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Letter to the Editor regarding: Negative pressure wound therapy

Re: Wang X, Zhang Y, Han C: Topical negative pressure improves autograft take by altering nutrient diffusion: A hypothesis. Med Sci Monit, 2014; 20: 61–63

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534

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I read the article of Wang et al. [1] entitled “Topical negative pressure improves autograft take by altering nutrient diffusion: A hypothesis” with great interest. Negative pressure wound therapy (NPWT) is generally used in a two-step surgical procedure to treat surgical site infections. At the time the wound is sterile and wound granulation has been initiated, the wound can be secondary surgically closed using different available techniques, such as direct sternal closure, pectoralis muscle flap, rectal muscle flap, omentum plasty or latissimus dorsi plasty.

Today, NPWT is also used to prevent surgical site infections after surgery, due to the unique positive applied mechanical forces as a permutation of Wolff’s law. Additionally it is also used to support more superficial full-thickness skin defects where mobilization of the surrounding tissue is not possible or limited and extensions are needed by different substitutes. The current study is important in patients who are treated for acute full-thickness skin defects with this hypothesized one-step closure method, using a commercial dermal substitute. The authors report that it takes approximately three weeks for these substitutes to become completely vascularized. Up till this time-period, the functionality of the material is not comparable with native skin tissue, which forms a natural barrier against microbial invasion. The hypothesis of the authors was concentrated only on rapid balance of nutrient supply and

angiogenesis due to NPWT, but by reading the literature carefully, NPWT seems to be even more innovative [2].

Previous studies have shown that NPWT can significantly decrease the tissue bacterial count as early as four days after implementing this therapy compared with controls in a randomized trial. Therefore NPWT is not only an active barrier for microbes to enter the skin, but also the number of microbes is actively reduced after starting this therapy. Furthermore the sub-atmospheric pressure will prevent the progressive tissue damage of the surrounding tissue at the initial injury, starting hours after insertion. Additionally wound oedema is reduced, as well as proteolytic enzymes and cytokines deriving from cell necrosis will be transported away from the granulation tissue, which will improve wound healing. On the other hand it is also conceivable that supporting mediators for wound healing are transported away from the wound by installing NPWT. Further studies will be needed to identify and analyse these factors and evaluate potential possibilities to administer these mediators to the patients or better synthesise them and apply them locally.

It would be desirable to receive more experimental and clinical data on this one-step procedure, to better understand all single supportive developments to improved results of dermal substitutes to close these full-thickness skin defects.

This hypothesis of Wang et al. [1] is an important impulse and should be a trigger to study healing processes more in detail. Additionally this would be an opportunity to study dermal substitutes, generally produced by decellularization techniques, in which an extracellular matrix is, rebuilt by the host. An experimental model would also help to better understand the remodelling and regeneration potential of decellularized materials, which are used for tissue engineering.

References:

1. Wang X, Zhang Y, Han C: Topical negative pressure improves autograft take by altering nutrient diffusion: A hypothesis. *Med Sci Monit*, 2014; 20: 61–63
2. Dohmen PM, Misfeld M, Borger MA, Mohr FW: Closed incision management with negative pressure wound therapy. *Expert Rev Med Devices*, 2014 [in press]

Conflict of interests

The author has no personal or financial support or author involvement with organization(s) with financial interest in the subject matter or any conflict of interest to report.