VAC therapy for resource poor locations

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Summary

The concept of NPWT (Negative Pressure Wound Therapy) has been established since 1996 with the introduction of a proprietary method called V.A.C. promoted by a US based company.
We have created a similar machine which lacks a few features of the proprietary machine but hence indigenously produced and far cheaper. We have also used disposable components are available from the local super market thus NPWT can be done in any location without considering the cost and
The same has been tested by us and found to be useful

From the V.A.C. website

How V.A.C.® Therapy Works
V.A.C.® (Vacuum Assisted Closure™) Therapy is a non-invasive, dynamic and unique system that helps promote wound healing.
The V.A.C.® Therapy unit delivers negative (sub-atmospheric) pressure (negative pressure wound therapy) to the wound site applied by a tubing which decompresses a foam dressing, continuously or intermittently (e.g. five minutes on, two minutes off), depending on the type of wound being treated and the clinical objectives.
V.A.C.® Therapy has been used effectively in treating thousands of wounds of different etiologies in all care settings.
Clinicians prescribe V.A.C.® Therapy for many chronic, acute, sub-acute and traumatic wounds, – in the hospital, extended care facility and in home care.

V.A.C.® Therapy clinical benefits
Provides a closed moist wound healing environment
•Decreases wound volume
•Promotes granulation

Evaluating Treatment

It is important to review progress regularly. This will involve an accurate and reproducible method of wound measurement5. If there is a reduction in wound area (e.g. around 15%) after one or two weeks6, strong consideration should be given to continuing VAC therapy with **ongoing clinical evaluation**. Reassess again after a further week of therapy. If there is no improvement, discontinue VAC therapy and begin an alternative treatment. VAC therapy may be reconsidered at a later stage.

In **chronic wounds**, effective general assessment measure are:
■ Examine wound margins for inflammation after the first application of NPWT. If there is increased inflammation consider discontinuing treatment
■Re-examine wound margins for a thin white epithelium after the second and subsequent applications: this indicates healing
■Evaluate overall appearance of the wound bed. A beefy, granular appearance is a positive outcome, while a dusky bed indicates inadequate tissue perfusion. Granulation tissue should increase by around 3–5% per day.

Under ideal conditions (especially in the absence

About our machine

The machine has been made indigenously using the components as well as body of a different medical apparatus (VIPEL®) with suitable modifications for negative pressure generation. We have also made simple and easily available methods for the foam
g process as at

+*Patient with exposed Tibial plate undergoing therapy*

Slovac components (Suction tube and others are not labeled)

Wounds suitable for NPWT

•Chronic wounds (pressure ulcers and diabetic wounds)
•Sub-acute wounds (surgical dehiscence, abdominal)
•Acute wounds (traumatic wounds, partial-thickness burns, flaps and grafts)

How NPWT works

NPWT Therapy is intended to create an environment that promotes wound healing by secondary or tertiary (delayed primary) intention by preparing the wound bed for closure, reducing edema, promoting granulation tissue formation and perfusion, and by removing exudates and infectious materials. Wound bed preparation allows for wound closure.
Acute wounds progress efficiently and produce granulation tissue to fill the deficit, and heal by secondary intention. Chronic wounds often get “stuck” and are not as efficient. These wounds will either epithialize or they will be grafted or flapped for closure. Once the wound bed has been adequately prepared, it can be surgically closed.
NPWT helps Macrostrain (i.e. Wound Deformation or pulling together of the edges) as well as Microstrain (i.e. Cellular stretch – this helps cellular proliferation)
NPWT produce strains of 5 to 20 percent, resulting in undulations (waves or ripples) in the surface of the wound.
Granulation tissue (composed of new blood vessels, fibroblasts, collagen platelets, macrophages, and lymphocytes) grows from the base of the wound and is
NPWT increases fibroblast migration in vitro, as well as proliferation through mitosis. This creates an environment that promotes granulation tissue formation.

Factors to endure good results from NPWT

Wound factors

Wound has ---
■ a good blood supply
■a healthy, granular bed
■been freshly debrided
■high levels of exudate
■width is greater than 2cm

Patient factors

Patient has/is ---
■been well stabilised (e.g. regarding nutrition, blood pressure, Blood glucose, fluid balance, infection etc)
■few or well-controlled co-morbidities
■comfortable (e.g. not in pain)
■adherent with therapy

Comparative Analysis

Type	V.A.C.	Slovac	Remarks
Price	125,000 /-	10000/ -	Affordable for Indian patients
Pressure range	0 -200 mm Hg	0-200 mm Hg	Preferable 50 – 125 mm Hg
Electronic Display	Yes	No	Makes it cheaper
Pressure sensors	Yes	No	Not really required
Battery operated model	Yes	No	In the planning
Disposables	Yes – high cost	Yes - low cost	Cheap local replacements

Our Innovations

Our solution	Remarks
Affordable Machine	Costs 1/10th of original and 1/3rd of Indian variants
Simple replacable fluid collection jar	Baby Food jar - Available in any store – unbreakable, -can be boiled and sterilized (with precautions --Every patient can purchase a new one
Indigenous Foam for dressings	Purchased from the local store Ethylene Oxide sterilization – available in many hospitals - Have arrangements for supply to colleagues who do not have access to EO sterilizer
Simple Wound sealing technique	KlinWrap® or similar Kitchen seal can be sterilized in a formaline chamber and wrapped around – Cost per pt < Rs 2/-

In Conclusion

We are using a cheap simple and convenient method of providing Negative pressure therapy for our patients with wounds and ulcers. The same can easily be used by our fraternity at large

Things to be aware of regarding NPWT

Quality of life Advantages
■ Control of odour and exudate in many wound types (ie social benefits) with less frequent dressing changes
■ Able to participate in daily living activities, physical therapy and rehabilitation
■ Faster return to reduced dependency and normal living
■ Improvement in adherence (e.g. with offloading)
■ Improvement in anxiety and depression
Disadvantages
■ Noise of the VAC therapy unit (can be intrusive and difficult to tolerate)
■ Weight of the VAC therapy unit (mobility can be a problem, especially in older people)
Other considerations
■ Duration of treatment
■ Clinician’s level of expertise and confidence in using the technology
■ Setting in which the treatment is given (home or secondary care)
■ Communication (benefits need to be explained/ patients’ expectations assessed)
Cost-effectiveness
■ Reduction in use of resources and labour
■ Reduction in complexity and number of surgical procedure /adverse events
■ Reduction in length of treatment and hospital stay/number of hospitalisations
■ Improvement in clinical outcome

References
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Things to remember before starting NPWT

•It is not a replacement for debridement
•Oozing or blood loss may increase with excessive suction
•For recent operations, negative pressure may increase fluid loss and keep cut vessels especially lymphatics open

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