How to apply vacuum-assisted closure therapy

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Rationale and key points

This article aims to provide an overview of the technique for applying vacuum-assisted closure therapy (V.A.C. therapy), using the example of one of the most basic dressing types: V.A.C. GranuFoam, a black polyurethane foam. Practitioners should refer to the manufacturer’s instructions for application of other dressing types.

- V.A.C. therapy is used to apply negative pressure to the wound bed to promote wound healing.
- V.A.C therapy promotes perfusion, reduces oedema, draws the wound edges together and stimulates the formation of granulation tissue.
- The correct technique for applying V.A.C. therapy is essential to ensure patient safety and optimum wound healing outcomes.

Preparation and equipment

- The practitioner should have the knowledge and skills to apply V.A.C. therapy, including an understanding of the mechanism of action, indications, contraindications and precautions. Correct application is required to ensure patient safety and to promote optimum wound healing outcomes.
- Practitioners should always refer to the manufacturer’s instructions and to local guidelines and policies.
- Patient information leaflets are available from KCI (an Acelity Company). The wound should have been assessed and approved as suitable for V.A.C. therapy. It is important to ensure the multidisciplinary team consents to the use of this therapy.
- The practitioner should ensure all necessary equipment is available for wound care and therapy, including:
  - A dressing pack, including sterile gloves, gauze, a plastic tray, a wound measure and an apron.
  - Sterile scissors.
  - Sterile 0.9% sodium chloride, if required, for wound cleansing.
  - A vacuum-assisted closure pump, for example an ActiV.A.C. Therapy Unit, with power lead and carry case. Alternative devices are available, for example RENASYS GO and EZ Plus (Smith&Nephew), Avance Solo and NPWT system (Mölnlycke Health Care), and VENTURI AVANTI and VENTURI COMPACT NPWT system (Talley Medical).
  - A vacuum-assisted closure dressing, for example a V.A.C. GranuFoam dressing kit with SensaT.R.A.C. Pad (pad connector) and V.A.C. Drape (adhesive film dressing). Alternative devices use comparable foam or gauze dressing kits.
  - A wound contact layer.
  - A V.A.C. Canister with tubing to collect wound exudate. Alternative devices use comparable canisters to collect wound exudate.
  - A patient information leaflet (available from KCI on request). Other information is

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Keywords

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– Appropriate pain relief, as required.

Procedure
This procedure outlines the technique for applying a basic vacuum-assisted closure dressing using V.A.C. therapy.
1. Explain the procedure to the patient and obtain informed verbal consent. Patient information leaflets are available from KCI.
2. Ensure the patient is positioned comfortably and has been given adequate pain relief as prescribed, if required.
3. Remove the previous wound dressing using an aseptic non-touch technique, as per local policy. To remove a V.A.C. dressing, close off the clamps on the tubing, turn off the vacuum-assisted closure pump, stretch the drape gently in a horizontal direction and gently remove all the foam from the wound bed. Document the number of pieces of foam removed.
5. Irrigate the wound with sterile 0.9% sodium chloride, as per local guidelines. Apply a barrier film to the skin around the wound, if required.
6. Use sterile scissors to cut the V.A.C. GranuFoam dressing to the size and shape of the wound (Figure 1) and insert the foam into the wound cavity (Figure 2). Do not cut the foam over the wound, to avoid the risk of small particles of foam entering the wound. When packing a cavity wound, ensure that the entire wound bed and any undermining edges are in contact with the foam. This ensures that wound therapy is delivered to the entire wound bed. If exposed blood vessels, tendon, bone or muscle are evident in the wound bed, cover them with a wound contact layer. Document how many pieces of foam were inserted into the wound. Ensure the foam does not come into contact with periwound skin, since this will cause maceration.
7. Cover the wound, packed with V.A.C. GranuFoam, with a V.A.C. Drape. Cut the drape so that it will cover a few centimetres of skin around the wound. To do this, remove layer one of the drape (Figure 3) and place it adhesive side down on the wound. Remove layer two of the drape and finally remove the perforated blue handling tabs. More than one piece of film may be used to ensure the foam is covered completely and to promote an effective seal to the skin.
8. Pinch the V.A.C. Drape in the centre of the V.A.C. GranuFoam and cut a 2.5cm hole in it (the size of a £2 coin or a United States quarter) (Figure 3). The size is important to allow the SensaT.R.A.C. Pad sensor to be in contact with the foam and therefore to monitor the V.A.C. therapy pressure.
9. Remove the two backing layers, one and two, from the SensaT.R.A.C. Pad. Place the opening of the SensaT.R.A.C. Pad directly over the hole in the drape and remove the blue tab (Figure 4).
10. Connect the SensaT.R.A.C. Pad tubing to the...
V.A.C. Canister tubing.

11. Connect the V.A.C. Canister to the vacuum-assisted closure pump. A click will be heard as the V.A.C. Canister is connected.

12. Turn on the vacuum-assisted closure pump and set it to the prescribed level of pressure. Pressure settings should be prescribed by a competent professional. Your local KCI representative will advise on pressure settings if required, or call KCI on 0800 980 8880. The default or standard pressure is 125mmHg (continuous therapy). Pressure may be reduced if the patient experiences pain in the wound or has an increased risk of bleeding. The pressure setting may be increased if the patient is experiencing high volumes of wound exudate or shows signs and symptoms of infection.

13. Remove the gloves and dispose of according to local guidelines.

14. Ensure the patient is comfortable, has the opportunity to ask questions and knows who to contact if they have any concerns about the therapy.

15. Change the dressing every 48-72 hours per instructions for use. This frequency varies according to individual patients, symptom control or wound types. Local guidelines should be consulted and information on the patient care plan referred to.

**Evidence base**

V.A.C. therapy has been commercially available since 1995 (Banwell and Téot 2004). An increasing number of clinical case studies and randomised controlled trials support its use. There is evidence to support its use in sternal wounds (Sjögren et al 2005), the open abdomen (Wild et al 2007), open fracture wounds (Stannard et al 2009) and foot ulcers in patients with diabetes (Blume et al 2008).

According to Gustafsson et al (2007), V.A.C. therapy is associated with mechanisms of action that support healing, including:

- Drawing wound edges together.
- Increasing local blood flow.
- Reducing bacterial load.
- Reducing cytokines and matrix metalloproteinases.
- Reducing oedema.
- Stimulating the formation of granulation tissue.
- Stimulating cell proliferation.

V.A.C. therapy removes excess exudate from the wound bed while maintaining a moist wound healing environment (Banwell and Téot 2006). Removal of excess exudate reduces oedema, cytokines and matrix metalloproteinases, which may delay wound healing (Greene et al 2006).

Wound closure is enhanced by V.A.C. therapy since it physically draws the wound edges together (Banwell and Téot 2004). Saxena et al (2004) described how V.A.C. GranuFoam applies micro-mechanical forces to the wound bed, which promote cell division and therefore wound healing. V.A.C. therapy is indicated for patients with chronic, acute, traumatic, subacute and dehisced wounds, partial-thickness burns, ulcers associated with diabetes, pressure ulcers, venous ulcers, and flap and graft wounds (KCI Licensing 2014). Practitioners should refer to the manufacturer’s clinical guidelines for complex clinical scenarios. The patient’s physical, nutritional and psychosocial wellbeing should be optimised to improve treatment outcomes (World Union of Wound Healing Societies 2008).

V.A.C. therapy is contraindicated in wounds with a significant amount of thick necrotic or sloughy tissue and for untreated osteomyelitis, malignant wounds and non-enteric or unexplored fistulas (KCI Licensing 2014). V.A.C. dressings should not be placed directly over exposed vital structures, for example tendons, ligaments, blood vessels, anastomotic sites, organs and/or nerves.

V.A.C. therapy should be used with caution, and patients with bleeding wounds or difficulty in maintaining haemostasis and those taking anticoagulants should be monitored per instructions for use (Vowden et al 2007).

The standard negative pressure recommended for V.A.C. therapy using a foam dressing is 125mmHg (KCI Licensing 2014). Morykwas et al (1997) identified that this pressure level increases blood flow to the wound. They also observed that 125mmHg negative pressure increases granulation tissue growth by 63% (continuous negative pressure) or 103% (intermittent negative pressure). It is recommended...
that practitioners use continuous therapy for the first 48 hours in all wounds, and then consider switching to intermittent therapy (KCI Licensing 2014). Intermittent therapy is shown to promote faster granulation tissue growth. However, it may be advisable to continue with continuous therapy if a patient has wound discomfort, high exudate levels, undermined areas, graft or flap wounds, or if there is difficulty obtaining a seal for V.A.C. therapy (KCI Licensing 2014).

Morykwas et al (1997) identified that the mechanism of V.A.C. therapy reduces interstitial fluid and therefore the bacterial load of the wound. The risk of infection is further reduced by increased blood perfusion and the physical barrier created by the V.A.C. Drape, sealing the wound from external contaminants (Gustafsson et al 2007). Chester and Waters (2002) suggested that V.A.C. therapy may create an adverse alteration of wound flora in the wound bed. However, several authors, for example Schuster et al (2006), have demonstrated that V.A.C. therapy may have a positive effect on the bacterial load of an infected or high-risk wound. 

References


