Accelerated reepithelisation of a IIb° scald through extracorporeal shock wave therapy

Abstract

Based on the observation that, in addition to consolidation of osseous tissue, extracorporeal shock wave therapy (ESWT) effectuates a healing of skin lesions lying in the path of said shock waves, the effect of ESWT on partial thickness (IIa°) thermal lesions was studied by the Centre for Severely Burned Patients with Plastic Surgery at the Unfallkrankenhaus in Berlin in conjunction with the International Centre for Extracorporeal Shock Wave Therapy in Berlin. This took place within the framework of a clinical study to demonstrate the effects of extracorporeal shock wave therapy on superficial (IIa°) (IIb°) thermal lesions. Shock waves are small, high pressure sonic pulses and are characterised by a mixture of sound waves with a wide frequency spectrum. The application of shock waves was carried out once during the 24 hour period post trauma. Shock waves with an energy density of 0.1–0.14 mJ/m² using 100 impulses per cm² were applied. We present a case study of a 89 year old female patient with a IIb° scald on her buttock. The ESWT resulted in a complete reepithelisation on day 12 post trauma. Extracorporeal shock wave therapy presents a new complementary method of treatment of thermal lesions that leads to a significantly reduced healing period due to an accelerated rate of reepithelisation.

Keywords: extracorporal shockwave, thermal lesion, scald, reepithelisation

Zusammenfassung

Ausgehend von der Beobachtung, dass die extrakorporale Stoßwellentherapie (ESWT) bei orthopädischer Anwendung neben der knöchernen Konsolidierung eine Abheilung von sich im Strahlengang befindlichen Hautläsionen bewirkte, wurde im Zentrum für Schwerbrandverletzte mit Plastischer Chirurgie des Unfallkrankenhauses Berlin in Zusammenarbeit mit dem Internationalen Zentrum für extrakorporale Stoßwellentherapie Berlin der Einfluss der ESWT auf oberflächliche (IIa°) und tief zweigradige (IIb°) thermische Läsionen untersucht. In diesem Rahmen präsentieren wir die Fallvorstellung einer 89-jährigen Patientin, die sich eine IIb° Verbrühung am Gesäß zugezogen hatte. Die Anwendung der ESWT erfolgte 24 h post Trauma. Es wurden Stoßwellen der Energie- dichte 0,1–0,14 mJ/m² angewandt. Die ESWT wurde mit 100 Impulsen/cm² appliziert. Es zeigte sich eine komplette Reepithelisierung am 12. Tag. Durch die extrakorporale Stoßwellentherapie steht eine neue Behandlungsoption im Sinne einer ergänzenden Methode in der Thera- pie thermischer Läsionen zur Verfügung, die zu einer verkürzten Abheilungsduer durch eine beschleunigte Reepithelisierung führt.

Schlüsselwörter: extrakorporale Stoßwelle, thermische Läsion, Verbrühung, Reepithelisierung
Introduction

We present an accelerated reepithelisation of a IIb° scald in an 89 years old female after twelve days by using extracorporeal shock wave therapy (ESWT) for the first time.

Case presentation

A 89 years old female Russian emigrant tried to treat her acute cystitis by sitting over a hot water steam concentrated with herbs. Unfortunately, she fell with her buttocks into the boiler. Despite her forwarded age no maladies were known, she was mentally healthy and walked instantly and autonomously after the accident in our emergency room. After initial debridement a IIb° scald of her buttocks, genitals as well as both the proximal dorso-medial tights appeared (3% TBSA) (Figure 1). We conducted an extracorporeal shock wave therapy (ESWT) on admission day for the first time for this reason (Figure 2). The ESWT was applied to the IIb° scald wound area once. Application of the defocused shock head was carried out orthograde on the wound area. The defocused shock head was placed on the wound using a sterile gel (Lavaseptgel®) and sterile protective film. The healing time needed until the definitive closing of the wound by means of reepithelisation was documented descriptively and recorded photographically. The basic dressing protocol after ESWT was composed of Mepitel® in combination with Polyhexanid-Gel. The protocol and schedule for changing dressings was followed based on the normal regime without ESWT. The shock wave device Ortho-Wave 180C® from MTS Europe GmbH was used with a defocused sonic head. For the purpose of treatment only shock waves with an energy density of 0.1–0.14 mJ/m² were applied. The ESWT was applied with 100 impulses per cm². The ESWT was applied for a period of 20 seconds per cm². This new treatment method resulted in a complete reepithelisation after twelve days with immediate demission of the patient after this short healing period (Figures 3, Figure 4).

Discussion

In the case of septic pseudoarthrosis, often characterised by soft tissue defects and skin lesions, a healing of skin and tissue defects lying in the path of the shock waves was demonstrated, in addition to consolidation of osseous...
shorten the inpatient period. Framework of deep dermal scalds in elderly patients to a new complementary method of treatment in the healing. Extracorporeal shock wave therapy may present wave therapy could be found (twelve days to complete the IIb° scald after treatment with extracorporeal shock of the infected wounds in terms of a subsidence of the infection was also diagnosed. If one examines the relevant literature, a publication by Gerdesmeyer et al. is found. In this case the effects of extracorporeal shock waves on microorganisms were studied, whereby a bacterial effect in vitro was exhibited [3]. Because ESWT is still in its early stages as a treatment for chronic wounds and superficial burns, the actual mechanism of actions is purely hypothetical. The following hypotheses exist regarding the mechanism of actions, whereby the most authors favour the action through a neoangiogenesis. Permeability changes to the cell membrane, this hypothesis is put forth by Fukumoto et al., whose application of ESWT had positive effects on cardiac dysfunction induced by ischemia [4]. This hypothesis is also supported by Takahiro et al., whose work group studied the effects of ESWT on pathologically changed coronary arteries [5]. Gottle et al. showed that ESW leads to a release of Substance P [6], whereby Mariotto et al. assume a direct NO triggered effect, i.e. without a consecutive release of neurotransmitters [7]. Finally, Wang et al. reported on a directly significant release of growth factors upon stimulus by extracorporeal shock waves [8] and Meirer et al. reported on a significantly reduced rate of necrosis in adipocutaneous skin flaps of rats after exposure to ESWT, in this case they observed an angiogenesis, explained by the impact of growth factors [9]. Which hypothesis is correct cannot presently be determined. Based on the current level of scientific knowledge, however, the fact that ESWT has an effect on biological tissue is incontrovertible. We were highly surprised about the pace of reepithelisation in this case, especially with respect to the age of the patient.

Conclusions
The case report herein documented the first time that extracorporeal shock waves were applied to a deep dermal scald (IIb°) in a patient of this forwarded age. A highly significant reduction in the reepithelisation period of the IIb° scald after treatment with extracorporeal shock wave therapy could be found (twelve days to complete healing). Extracorporeal shock wave therapy may present a new complementary method of treatment in the framework of deep dermal scalds in elderly patients to shorten the inpatient period.