Journal watch

Miller C

Lalezari S, Lee CJ, Borovikova AA, Banyard DA, Paydar, KZ, Wirth GA, Widgerow AD. Deconstructing negative pressure wound therapy. Int Wound J 2017; 14(4):649–657. doi:10.1111/iwj.12658

Negative-pressure wound therapy (NPWT) has been well represented in the literature in the most recent half of 2017; a selection of the reported studies shall be profiled in this *Journal watch*. As a starting point for this report, the reader is referred to a recent overview of NPWT presented by Lalezari and colleagues (2017). In this paper the authors trace the origins of NPWT and misnomers associated with the terminology used to describe this treatment. The evidence, thereafter, is examined from two perspectives. Firstly, the theory and evidence associated with the proposed mechanisms by which NPWT aids wound healing are explored, with specific attention to the influence of NPWT on perfusion, micro- and macrodeformation, and exudate and bacterial burden management. Secondly, the empirical foundation for using NPWT for various types of wounds, including acute open wounds, closed surgical incisions, chronic wounds, and for wounds treated with skin grafts and skin substitutes is examined. The authors also briefly describe the recommended uses of NPWT with instillation (NPWTi) whereby a fluid is applied to the wound prior to commencing NPWT. This paper provides a useful resource for those seeking general reading on the topic of NPWT. It articulates some of the controversies as to the theory and mechanism of action that makes NPWT, according to the authors, "… the most significant disruptive technology in wound care in recent times" (p. 649). The authors present a perspective that NPWT aids wound healing when individualised to each type of wound and concluded that there is no single unifying theory of NPWT.

Yang SL, Zhu LY, Han R, Sun LL, Dou JT. Effect of negative pressure wound therapy on cellular fibronectin and transforming growth factor-β1 expression in diabetic foot wounds. Foot Ankle Int 2017; 38(8):893–900.

This study sought to extend evidence emerging from animal-based research regarding the capacity for NPWT to enhance the production of growth factors and collagen that aid wound healing by examining these factors *in vivo*. Specifically, the study aimed to determine if cellular fibronectin (cFN) production and TGF-β1 expression were increased in diabetes-related foot ulcers treated with NPWT. A prospective, open-label, randomised controlled trial was conducted. Participants (n=40) were randomly allocated to a NPWT group (n=20) or a control group (n=20). Participants had a non-healing diabetes-related foot ulcer (>1 month), were aged between 50 and 70 years, ABPI ranging ≥0.5 and ≤0.9,$TcPo_2$ ≥20 and ≤40mmHg, and a Wagner grade between 2 and 4. A variety of comorbid conditions or growth factor or hyperbaric oxygen therapy treatment in the last 30 days were reasons for exclusion. No significant differences between the intervention and control groups were detected at baseline. NPWT involved the provision of continuous negative pressure –125mmHg for 7 days. The NPWT dressing was changed every 48–72 hours. Moist wound therapy was attended with dressings changed every 24–48 hours. Punch biopsies (8 mm diameter, 3 mm depth) were obtained at baseline and after 7 days of study follow-up and were divided into 3 samples for immunocytochemical staining, western blot analysis and mRNA analysis. Results confirmed that cFN and TGF-β1 were significantly increased in the NPWT-treated wounds. This study provides *in vivo* support that NPWT facilitates the presence of factors known to facilitate wound healing in diabetes-related foot ulcers.

Krebs B, Jagrič T. Does negative-pressure wound therapy for the open abdomen benefit the patient? A retrospective cohort study. Adv Skin Wound Care 2017; 30(6):256–260.

A retrospective cohort study over a three-year period was conducted with the aim of identifying predictors of mortality amongst open abdomen (OA) patients who had received NPWT (Krebs & Jagrič, 2017). It was proposed by the authors that mortality rate after NPWT, and temporary abdominal closure (TAC) more generally, is high and prompted their investigation as to what factors associated with NPWT specifically were linked with mortality. Patients were included in the study if their hospital record indicated a diagnosis of an OA and received NPWT (n=52). Patient outcomes were determined as death during the acute episode (death) or discharge from hospital (survival). NPWT involved the RENASYS Open Abdominal Solution (Smith & Nephew Pty Ltd). Treatment protocols were not described further; however, dimensions of NPWT use were included as variables in the predictive model including time to commence NPWT, number of NPWT changes, and days of NPWT use. Additional variables included in the model were age, sex, type of operation and abdominal closure, number of operations prior to commencing NPWT, and OA classification. Logistic regression was used to identify significant predictors of short-term survival following NPWT for patients with an OA. Mortality was 50% overall (29% <30 days postoperative). Univariate relationships between the predictor variables and mortality were determined for patients having more than seven NPWT system changes, longer NPWT duration, and

the type of abdominal closure (mortality rates were highest for those receiving a laparotomy compared to fascia closure, mesh, one layer or skin only). Multivariate analysis revealed only those patients having more than seven NPWT system changes had an increased risk of death (Hazard ratio = 4.033, CI=1.078-15.086). The authors acknowledge that the underlying medical conditions are relevant to patient mortality and as such the suite of variables included in the analysis was limited. As such, the author's recommendation for prospective studies, a vehicle by which an expanded range of data can be sourced, is warranted. More generally, reducing NPWT duration including the number of system changes was proposed as a means to reduce mortality among these patients.

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THANK YOU

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