

VACUTEX may be effective in wound healing through rapid capillary action: a case study

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The purpose of the case study is to share the treatment effects and experiences of patients who have switched from VAC therapy to VACUTEX, a negative pressure dressing with 68mmHg through optimized capillary action. In all seven patients, VAC therapy was terminated prematurely and rapid capillary action therapy was initiated. The average time to wound healing was 45 days. The reasons for premature termination of VAC therapy were skin irritation and discomfort due to limitation in mobility and noise from the VAC pump. The patients indicated that they found the dressing with rapid capillary action pleasant, because it improved mobility, there were no pumping noises and the removal and application of the dressing with rapid capillary action was perceived as less stressful than VAC therapy.

After surgery, 1-2% of patients experience wound problems. The factors that can make patients more susceptible to wound problems are diabetes mellitus, overweight and underweight, vascular and lung disease and smoking. When wound problems arise, effective wound treatment is important. There are many treatments for wound care. This case study examines wound problems after open heart surgery, using VAC therapy, which creates a negative pressure in the wound, causing the wound fluid to be sucked up and the wound edges to grow together.¹ VAC therapy has been used for a long time in postoperative wounds that are difficult to heal.² The VAC therapy shows good results for wound healing, but patients also experience discomfort, both physical and psychological, which is why the patient prefers to stop treatment early VAC therapy.² As a follow-up treatment to premature termination of VAC therapy, VACUTEX can be started, whereby patients do not experience the negative consequences of VAC therapy. VACUTEX is a special wound dressing consisting of 3 layers of Polyester and Polyester-Cotton filaments that mechanically act as a low level “pump” through capillary action.³ The dressing with rapid capillary action provides a negative pressure of -68mmHg in the wound.³ This may be sufficient, as another study showed that the maximum negative pressure should be -80mmHg.^{4 5} The association with rapid capillary effect can therefore be a follow-up after VAC therapy, whereby patients do not experience the negative consequences of VAC therapy. The costs of the bandage with rapid capillary action are also many times lower than the VAC therapy. The costs per VAC change are around one hundred euros and around ten euros for the change of the bandage with rapid capillary action.

Method

For this case study, 7 patients with wound problems after heart surgery were treated with the rapid capillary action dressing at the AmsterdamUMC between January 2024 and October 2024. Patients were eligible if the VAC therapy was terminated prematurely, because the patients experienced discomfort from the VAC therapy, such as irritation from the pump sounds (86%), skin irritation (43%), painful changes (86%) and limited mobility (71%). The patients gave verbal consent to participate in this study and to publish photos of the wound. Patient data were recorded in Table 1. When VAC therapy was discontinued, treatment was continued with the rapid capillary action dressing. The connection with rapid capillary action was applied in the same way to all. The rapid capillary action dressing was cut 2-3 mm smaller than the wound edges to allow the wound edges to grow together. An absorbent dressing was placed on the rapid capillary action dressing. If it was saturated, it was replaced, but the rapid capillary action dressing itself remained in place. The rapid capillary action dressing was changed twice a week. The patients were followed at the outpatient clinic by a nurse specialist until the wound was closed. A closed wound means that the wound showed no signs of infection and no exudate was present. The patient's experiences with VAC therapy and its association with rapid capillary action were noted.

Results

For this study, 7 patients, 5 men and 2 women, with wound problems after open heart surgery were included. This concerns 6 sternal wounds and 1 leg wound. The basic characteristics of the patients are shown in Table 1. All wounds were healed after treatment.

Treatment effect

All patients first received surgery for wound exploration and then VAC therapy, with the aim of continuing VAC therapy until the granulation tissue reached the skin level. In all patients, the VAC was set at 125mmHg, negative pressure. The average duration of VAC therapy was 21 days. The VAC therapy was stopped by the nurse specialist at the outpatient clinic. The reasons for premature termination of the VAC therapy were skin irritation, pain experienced during dressing change, limitation in mobility and irritation due to pump noises, these are listed per patient in table 2. After stopping the VAC therapy, all patients started with the treatment of rapid capillary action until the wound was healed. The mean duration of rapid capillary action treatment was 24 days. Table 3 shows the photos where the healing of the wound is visible. During the change, the patients reported no pain, the skin irritation decreased and the patients were satisfied because they had a better night's sleep, because there are now no more pumping sounds. All patients also indicate that they have more freedom of movement than with VAC therapy, because they always had to take the tubing into account. The patients also indicated that the connection with fast capillary action is less psychologically stressful, because you have more freedom and do not have to walk across the street with visible tubing. The average duration for the total treatment was 45 days.

	Tabel 1: patient data									
patiënt	gender	age	operation	woundlocation	BMI	diabetic	smoking	COPD/ astma	PAD	intervention
1	male	74	Aortic valve	sternum	27.7	No	No	Yes	No	wound exploration, placing VAC and antibiotics
2	female	67	aorta	sternum	31.7	No	No	No	No	wound exploration, placing VAC and antibiotics
3	Female	60	bypass	lower leg	27.2	Yes	No	Yes	No	wound exploration, placing VAC and antibiotics
4	Male	78	aorta	sternum	32.9	No	No	No	No	wound exploration, placing VAC and antibiotics
5	male	70	Aortic valve	sternum	31.0	Yes	No	No	Yes	wound exploration, placing VAC and antibiotics

6	male	49	Aortic valve	sternum	25.7	No	No	Yes	No	wound exploration, placing VAC and antibiotics
7	male	61	Aortic valve	sternum	32.6	No	No	No	Yes	wound exploration, placing VAC and antibiotics
PAD = peripheral arterial diseases										

Tabel 2: results				
patiënt	duration VAC	reason stop VAC	duration VACUTEX	reason stop VACUTEX
1	14 days	skin irritation, irritation pumping noises	28 days	wound closed
2	38 days	skin irritation, painful change, irritation pumping sounds	21 days	wound closed
3	17 days	painful dressing change, limited mobility	21 days	wound closed
4	21 days	painful dressing change, skin irritation, irritation pumping noises, limited mobility	35 days	wound closed
5	25 days	painful dressing change, irritation pumping sounds, limited mobility	21 days	wound closed
6	15 days	painful dressing change, irritation pumping sounds, limited mobility	20 days	wound closed
7	14 days	painful dressing change, irritation pumping sounds, limited mobility	21 days	wound closed

Tabel 3: result photos of wounds

Patiënt 1:

19-01-24 start
VACUTEX

24-01-24

29-01-24

16-02-24



Patiënt 2:

05-04-24 start
VACUTEX

12-04-24

19-04-24

26-04-24



Patiënt 3:

24-05-24 start
VACUTEX

31-05-24

07-06-24

14-06-24



Patiënt 4:

19-07-24 start
VACUTEX

26-07-24

09-08-24

23-08-24



Patiënt 5:

05-07-24 start
VACUTEX



12-07-24



26-07-24



Patiënt 6:

13-09-24 start
VACUTEX



20-09-24



26-09-24



03-10-24



Patiënt 7:

13-09-24 start
VACUTEX



20-09-24



04-10-24



Discussion

The patient cases in this case study indicate that a rapid capillary action dressing is a suitable alternative as a follow-up after VAC therapy. All patients included first started with VAC therapy, which already started the initial process of wound healing, when the wound had healed more towards the skin surface, the dressing with rapid capillary action was started. All patients in the case study stopped VAC therapy prematurely because the patients experienced discomfort from VAC therapy, such as irritation from the pump sounds (86%), skin irritation (43%), painful dressing changes (86%) and limited mobility (71%). After premature termination of VAC therapy, patients started with the rapid capillary action dressing. The patients indicated that they found the connection with fast capillary action pleasant, due to less painful changes, freedom of movement, no skin irritation and absence of pumping noises. Research into the effectiveness of fast capillary action is still lacking. However, this case study does show potentially effective results if the patient experiences a lot of discomfort from VAC therapy. However, the sample size is small, making this case study not entirely representative for the entire population and the research is not entirely representative. Vermeulen et al (2007) showed in an analysis that if patients experience little pain during the application of the wound dressing, the hospital stay is shortened and rapid wound healing is promoted.⁶

Conclusion

The case study shows that a rapid capillary action dressing may show potentially effective results in patients with difficult-to-heal wounds after open heart surgery. Although the case study may not demonstrate sufficient evidence to initiate a rapid capillary action dressing rather than continuing with VAC therapy, the case study does show that this is a suitable alternative as patients experience less skin irritation and discomfort than VAC therapy. The limitations of this case study are the small sample size of seven patients and the short observation period. To obtain sufficient evidence, an RCT can be performed in which VAC therapy and its association with rapid capillary action dressing are compared.

Literature list

1. Acelity, VAC therapy, richtlijn (geraadpleegd op 12-09-2024). Beschikbaar via: <https://www.acelity.com/-/media/Project/Acelity/Acelity-Base-Sites/shared/PDF/2-b-128-au-enb-clinical-guidelines-web.pdf>
2. Janssen AH, Wegdam JA, de Vries Reilingh TS et al (2020) Negative pressure wound therapy for patients with hard-to-heal wounds: a systematic review. *J Wound Care* 29(4): 206–12
3. VACUTEX, Protex Healthcare (geraadpleegd op 12-09-2024). Beschikbaar via: <https://protexhealthcare.com/nl/producten/vacutex/>
4. Borgquist O, Ingemansson R, Malmsjö M (2010) Wound edge microvascular blood flow during negative-pressure wound therapy: examining the effects of pressures from –10 to –175 mmHg.
5. Borgquist O, Ingemansson R, Malmsjö M (2011) The influence of low and high pressure levels during negative-pressure wound therapy on wound contraction and fluid evacuation.
6. Vermeulen H, Ubbink DT, de Zwart F et al (2007) Preferences of patients, doctors, and nurses regarding wound dressing characteristics: a conjoint analysis. *Wound Repair Regen* 15(3): 302–7