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Role of Cyclical Negative Pressure Wound Therapy in Scald Burns

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ABSTRACT

Aim of this case report is to assess the role of cyclical negative pressure wound therapy (CNPWT) in management of scald burns. Clinical examination of the scald burns before and after use of cyclical negative pressure wound therapy was done. Cyclical negative pressure wound therapy is effective in healing of scald burns wound. CNPWT may be used in scald burns wound management.

Keywords: Negative pressure wound therapy; Cyclical NPWT; Burns; Scald burns.

INTRODUCTION

Management of scald burns poses a challenge regarding improving the general condition of the patient and adequate dressing of the wound. Apart from wound cleaning and dressing, one of the available methods of wound care is negative pressure wound dressing which utilises a vacuum device to create negative pressure over the wound, which then improves the wound blood supply, improves wound granulation and removes exudates.[1] The aim of this case report is to assess the role of cyclical negative pressure wound therapy (CNPWT) in management of scald burns.

MATERIALS AND METHODS

The study is done in a tertiary care hospital in South India. The subject is an 8-year-old male child, with no comorbidities, with alleged history of scald burns overback of both thighs with hot water. On examination, the patient's vitals were stable. On local examination, second degree deep burns over back of both thighs (Fig. 1). He was admitted for management of the scald burns and burns care was given in the form of intravenous fluids, antibiotics and dressing. Collagen dressing, APRP, LLLT and CNPWT was also given. CNPWT was given with the negative pressure oscillates between -75 and -125 (Fig. 2).

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Fig. 1: Burn wound at presentation

Fig. 2: Cyclical negative pressure wound therapy (CNPWT)

RESULTS

CNPWT is useful in reducing the size of the scald burns wound and fasten the wound healingin our patient. (Fig. 3)

Fig. 3: Healed burn wound after CNPWT

DISCUSSION

Since the introduction of the negative pressure wound therapy (NPWT) system by Morykwas and Argenta, it has been applied to a number of wounds and has become an influential and effective technique for healing simple and complex wounds. The conventional NPWT system adopts either 'intermittent' or 'continuous' mode.

While the continuous mode constantly applies a sub-atmospheric pressure of −125 mmHg, the intermittent mode creates a sub-atmospheric pressure of −125 mmHg for 5 minutes and a 2 minutes resting phase of 0 mmHg.

In experiments performed on animal models, the intermittent mode showed increased perfusion level and formation of granulation tissue in the wound area compared with the continuous mode.[1,2] Despite the effectiveness of intermittent mode in wound healing, it has been avoided in clinical application because of the pain occurring every few minutes during the initiation phase of the system to reach −125 mmHg. Thus, 'cyclic' mode would minimize the pain while maintaining the superior efficacy of the intermittent mode.

The cyclic NPWT system is similar to the intermittent mode in terms of using the same maximal sub atmospheric pressure, but the pressure never reaches zero in the cyclic mode. So, it continuously creates certain pressure gradient that oscillates between −125 mmHg and the preset sub atmospheric pressure. The cycle runs based on the changes in sub atmospheric pressure, not time, and thus its frequency reflects the wound volume.[3]

Types of NPWT

1. Continuous NPWT the continuous mode constantly applies a sub-atmospheric pressure of −125 mmHg.
2. Intermittent NPWT the intermittent mode creates a sub-atmospheric pressure of −125 mmHg for 5 minutes and a 2-minute resting phase of 0 mmHg.
3. Cyclic NPWT the cyclic NPWT system is similar to the intermittent mode in terms of using the same maximal sub-atmospheric pressure, but the pressure never reaches zero in the cyclic mode. So, it continuously creates certain pressure gradient that oscillates between −125 mmHg and the preset sub atmospheric pressure.

Variables affected by NPWT

Cutaneous capillary network can be investigated with regards to blood flow (BF), velocity (VELO), postcapillary oxygen saturation (StO_2), and relative hemoglobin content (rHb).[4]

Blood Flow (BF)

Regardless of the application of different pressure levels, intervals of suction and cutaneous blood flow below the foam dressing was significantly enhanced in all three types.

Post-capillary Tissue Oxygen Saturation (StO_2)

Corresponding to enhancements in cutaneous BF, StO2 values steadily increased when suction was active.

Relative Hemoglobin Content (rHb) and Red Blood Cell Velocity (VELO)

Both parameters were significantly altered due to the NPWT stimulus.

Pain / Discomfort

As expected, reported levels of discomfort were nominal. No statistic difference was found in comparison of maximum values between groups ($p > 0.05$).

Surface Pressure

Applied suction caused significant changes in the surface pressure (sp) of the underlying skin.

Remote Effects

Cutaneous microcirculation of the contralateral thigh was also affected by NPWT treatment. It shows virtually a linear increase in BF 90 min in all three types.

Advantage of cyclic NPWT

1. Less painful when compared to intermittent NPWT.
2. Superior effects on local and remote cutaneous perfusion in the cyclic type compared to others.

CONCLUSION

Cyclic negative pressure wound therapy is found to be effective in improving wound healing in scald burns, by enhancing the blood supply and tissue oxygenation.

Conflicts of Interest

This study does not require any institutional approval.

Declarations

Authors' contributions: All authors made contributions to the article

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REFERENCES

1. Argenta LC, Morykwas MJ. Vacuum-assisted closure: a new method for wound control and treatment: clinical experience. Ann PlastSurg 1997;38:563-76 discussion 577.
2. Morykwas MJ, ArgentaLC, Shelton-Brown El, McGuirtW. Vacuum-assisted closure: a new method for wound control and treatment: animal studies and basic foundation. Ann PlastSurg1997;38:553-62.
3. Glass GE, Nanchahal J. The methodology of negative pressure wound therapy: separating fact from fiction. J Plast Reconstr Aesthet Surg. (2012) 65:989-1001.
4. KairinosN, Voogd AM, Botha PH, Kotze T, Kahn D, Hudson DA, *et al.* Negative-pressure wound therapy II: negative-pressure wound therapy and increased perfusion. Just an illusion? Plast Reconstr Surg. (2009) 123:601-12.
5. Jacob AntonyChakiath, Ravi Kumar Chittoria. Cyclical Negative Pressure Wound Therapy- A Review/ Indian J Anat. 2022:11(3);87-90.