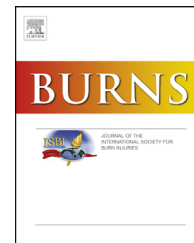




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Review

A review of negative-pressure wound therapy in the management of burn wounds

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ABSTRACT

Objective: Negative pressure has been employed in various aspects of burn care and the aim of this study was to evaluate the evidence for each of those uses.

Methods: The PubMed and Cochrane CENTRAL databases were queried for articles in the following areas: negative pressure as a dressing for acute burns, intermediate treatment prior to skin grafting, bolster for skin autografts, dressing for integration of dermal substitutes, dressing for skin graft donor sites, and integrated dressing in large burns.

Results: Fifteen studies met our inclusion criteria. One study showed negative pressure wound therapy improved perfusion in acute partial-thickness burns, 8 out of 9 studies showed benefits when used as a skin graft bolster dressing, 1 out of 2 studies showed improved rate of revascularization when used over dermal substitutes, and 1 study showed increased rate of re-epithelialization when used over skin graft donor sites.

Conclusions: Negative pressure can improve autograft take when used as a bolster dressing. There is limited data to suggest that it may also improve the rate of revascularization of dermal substitutes and promote re-epithelialization of skin graft donor sites. Other uses suggested by studies that did not meet our inclusion criteria include improving vascularity in acute partial-thickness burns and as an integrated dressing for the management of large burns. Further studies are warranted for most clinical applications to establish negative pressure as an effective adjunct in burn wound care.

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1. Introduction

Negative pressure wound therapy (NPWT) has been used in the treatment of acute and chronic wounds for almost twenty years and is now widely used around the world. Here we review the literature on NPWT in the treatment of burn wounds, organized by clinical application: limiting the extent of injury in acute burn wounds, as a bridge to skin grafting, as a method of securing skin grafts and skin substitutes, and as a dressing for skin graft donor sites. While clinical experience suggests that negative pressure wound therapy may be beneficial in these contexts, further research is indicated to specifically validate these treatments and to determine cost-effectiveness.

2. Methods

2.1. Criteria for considering studies for this review

We included peer-reviewed studies from the searchable online PubMed database and Cochrane CENTRAL Trial Register, accessible on or before June 1, 2014. With the exception of our analysis of uses of NPWT in the management of acute burn wounds, we did not limit study selection to a population of patients with burn wounds specifically. Firstly, there is a dearth of such studies that specifically analyze the burn population. Secondly, many of the same mechanisms are at play in the reconstruction of chronic wounds of other etiologies, and benefits of NPWT in these populations is likely to translate to the burn wound population as well. Thus, while our sections on management of acute burn wounds and description of NPWT as an integrated dressing for large burns were specific to the burn population, studies on use as a skin graft bolster, skin graft donor site dressing, and dressing for integration of dermal substitutes included studies in which subjects had wounds of various etiologies.

Only clinical studies performed on human subjects, which contained both an intervention group using a dressing with

negative pressure applied and a control group using a dressing without negative pressure, were included in the tables in this study. As such, individual case studies and case series lacking control groups were excluded. Articles not written in English were also excluded. After an initial search was performed in each respective database, articles analyzing topics that met the search criteria were downloaded and inclusion criteria were applied. References from articles that failed to meet the inclusion criteria, as well as references from review articles, were also analyzed and any of these referenced studies that did meet our inclusion criteria were included in the study. Note that some of these referenced articles were not displayed upon initial search of the database. Fig. 1 demonstrates our algorithm for exclusion and selection of articles. Some of the excluded studies that did not meet inclusion criteria for our tabulated listing, but that introduce interesting ideas to guide further investigation, were referenced as part of the discussion.

2.1.1. Management of acute burns with NPWT

We searched for publications that examined the effects of NPWT on acute burn wounds compared with conventional dressings. Search criteria were: “burns” AND (“VAC” OR “negative pressure” OR “NPWT”). PubMed MeSH criteria were also used with the following search: “dressings, negative pressure” AND “burns”.

2.1.2. NPWT as a bridge to skin grafting

We searched for publications that examined the effects of using NPWT for a period of time prior to skin grafting to determine whether NPWT affected the outcomes of skin grafting. Search criteria were: (“negative pressure” OR “NPWT” OR “VAC”) AND (“skin graft” OR “skin grafting” or “STSG”). PubMed MeSH criteria were also used with the following search: “dressings, negative pressure” AND “skin grafting”.

2.1.3. NPWT as a bolster for autografts

We searched for publications that studied the effects of NPWT dressings used to bolster fresh STSGs compared to traditional

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