the continuous mode maintains constant negative pressure of -125 mmHg. In the present study, the intermittent mode of VAC therapy was used for the treatment of patients with pilonidal cysts post-surgery. Patients reported no pain during the use of this mode and felt more comfortable [9].

Since the treatment cycle with VAC therapy is repeated more than 200 times per day, the intermittent mode can sometimes cause frequent discomfort, which may lead to treatment interruption. Although the intermittent mode generally provides better results compared to the continuous mode, previous reports have noted that pain associated with the intermittent mode led to an increased need for analgesics, and some patients discontinued treatment due to discomfort during therapy [10].

In the present study, we observed the exact opposite—in children, the use of intermittent VAC therapy for the treatment of pilonidal cysts in the sacral area after excision provided better patient comfort, and the use of analgesics was not necessary. This may also be related to the application of this therapy specifically in the sacral area [10].

5. CONCLUSION

This study investigates the effects of applying intermittent mode of VAC therapy for wound treatment in children, providing valuable data for optimizing this approach in pediatric practice. The main goal of the study is to assess the effectiveness of the intermittent VAC therapy mode compared to the traditional continuous mode, with a particular focus on healing speed, potential side effects, and patient comfort.

The results of the study show that the intermittent mode of VAC therapy can offer significant benefits in terms of accelerated wound healing and better infection control [6]. This mode more effectively stimulates the formation of granulation tissue, which is a key factor in the rapid healing of tissues [3]. Shorter periods of vacuum and the subsequent pauses allow the skin and surrounding tissues to adapt better to the therapy, which is especially important for pediatric patients, who have more sensitive tissues and experience discomfort during prolonged therapeutic interventions [2].

The intermittent mode significantly reduces the likelihood of skin irritation around the wound, which is commonly observed with the application of continuous vacuum [4]. This is particularly noticeable in children under the age of 3, whose skin is much more delicate and prone to damage [2]. Patients report better comfort with the intermittent mode, as the short pauses during therapy reduce the effect of the constant vacuum pressure [7].

Despite these positive results from using the intermittent mode of VAC therapy for wound treatment, further studies with more participants, divided into appropriate age groups, are needed to confirm the observed effects and determine the optimal frequency and duration of intermittent periods [5]. Additionally, the long-term effects of applying the intermittent mode of VAC therapy on scar formation have not been studied, which is also important for the patients' quality of life [8].

In conclusion, the intermittent mode of VAC therapy for wound treatment following excision of pilonidal cysts in the sacral area shows good results and may offer significant advantages over the use of the traditional continuous suction mode. This therapy not only accelerates wound healing but also improves patient comfort and quality of life, while minimizing the risk of unwanted skin damage [6]. However, further studies are required to establish accurate criteria for using the intermittent mode of VAC therapy for wound treatment in pediatric patients [5].

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