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Indigenous negative pressure wound treatment: Easy, effective and affordable

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Abstract

The purpose of this study was to evaluate the use of negative pressure wound therapy in traumatic injuries, post operative wound dehiscence and pressure sores. Negative-pressure wound therapy (NPWT) is believed to accelerate wound healing by increasing blood flow, promoting angiogenesis, suction removal of matrix metalloproteinases. In our study we have used cost effective material as an alternative to the more expensive commercial NPWT in the management of complex wounds.

Material and Methods: This study is a prospective evaluation of NPWT in 70 patients with traumatic injuries, post operative wound dehiscence and pressure sores. In our study we have used low cost indigenous NPWT set for wound therapy. Dressing was changed for every 4 days till the desired granulations tissue is formed for skin cover.

Results: Of the 70 patients treated with indigenous NPWT, 42 (60 %) patients achieved direct closure and 28 patients (40%) required split thickness skin grafting.

Conclusion: Our study showed low cost indigenous NPWT system producing comparable results at meagre cost to commercially available NPWT. NPWT has now become an established method of wound management. Low cost Indigenous NPWT can be revolutionary in wound management urban as well as in rural areas of our country.

Keywords: Negative pressure wound treatment, indigenous NPWT

Introduction

Wound healing remains a challenging clinical problem and correct, efficient and cost effective wound management is essential ^[1]. In the countries like India, where the chances of wound infection are high due to multiple issues, the importance of novel techniques of wound care are essential. Argenta LC and Moryk was M in the year 1997 first reported about the use of negative pressure in promoting wound healing ^[2]. The Negative pressure wound treatment (NPWT) is a closed dressing system that applies negative pressure to a wound bed through an open cell sponge covered with an occlusive dressing. This dressing is connected by tubing to a pump that supplies negative pressure. It is generally believed that negative pressure plays a beneficial role by increasing blood flow, promoting angiogenesis, suction removal of matrix metalloproteinases and also helps in contraction of wound ^[3,4,5].

The NPWT is currently in use for primary treatment of chronic and complex wounds and also as an adjunct treatment for temporary closure and wound preparation preceding surgical procedures such as skin grafts and flap surgery ^[6, 7]. The commercially available NPWT systems are very expensive and not available in most of the rural areas of developing countries like India. In our study we designed a NPWT using materials commonly available in hospital setting. The cost of this system comes around 300 Rs per dressing (total 1000 to 1200 Rs) for 2 weeks. This study is to determine the efficacy of this low cost indigenous system in different type of wounds including traumatic injuries, post operative wound dehiscence and pressure sores.

Materials and Methods

This study was done in Mata Gujari Memorial medical college and Lions Seva Kendra hospital located in Kishanganj, Bihar from September 2018 to August 2019. Seventy patients

were treated with indigenous NPWT. The materials that were used were commonly available in our hospital and could be found in most hospitals (Figure 1). All wound were thoroughly debrided and irrigated with normal saline before applying NPWT set. A sponge was pressed against the wound to create a template. Sponge was cut to template size. The drain tube was introduced in the sponge, and the sponge was then placed on the wound. The sponge was applied and then enclosed by Opsite® creating a vacuum. The other end of the drain tube was attached to the suction device. The suction pressure was maintained at 150 mm Hg. Dressing was changed for every 4 days till the desired granulation tissues has formed for Skin cover.

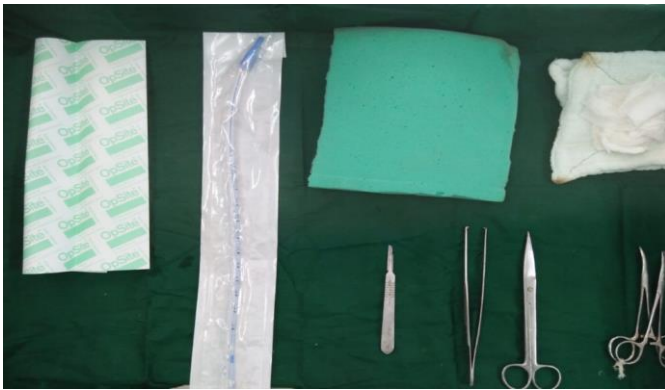


Fig 1: Materials used for indigenous NPWT

Results and Discussion

Healing is an intricate, interdependent process that involves complex interactions that usually results in a functional restoration of the injured tissue [7]. In our study we have included traumatic injuries, post operative wound dehiscence and pressure sores. Of the 70 patients treated with indigenous NPWT, 42 (60 %) patients achieved direct closure and 28 patients (40%) required split thickness skin grafting.

Sample cases

1. 40 years old male with bilateral circumferential non healing ulcer over distal leg and ankle (Figure 2 to 5).



Fig 2: Day 1



Fig 3: Day 8



Fig 4: Day 12



Fig 5: Day 20

2. 56 years, male, Status ORIF with plate in situ for Calcaneum Fracture 10*7 cm (Figure 6 to 9)



Fig 6: Day 1



Fig 8: Day 10



Fig 9: Day 15

3. 13 yrs old girl with open grade 3B fracture proximal Humerus with 30*10 cm wound over left axilla extending to left breast



Fig 7: Day 5



Fig 10: Day 1



Fig 11: Day 5



Fig 12: Day 10



Fig 13: Day 14



Fig 14: Day 22

In our study a standard pressure of 150mmHg of suction pressure was applied for all patients. Early studies showed that applying this amount of pressure to a wound bed had the greatest effect on tissue re-growth and granulation tissue^[8]. In our study dressing was changed for every 4 days till the desired granulation tissues has formed as done in a study by Banwell *et al.*^[9]. The cost of NPWT appears to be a limiting factor for its use in developing countries. The commercially used V A C systems cost around 10,000 rs per week. A total of approximately 300 Rs per dressing (Chest drain tube-around 120 rs, Opsite approx. 150 and sterile sponge approx. 30 rs) was required for a duration of 14 days NPWT in our study.

NPWT has been shown to work and be beneficial to wound healing. NPWT is not the answer for all wounds; however, it can make a significant difference in many cases. NPWT is most useful in difficult cavity or highly exudative wounds. NPWT is a useful tool in moving a wound to a point where more traditional dressings or more simple surgical reconstructive methods can be used^[10].

Our study indicate that low cost indigenous NPWT system produced comparable results at meagre cost to commercially available NPWT. Moreover it is available in almost any hospital in India and can be used with good patient compliance for healing of traumatic injuries, post operative wound dehiscence and pressure sores.

References

1. Velnar T, Bailey T, Smrkolj V. The Wound Healing Process: an Overview of the Cellular and Molecular Mechanisms. *The Journal of International Medical Research*. 2009; 37(5):1528-1542.
2. Argenta LC, Morykwas MJ. Vacuum-assisted closure: a new method for wound control and treatment: clinical experience. *Ann Plast Surg*. 1997; 38(6):563-577.
3. Morykwas MJ, Simpson J, Pungler K, *et al.* Vacuum-assisted closure: state of basic research and physiologic foundation. *Plast Reconstr Surg*. 2006; 117:121S-126S.
4. Timmers MS, Le Cessie S, Banwell P, *et al.* The effects of varying degrees of pressure delivered by negative-pressure wound therapy on skin perfusion. *Ann Plast Surg*. 2005; 55:665-671.
5. Wackenfors A, Gustafsson R, Sjogren J, *et al.* Blood flow responses in the peristernal thoracic wall during vacuum-assisted closure therapy. *Ann Thorac Surg*. 2005; 79:1724-1730.
6. Novak A, Wasim S Khan, Palmer J. The Evidence-Based Principles of Negative Pressure Wound Therapy in Trauma & Orthopedics. *Open Orthop J*. 2014; 8:168-177.
7. Clarke RAF, Henson PM. Eds., *The Molecular and Cellular Biology of Wound Repair*, Plenum Press, New York, NY, USA, 1988.
8. Argenta LC, Morykwas MJ, Marks MW, *et al.* Vacuum-assisted closure: state of clinic art. *Plast Reconstr Surg*. 2006; 117:127S-142S.
9. Banwell P, Teot L. Topical negative pressure (TNP): the evolution of a novel wound therapy. *J Tissue Viability*. 2006; 16:16-24.
10. Jones SM, Banwell PE, Shakespeare PG. Advances in wound healing: Topical negative pressure therapy, *Postgraduate Medical Journal*. 2005; 81(956):353-357.