



ORIGINAL RESEARCH PAPER

General Surgery

AN OBSERVATIONAL STUDY OF VAC THERAPY (NEGATIVE PRESSURE) --A NEW ERA FOR THE FAST HEALING OF ULCERS IN NEUROPATHIC PATIENTS.

KEY WORDS:

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ABSTRACT

Introduction: VAC (VACUUM ASSISTED CLOSURE) is a potential treatment option for skin wounds that requires ideal negative pressure of 50-125mm/Hg which hastens the production of granulation tissue and encourage angiogenesis. **Aim:** To assess the efficacy of vacuum-assisted dressings in the management of nonhealing ulcers among neuropathic patients attending Dr.Pinnamaneni Siddhartha Institute of Medical Sciences & Research foundation ,Gannavaram, Krishna District, Andhra Pradesh. **Objectives:** To Study That Negative Pressure Wound Therapy (npwt) 1. Accelerates granulation tissue formation. 2. Rate of wound healing and mean duration of therapy. 3. Decreases the time of wound healing and bacterial burden of the wound bed. **Methodology:** Retrospective Cross-sectional study for a period of 24 months conducted in the Department of General Surgery, Dr. PSIMS & RF, Gannavaram, Krishna District A total of 44 Patients with nonhealing ulcers during the time period between Nov 2019 to Oct 2021. **Inclusion Criteria:** 1.Neuropathic Patients with non-healing ulcers 2.Pressure ulcers **Exclusion Criteria:** 1.Non-healing venous leg ulcers 2.Malignant Ulcers 3.Necrotic ulcer with eschar or slough before debridement 4.Actively bleeding wounds / wounds with visible blood vessels. 5.Wounds with untreated osteomyelitis 6.Arterial ulcers **Conclusion:** V.A.C dressing decreases Hospital stay,improves pus culture sensitivity and improves outcome and more Split skin graft uptake.

INTRODUCTION

Neuropathic ulcers are caused by loss of sensorium, inability to withdraw from painful stimuli like constant friction, shearing forces leading to ulcer formation. NPWT, also known as vacuum-assisted wound closure (VAC) is a more advance form with ideal pressure of 125mmhg that provides sub-atmospheric pressure to a wound's surface. It helps in the evacuation of interstitial fluid, decreasing localized edema, and increasing blood flow by directly applying a sterile, open-pore foam dressing to the wound to produce a closed, controlled environment. A vacuum source is attached to a fenestrated vacuum tube, and fluid is sucked from the wound via the foam into a reserve for later disposal. At a 48-hour interval, the vacuum dressing is routinely changed^{1,2}.

Aim :

To assess the efficacy of vacuum-assisted dressings in the management of non-healing ulcers among the neuropathic patients attending Dr. PSIMS &RF, Gannavaram, Krishna District, Andhra Pradesh.

Objectives

To study that NPWT

1. Accelerates granulation tissue formation.
2. Rate of wound healing and mean duration of therapy
3. Decreases the time of wound healing and bacterial burden of the wound bed

Management Of Wounds

The wound heals through granulation tissue deposition, wound contraction, and maturation. Other factors delaying healing includes pressure, trauma, venous insufficiency, diabetes, vascular illness. Vacuum -assisted closure has really been suggested as a way to hasten the healing of

wounds while lowering the number of painful dressing changes.

Vacuum – Assisted Closure [vac]

Dr. Louis Argenta and Dr. Michael Mory kwasin were the first to use vacuum aided closure in 1993. NPWT device was employed for contaminated wounds to eliminate blood or serous discharge from a surgical site. The negative pressure hastens the production of granulation tissue and encourage angiogenesis. Tensile stimulation of cells, which increases cellular proliferation and protein synthesis may play a role³.

Mechanism Of Action Of Vac

Injuries heal in one of two ways: **primary intention**, which involves suturing the two surfaces together, or **secondary intention**, which involves forming a matrix of capillaries and connective tissue in between the wound edges to allow keratinocytes to relocate across the surface and re-epithelialize the defect.

Indications

Acute and traumatic wounds, subacute wounds, pressure ulcers, chronic open wounds.

Contraindications

Fistulas to organ or body cavities, necrotic tissue in eschar before debridement, osteomyelitis, malignancy in wounds.

Recent Views Of Vacuum Assisted Closure

VAC heals faster than regular procedures and has less major side effects. The method could also be used to treat wounds with a lot of exudates, such as those with lymphatic involvement⁴In the treatment of neuropathic ulcers-VAC appears to be more successful, safe and patient-pleasant than

standard dressings⁵.

Wound scores:

- <10: Poor
- 11-15: Adequate
- 16-20: Satisfactory
- >20: Good

Wound score of 16–20 / >20 was taken as the primary end point (for definitive treatment). Deterioration of the wound, progression to sepsis was taken as the secondary end points. The endpoint of the study was complete ulcer closure; defined as skin closure (100%re-epithelization) without drainage or dressing requirements. Patients in both groups were subjected to definitive surgical management by SSG (Split skin graft), Secondary suturing & Secondary healing.

Results have been analyzed using the Statistical Package for Social Science (SPSS) version 19.031 for data analysis, the Chi-square test, and the Unpaired student "t" test.

RESULTS

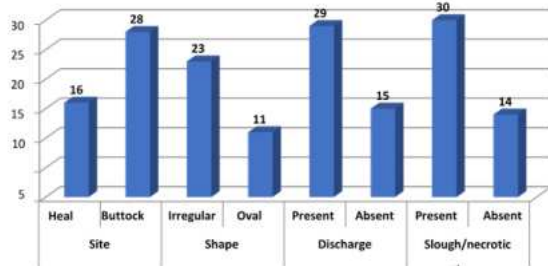
Table :1 Age Distribution

Age (Years)	Frequency	Percentage
40-49	11	25.0
50-59	16	36.4
60-69	10	22.7
>=70	7	15.9
Total	44	100.0
Mean ± SD	55.88±9.93	

Table :2 Duration Of Ulcer

Duration Of Ulcer(weeks)	Frequency	Percentage
<=4	20	45.5
4-8	24	54.5
Total	44	100.0

Ulcer Characteristics

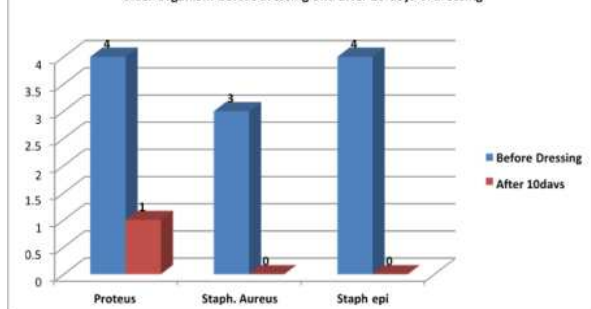


Graph :1 Ulcer Characteristics Before Treatment

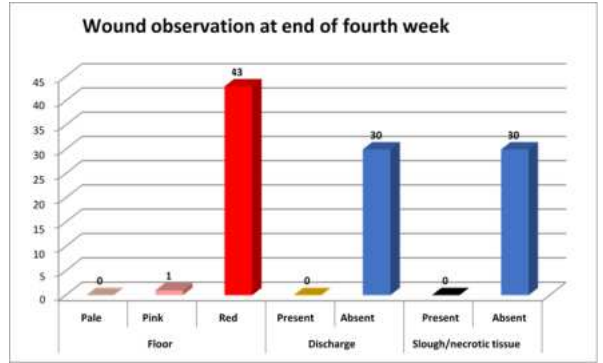
Table :3 Comparison Of Ulcer Culture, Before Dressing And After 10 Days Of Dressing

Pus culture	Findings	Before Dressing	After 10days	p-value
Culture	Positive	18	2	<0.001
Culture	Negative	26	42	0.001

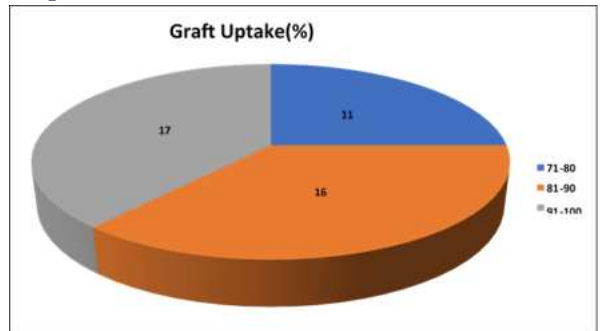
Ulcer Organism before dressing and after 10 days of dressing



Graph:2 Comparison Of Organisms Before Dressing And After 10 Days



Graph :3 Wound Observation At End Of Fourth Week



Graph:4

DISCUSSION

An effective wound dressing should maintain the site moist and free of any negative reactions like infection, maceration, or intolerance. Failure to heal a wound not only causes pain but suffering, social and economic consequences.

Apart from the surgical approach, a variety of medical therapies like topical drugs are very useful in the management of chronic ulcers. VAC reduce the number of uncomfortable dressing changes⁴. NPWT is a costly technique, hence not used as first-line therapy. Many studies suggest that NPWT has the potential for saving money if it is used on the “right patient, the right wound, at the right time.”

Negative pressure therapy has been presented as a novel way of altering the chronic wound environment to help and speed up wound healing.



Sterilised Sponge, Io Ban Sheet Transparent Adhesive Plaster, Suction

Vacuum Suction Apparatus Vacuum Dressing Application



Wound Before Vac Dressing



Wound After Vac Dressing

DISCUSSION

A total of 44 patients presented with ulcers measuring >1 cm, with slough, foul smell, and minimal granulation tissue. The acceptance of VAC was better in the younger age group as they wanted a faster mode of wound healing to reduce their hospital stay. The wounds initially harboring Streptococcus, Staphylococcus, Acinetobacter, Proteus and Escherichia coli became negative culture at the end of treatment and none showed pale granulation tissue and discharge.

A pilot study⁶ with NPWT dressing on full-thickness, nonhealing ulcers showed good results. Profuse granulation tissue formed rapidly, covering bone and hardware⁶. VAC dressing has a better advantage over regular dressings in terms of collagen formation with a greater reduction in inflammatory cells during healing days. Overall, the present study showed that patients treated with VAC dressing is efficacious in terms of minimizing the wound area, discharge, and increase in granulation tissue resulting in early wound healing. The mean graft uptake in the study group was 93.08 + 6.37 compared to 84.13 + 6.402 in the other study group which was statistically significant (p<0.05)

It can be summarized that the subjects who underwent VAC therapy had significantly higher graft uptakes when compared to those subjected to conventional modes of wound healing. The reasons that contributed are better vascularity of the recipient wound bed, good quality of granulation tissues, and a lower load of microorganisms on the bed amongst the VAC group. In our study, hospital stay with VAC dressings is 18.08 days

Table 5. Comparison of mean hospital stay among various other studies

STUDY DONE BY	MEAN HOSPITAL STAY (in days)
	VAC
Current study	18.08
Siddha L V et al ⁸	21
Krishna Girish A et al ⁹	18.4
Tauro et al ¹⁰	32.64
Peter Blume et al ¹¹	63.6
Joseph et al ¹²	36.24
Aziz Nather et al ¹³	23.3

The mean length of hospital stay in VAC dressings was 19±4.68 days.

VAC seems to be potential and more efficacious in treating a variety of chronic and complex wounds, by reducing wound volume, depth and treatment time by a significantly. VAC creates the "ideal wound healing environment"⁴ by providing a moist wound environment while also removing excess wound exudates⁴. NPWT is emerging as an acceptable choice for wound care.

Limitations

- Small sample size.
- Long-term patient follow-up was not done.

CONCLUSION

V.A.C dressing

- Decreases Hospital stay
- Improves pus culture sensitivity
- Improves outcome
- More SSG uptake

REFERENCES

1. Banwell PE, Teotl L. Topical negative pressure (TNP): the evolution of a novel wound therapy. *JWound Care* 2003; 12(1):28-30. - 10.
2. Morykwas MJ, Argenta LC, and Shelton-Brown EI, et al. Vacuum-assisted closure: a new method for wound control and treatment: animal studies and basic foundation. *Ann Plast Surg* 1997; 38:553-562.
3. Earley J. Wounds, tissue repair and scars. In: Bailey and love's short textbook of surgery. 25th ed. London: Edward Arnold; 2008:3: p 24-31
4. Lambert KV, Hayes P, McCarthy M. Vacuum assisted closure: A review of development and current applications. *Eur J Vasc Endovasc surg.* 2005 Mar; 29(3):219-226
5. Diabetic Foot & Ankle 2014. # 2014 Ali M. Lone et al. Citation: Diabetic Foot & 66 Ankle 2014, 5: 23345 - <http://dx.doi.org/10.3402/dfa.v5.23345>
6. DeFranzo, A. J., Argenta, L. C, Marks, M. W et al. The Use of Vacuum-Assisted Closure Therapy for the Treatment of Lower-Extremity Wounds with Exposed Bone. *Plast. Reconstr. Surg.* 2001, October; 108 (5): 1184-95.