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Nicholas Goodwin
c/o Ambulance Victoria, 375 Manningham Road Doncaster 3108,
Victoria, Australia

Focused extracorporeal shockwave therapy (ESWT) for burn-related pruritus — some technical considerations[☆]



Dear editor,

We read with greatest interest the recent RCT on the effect of extracorporeal shock wave therapy (ESWT) for burn-related pruritus [1]. When we attended the 2010 annual meeting of the American Burn Association (ABA) in Boston, MA, the ABA president mentioned that burn-related pruritus is one, may be THE number one problem hopefully to overcome in the future.

Yoo et al. from Seoul now report a smart non-invasive way, using focused extracorporeal shockwave therapy (ESWT), which quite rapidly within 14 days seem to beneficially intervene in this regard in burn-related pruritus in a beautifully executed level Ib randomized-controlled trial.

Based on the aforementioned challenge to overcome burn-related pruritus, which is hardly understood from a pathomechanical point of view as of today, and being avid and high-level users of focused extracorporeal shockwave therapy

for more than a decade by now, we would really like to highlight a number of issues in this regard.

The first issue is a technical one on the probe used in the RCT. Focused ESWT was used by the authors with a Storz Duolith SD-1 device, which generates focused ESWT by electromagnetic means. The image in Fig. 2 highlights that the focused ESWT probe was applied with the so-called “stand-off device I”, which leads the focus to 3–5 cm tissue depth. Stand-off device II, in contrast, will guide the ESWT focus more superficial in the skin with a focus in 0–3 cm tissue depths, which might have a significant different clinical effect when treating a skin-related problem, which is here burn-related pruritus. Therefore, it might at least in our view be very interesting to re-do the ESWT-treatment with a more superficial ESWT focus using the stand-off device II probe focusing 0–3 cm tissue depth. Given the fact that the authors used

[☆] Regarding: S.Y. Yoo et al. The clinical utility of ESWT for burn pruritus: a prospective, randomized, single-blind study. *Burns* 2017 Oct 10.

stand-off device I with a deep focus (3–5cm) significantly beyond the dermal and subdermal plane, it appears from a mechanistic point of view, that the focused ESWT with the parameter applied in this RCT might lead to a stem-cell response IRRESPECTIVE of the focused ESWT probe used in this RCT in this regard.

Second, regarding the potentially underlying mechanisms of ESWT in burn-related pruritus. The authors report that both, a peripheral and a central cause of pruritus in burn scars are discussed. In addition to histamine, which is the primary mediator of pruritus, transmitters like substance P and CGRP might play a role in this regard which mediate neurogenic inflammation. ESWT has been reported to act via mechanotransduction [2]. An acoustic wave, the shockwave, is translated in the target cells in a protein response. Holfeld et al. have recently impressingly shown that shockwave therapy acts via stem-cell activation via toll-like receptor 3 signalling [3]. Thus, stem-cell activation might somehow beneficially influence the failed healing-response in burn scars with upregulation of peripheral histamine and central neurogenic inflammation. Notably, the beneficial effect of focused ESWT on burn-related pruritus happens to appear quite rapidly in the presented RCT within only 14 days after the first of three focused ESWT sessions. It might really be worth looking in the further follow-up at one, three and six months after focused ESWT treatment, where one might expect even further effects potentially.

Third — the timing of ESWT application. Joo et al. applied three sessions of focused ESWT at mean 84 ± 59 days in the ESWT and 74 ± 49 days in the SHAM-ESWT group after skin grafting. ESWT in the clinical RCT from Christian Ottomann from Berlin cited by the authors regarding split thickness grafting site epithelialization was done immediately after skin harvesting at the donor site [4]. A similar early single ESWT was done by Ottomann in the second published RCT on superficial dermal 2a° burn injuries at the first day of treatment [5]. Recently, on the joint meeting of the German and Austrian Society for Plastic Reconstructive Surgery in Graz, Austria in September 2017 Russe et al. [6] from Salzburg, Austria reported for the first time their pilot results of a single focused electromagnetic ESWT treatment (with a similar Storz ESWT device) at the day before scheduled abdominoplasty in a split design. Notably, Vancouver Scar Scale (VSS) was beneficially influenced in the focused ESWT-treated abdominoplasty scar region at 6 and 12 weeks postoperatively, which has not been published in print yet. Thus, it might be speculated that the earlier the focused ESWT is applied the more beneficial the clinical outcome might be.

We, as avid readers of the Burns journal, really would like to express our gratitude for both, the authors and the editors for this stimulating RCT on burn-related pruritus.

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Karsten Knobloch*

SportPraxis Prof. Knobloch, Hannover, Germany

Andreas Gohritz

Plastic, Reconstructive, Aesthetic & hand surgery, University of Basel, Switzerland

Robert Kraemer

Plastic Surgery, University of Lubeck, Germany

E-mail address: professor.knobloch@sportpraxis-knobloch.de
(K. Knobloch).

<http://dx.doi.org/10.1016/j.burns.2017.10.028>

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