

Negative Pressure Wound Dressing Application

Richard Davis

Introduction:

Negative pressure therapy is very helpful in appropriate wounds. The beneficial effects on wound healing and promotion of healthy granulation tissue are well studied. Here, we demonstrate one way to adapt this technique to a resource-limited setting. In this chapter will demonstrate placement on a leg, but this technique is equally adaptable on an arm or other parts of the body, as long as a reliable seal can be maintained.

This technique is contraindicated in wounds with purulent discharge or ongoing infection. You may be tempted to use it to control the drainage, but the system will be quickly overwhelmed. It is quite useful for wounds with dry eschar and non-infected debris, however. It is applied immediately after debridement. Negative pressure therapy's properties can be used to promote granulation over tissue where it does not grow normally, such as exposed tendons.

Some surgeons apply a negative pressure dressing immediately after a skin graft: this technique can promote graft take, especially in uneven surfaces like the hand and fingers. However, if your electricity or suction are not reliable, we suggest you use a different technique to apply continuous gentle pressure to your fresh grafts. See [Split Thickness Skin Grafting](#).

A source of suction is required: a portable electric machine can be used in areas where wall suction is not reliable. There are numerous reports of adapting a simple aquarium pump to provide suction, though we have no personal experience with this technique. A mechanical bellows system that needs no electricity is briefly described in the "Pitfalls" section below.

On commercial devices such as the KCI Wound Vac (Kinetic Concepts Inc., San Antonio TX USA,) the amount of suction is adjustable and tightly regulated. In our experience, it is more important to have continuous suction of any amount, than to have a specific value. We have noted that negative pressure ranging from 20mmHg (or less) up to 100mmHg yields an acceptable result.

Another necessary ingredient is thin plastic sheeting: ordinary plastic wrap is quite sufficient in most situations, especially where it is applied

circumferentially on an arm or a leg. Ordinary tape can be applied on the edges: make sure the skin is clean and dry, and apply alcohol and let it dry before applying the tape. In these examples we have used Ioban® adhesive plastic.

Negative pressure closure of the open abdomen is done differently than described here: see [Temporary Abdominal Closure](#).

Application of a negative therapy proceeds in the following steps:

- Appropriate selection and debridement of the wound
- Placement of gauze impregnated with Petroleum Jelly (such as Vaseline ®.)
- Placement of generous amounts of dry gauze
- Coverage of the gauze with plastic wrap, secured at the edges.
- Insertion of a tube through the plastic wrap, into the gauze
- Connection to suction and confirmation that all of the gauze collapses.

Steps:

1. Debride the wound until there is minimal eschar remaining. If there is exposed tendon, make sure it is clean. Make sure all of the adjacent skin is clean and dry.



Most eschar and all dead tissue should be debrided before the wound vac is applied. Exposed tendons can be preserved. These might be partially or completely covered with granulation tissue after the vac is removed in 5 days.

2. Apply petroleum jelly gauze to all of the wound.

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We make our own petroleum jelly gauze by impregnating plain gauze with jelly in a reusable sterilizable container.



All of the wound is covered in petroleum jelly gauze.

3. Generously cover the entire wound with several layers of dry gauze. This layer will transmit negative pressure to all of the wound.



Plain gauze is applied in several layers to the wound. It is useful after this step to clean the exposed skin again and wipe it with alcohol, prior to applying plastic wrap or tape, to be sure no petroleum jelly is there to keep the tape from adhering.

4. Cover the gauze in plastic wrap, such as available in a food store. Wrap or cover with 8-10 layers and overlap the edges of the gauze by at least 5cm.



Wrap or lay 8-10 layers of plastic wrap.

5. Trim a nasogastric tube so there are extra holes near the end.



Fold the tubing in half and cut off one corner, making an extra side hole in the tubing.

6. Cut the plastic wrap in one corner with scissors and insert the cut end of the nasogastric tube.

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Cut the plastic wrap in one place with scissors. Then use the tips of the scissors to create a “tunnel” in the gauze so that the tube will fit inside and transmit even, continuous negative pressure to all of the gauze.



Adhesive plastic sheet has been cut into a smaller piece and a seal is created at both the tube insertion site and the adjacent edge of the plastic wrap. It is also possible to use adhesive sheet wrap to cover all of the gauze, but this is more expensive than using plastic wrap for most of it and sealing only the edges with the adhesive wrap.



The tube should be inserted through the plastic wrap to lie completely within the gauze.

7. Using tape or adhesive plastic sheeting, make an airtight seal where the tube enters the plastic wrap.

8. Using tape or adhesive plastic, cover the edges of the plastic wrap and assure a good seal. If you use tape, be sure to use a generous amount and assure that the skin is clean.
9. Connect the tubing to suction and confirm that all of the gauze and plastic wrap grips tightly onto the area it is applied.



When suction is applied, the gauze is seen to “wrinkle” and become firm. If this does not occur, search for a leak in the system.

10. Verify every day that the vacuum seal remains in place. Open the dressing after 5 days and either graft or place a new dressing, depending on the appearance of the wound.

Pitfalls

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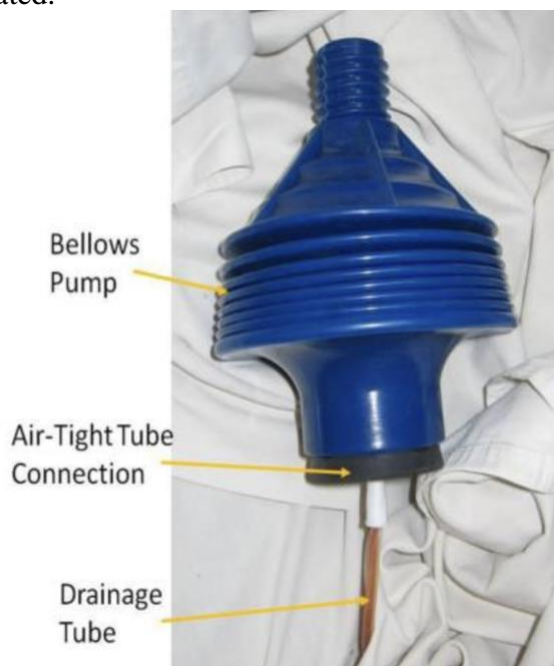
- Do not use negative pressure therapy on infected wounds or those with purulent discharge.
 - Verify that the suction continues to function throughout the 4-5 days that the dressing is in place. If suction is interrupted, the wound can worsen if left closed for an extended amount of time.
 - It is common in resource-rich settings to apply a negative pressure dressing directly over a skin graft after applying it. We would only recommend such a strategy if the electricity and suction were reliable, as a loss of suction could compromise the graft. Certainly the team should examine the dressing twice daily, to make sure the negative pressure remains until the graft is unveiled.
 - This technique depends on a continuous and reliable source of suction, which in turn depends on continuous and reliable electricity. Various solutions have been proposed, including a bellows device such as the one shown below. With such a device, a proper seal is more important, as a continuous slow leak is not tolerated.
- Do not apply a negative pressure dressing to large exposed blood vessels such as the femoral arteries or veins. Mobilize some adjacent muscle to protect the vessels from the gauze and adherent dressing.
 - Do not apply a negative pressure dressing directly to exposed intestine.

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A high volume bellows for negative pressure wound therapy in settings without reliable electricity. Source: Sorm K et al, J Orthop Trauma. 2015; 29(10):S33–S36.

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