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Late cocoon-hand release in a 15 year old patient with dystrophic epidermolysis bullosa

Ergebnisse der späten Behandlung der Cocoon-Handdeformation bei dystrophischer Epidermolysis Bullosa

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Introduction: Dystrophic epidermolysis bullosa (DEB) is a bullous disorder of the skin characterized by skin blistering following minor trauma. The hands, because of constant use during normal daily activity, are especially exposed to blistering, with progressive scarring leading to pseudosyndactyly, flexion contracture of the fingers and finally a cocoon-hand deformity.

Material and methods: A 15-year old girl presented with a bilateral cocoon hand deformity. On the left side there was still a fairly independent thumb, with some basic grasp function. On the right side there was a thumb-in-palm deformity, therefore we decided to operate this side first. After opening of the cocoon, the thumb was extended and the first web space deepened using blunt and sharp dissection. The thumb was fixed with axial K-wire in maximal abduction. Next the fingers were freed using blunt and sharp dissection, fully extended and fixed with an axial K-wire each. The speed up closure of the wound cultured allogenic keratinocytes were applied. A Mepithel hand dressing with caution to fully fill up the web spaces was applied for 7 days. The dressing was changed under anaesthesia twice. After 4 weeks the K-wires were removed and a splint moulded. Cultured allogenic keratinocytes were applied on residual skin defects. Physiotherapy was started 7 weeks after surgery.

Results: 3 months after operation there is complete wound closure. Daily physiotherapy is applied and basic grip functions are restored. Because of recurrent skin blistering the splint had to be revised 2 times.

Discussion: Usually cocoon hand release is performed between 4 and 6 years of age, in order to avoid additional secondary deformities. In spite of a remaining MP V subluxation function was satisfactory in our patient. Up to now there is not yet sufficient data to recommend one special technique for surface coverage of the release of the deformity. Although we cannot quantify the influence of allogenic cultured keratinocytes, the potential benefit has no donor site morbidity like in autologous skin grafting.

Summary: Prevention of deformity is of outmost interest. If deformity occurs, adequate treatment and timing should be done. However even in late release, basic hand functions can be achieved provided a multidisciplinary approach.

Einleitung: Die dystrophische Form der Epidermolysis bullosa ist charakterisiert durch Blasenbildung mit sekundärer Vernarbung bei minimalem Trauma. Da die Hände während der normalen Aktivität ständig Mikrotraumen ausgesetzt sind, kommt es bei

diesen Patienten zu progressiven Handdeformitäten mit Pseudosyndaktylie und schliesslich Cocoon-Handdeformität.

Material und Methode: Wir berichten über den Fall eines 15-jährigen Mädchens mit bilateraler Cocoon-Handdeformität, welche sich mit ihrer Mutter in unserer multidisziplinären Epidermolysis bullosa-Sprechstunde vorstellte. Durch eine noch bestehende Restbeweglichkeit des Daumens kann die Patienten mit der linken Hand noch Basisfunktionen durchführen. Rechts bestand eine Daumen-in-Hohlhanddeformität. Nach Erstellung eines Gesamtbehandlungsplans (Haut, Zähne, Ösophagus...) erfolgte die Operation der rechten Hand in Allgemeinanästhesie. Nach Entfernung des Cocoons wurden die Finger gestreckt und der Daumen in maximale Abduktion gebracht. Eine temporäre Fixierung der Gelenke mit Kirschner-Drähten erfolgte. Die Defekte nach Lösung der Pseudosyndaktylie wurden mit allogenen Keratinozytenkulturen in Sheet form gedeckt. Anschließend erfolgte ein Mepithelverband und eine Immobilisierung der Hand in einem Ring. Postoperativ erfolgte ein Verbandwechsel jeweils nach 7 Tagen in Ketanesthanästhesie. Die Entfernung der K-Drähte erfolgte 4 Wochen post-OP in Ketanesthanästhesie. Zu diesem Zeitpunkt erfolgte auch eine erneute Applikation von Keratinozyten zur Deckung der Restdefekte.

Ergebnisse: Die vollständige Wundheilung war nach 7 Wochen erreicht. Eine intensive krankengymnastische Übungsbehandlung wurde zu diesem Zeitpunkt begonnen. Ebenfalls wurden eine Nachtschiene angepasst. 1 Jahr nach Operation verwendet die Patientin die Hand für Basisfunktionen. Es besteht ein primitiver Schlüsselgriff und ein primitiver Faustschluss.

Diskussion: Die Behandlung der Cocoon-Handdeformität erfolgt normalerweise zwischen dem 4. und 6. Lebensjahr um sekundäre Deformationen zu vermeiden. Trotz der nicht reduktiblen MP V Subluxation lag eine befriedigende Globalfunktion der Hand vor. Zum jetzigen Zeitpunkt besteht noch kein Konsensus bezüglich der Defektdeckung und der Fixierung der Finger. Die Applikation von allogenen kultivierten Keratinozyten verstehen wir als biologische Hilfe der spontanen Reepithelialisierung.

Schlussfolgerungen: Die Prävention sekundärer Deformitäten ist von grösster Bedeutung, weshalb ein früherer Operationszeitpunkt gewählt werden sollte. Im Falle einer Cocoon-Handdeformität sollte auch die späte Operation durchgeführt werden, da sie dem Patienten eine signifikante Verbesserung der Funktion ermöglicht. Die Behandlung der Hände muss in einem globalen multidisziplinären Gesamtkonzept verankert sein.

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Induction of granulation tissue through arginine enriched oral nutritional supplements (Cubitan)

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Introduction: Patients suffering from pressure ulcers frequently show signs of malnutrition. These patients often do not adapt to increased requirements for calories and specific nutrients needed for optimal wound healing. This has an associated effect on other, expensive therapies, invariably reducing their efficacy. The aim of this study was to highlight the effect of an arginine, vitamin and protein enriched oral nutrition supplement (Cubitan) in the treatment of refractory pressure ulcers.

Methods: 33 patients undergoing treatment for refractory pressure ulcers were included in this observer study. Subjects had an average age of 79 years (59–97 y) and an average of 2.42 (1–12) pressure ulcers. Each patient received between 200 ml and 600 ml of Cubitan per day during an average length of stay of 12 days (6–29 days). Each patient initially underwent a radical necrosectomy. Documentation and analysis of wound healing was measured by a computer assisted Wound Healing Analysing Tool (W.H.A.T.), which allows calculation of wound size and the percentage of granulation tissue, fibrin and necrosis present and change over time.

Results: Subjects received an average of 423.08 ml Cubitan per day and 7.42 litre (1.2–24 litre) Cubitan throughout their admission. Therefore patients consumed an average of 6.2 g (\pm 1.04) arginine, 18.6 mg (\pm 3.13) Zinc, 12.4 mg (\pm 2.09) Iron and 41.33 g (\pm 6.96) protein per day. Analysis via the WHAT showed the amount of fibrin present in wounds decreased after day 2 from 80.37 % (\pm 21.81 %) to 37.34 % (\pm 25.64 %) and granulation tissue increased from 18.75 % (\pm 22.0 %) to 64.33 % (\pm 27.29 %). 4 patients died during the study period, due to causes unrelated to nutritional care.

Conclusions: This data suggests that a 3 g/200 ml arginine enriched oral nutritional supplement promoted the formation of granulation tissue in pressure ulcers. This may be due to vasodilatation or angiogenesis as a result of arginines role as a precursor of NO, promoting perfusion to these chronic wounds.

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Effect of a lipidocolloid dressing on extracellular matrix synthesis

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Urgotul[®], a lipido-colloid dressing, showed a stimulating effect on fibroblast proliferation. During wound healing, the function of

fibroblasts is to reconstitute the extracellular matrix network consisting in collagens, elastin, glycosaminoglycans (GAGs), fibronectin, etc... The aim of this study was to investigate the effect of Urgotul[®] on the extracellular matrix synthesis. Normal Human Dermal Fibroblast (NHDF) were cultivated at 37 °C in DMEM supplemented with 10 % fetal calf serum to confluency. A piece of dressing or a reference compound (positive control) were applied onto the cell layers for 72 hours. Neosynthesis of total GAGs was measured by [3H]-glucosamine incorporation in GAG fraction; collagen and fibronectin were quantified using specific ELISA assays, matrix organization was visualized by immunofluorescence. Neosynthesis of some components of dermal matrix were stimulated specially (pro)collagen I. Urgotul[®], a contact layer used in acute and chronic wounds, stimulates fibroblast proliferation and dermal matrix synthesis; both activities are potentially crucial for an optimal promotion of wound repair.

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Effect of a collagene / oxidized regenerated cellulose dressing (PROMOGRANTM) vs. standard treatment on cytokine profile, protein exudation, bacterial load and wound size in chronic ulcers

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In wounds considered to be stuck in the inflammatory phase of wound repair, the wound micro-environment has to be re-balanced in order to allow successful further treatment like skin grafting. PROMOGRANTM has been shown to re-balance the wound-microenvironment by binding and inactivating proteases and binding and protecting growth factors from proteolytical degradation. In this observational study the effect of PROMOGRANTM to modify the wound micro-environment in terms of interacting with specific components of the wound exudate was investigated during a short-term course after debridement and before skin grafting.

Methods: A total of 25 ulcers were treated with a collagen/oxidized regenerated cellulose dressing (n = 12) or standard treatment (n = 13) for 10 to 14 days. Before debridement and at day 3 and 5 before skin grafting the wound size was assessed by planimetry. Bacterial load was determined by the calibrated loop technique and protein content of wound exudates as well as locally released IL-6 and TNFTM were measured.

Results: Compared to controls, PROMOGRANTM therapy significantly decreased the local concentration of IL-6 (p < 0.005) and protein (< 0.03) of wound exudates. Although at baseline the mean ulcer size in the PROMOGRANTM group was significantly increased in comparison to the controls (p < 0.005), no differences were noticed after 5 days of treatment. No effect on the bacterial load was observed.

Conclusions: PROMOGRANTM exerts modulatory effects on the inflamed profile of chronic ulcers. Pro-inflammatory cytokines

of wound exudates like IL-6 are decreased during PROMO-GRAN* therapy as well as protein exudation. This modulation might be of clinical significance, since it was paralleled by a rapid wound size reduction compared to control treated wounds.

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Treatment of chronic wounds with EpiDex® – an alternative to mesh graft transplantation

Wundbehandlung Mit EpiDex® – eine Alternative zur Spalthauttransplantation

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We present several patients treated with autologous keratinocyte transplantation (EpiDex®) as an alternative to mesh graft transplantation in an out-patient-clinic. All patients have suffered from venous or mixed arterial and venous leg ulcers for several years. Both multimorbidity as well as extended ulcers resistant to conservative treatment presented major problems. 3 days after application of keratinocytes the wound dressing was changed for the first time and every 3–4 days thereafter for about two weeks. In addition, a sufficient therapy with compression bandages was carried out parallel to bed rest at home. After transplantation of keratinocytes we noticed a stimulation of wound healing and a beginning centripetal epithelial growth from wound margin by the so-called edge-effect within the first three weeks. In some cases, we even achieved an almost complete healing of the ulcers. Application of EpiDex® represents a therapeutic alternative to mesh graft transplantation, especially in multimorbid patients when surgical measures are limited or not feasible at all. Furthermore, it is an atraumatic and painless therapy which can easily be performed in an out-patient-clinic.

Im Nachfolgenden möchten wir mehrere Patienten vorstellen, die als Alternative zur Spalthauttransplantation eine autologe Keratinozytentransplantation (EpiDex®) als ambulante Therapie erhielten. Bei allen Patienten lag meist ein seit mehreren Jahren bestehendes venöses Ulcus oder gemischt venös-arterielles Ulcus vor. Insgesamt waren die ausgewählten Patienten multimorbide oder die Ulcerationen ausgedehnt und therapieresistent unter konsequenter konservativer Wundbehandlung. Nach Applikation der Keratinozyten wurde nach 3 Tagen der erste Verbandwechsel durchgeführt und danach für ca. 2 Wochen ebenfalls alle 3–4 Tage. Die Patienten erhielten eine konsequente Kompression und sollten daheim relative Bettruhe einhalten. Durch die Keratinozytentransplantation zeigte sich eine Anregung der Wundheilung mit neuer, meist vom Rand einsetzender Epithelisierung im Sinne eines Edge-Effekts innerhalb der ersten 3 Wochen. Bei den uns bis jetzt vorliegenden Ergebnissen zeigten sich einige der Ulcerationen bereits fast vollständig abgeheilt. Die Applikation von EpiDex® ist eine Therapiealter-

native zur Spalthauttransplantation, gerade bei Problempatienten, bei denen ein operativer Eingriff nur bedingt oder nicht in Frage kommt. Es ist ein für die Wunde schonendes und für den Patienten schmerzarmes Verfahren, welches ambulant durchgeführt werden kann.

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AA randomized clinical trial to evaluate healing of chronic venous ulcers in ambulatory patients treated with modified unna's boot¹ and and four layer compression bandage²

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Eighty (80) patients with chronic venous insufficiency and ulceration participated in a randomized, cross-over design, clinical trial to compare the healing of venous ulcers in patients treated with moderate compression (22–29 mm Hg) using a modified Unna's boot (MUB), and firmer compression (38–43 mm Hg) using a four layer bandage (4LB). After 6 weeks of compression with MUB, patients whose wound surface area had not healed by 50 % (N = 47) were crossed over to receive treatment with 4LB. Those whose wound had healed by more than 50 % (N = 33) continued to receive MUB. Both groups were followed for 12 weeks or until healing. The same primary dressing³ was used for both groups. Wound size, wound history, and patient demographics were similar in both treatment groups. The median time to healing was significantly shorter for the group receiving 4LB (76 days vs. 119 days p = 0.039). Thirty-five of the 47 patients (74 %) in the 4LB group healed within 12 weeks, and 20 (61 %) treated with MUB had closure (p = 0.021). Mean compression with 4LB was greater (41.5 compared to 27.0 mm Hg at the ankle). The 4LB compression bandage system also provided better edema control. These results show that 4LB should be recommended for venous ulcer patients who do not heal following a 6-week therapeutic course of standard compression. In patients with thin legs (ankle circumference < 23 cm) compression with either MUB or 4LB can exceed 44 mm Hg. Careful examination of the patients' arterial circulation is recommended prior to starting compression therapy.

1 Viscopaste®, Smith and Nephew, Largo FL, Coban, 3M, Minneapolis, MN

2 Profore®, Smith and Nephew, Largo, FL

3 Adaptic®, Johnson & Johnson, Dallas, TX

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The incorporation of silver fibers into elastic compression stockings results in easier donning of compression hose

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Background: Compression stockings have been shown to reduce the risk of venous leg ulcer (VLU) recurrence. However, poor patient compliance with traditional stockings, largely due to difficulties in donning and doffing, has led to reports of VLU recurrence rates exceeding 75 %. A recent innovation is the silver fiber embedded stocking (Juzo, Aichach, Germany). A unique knitting process results in over 20 % of the garment being comprised of X-Static®-The Silver Fiber™. Although initially employed in our clinics for its antimicrobial properties, we observed that these stockings were much easier to don and remove than traditional hose.

Methods: 50 subjects representing a cross section of the wound clinic population were asked to put on and remove three different pairs of stockings (standard 20–30 mm Hg; standard 30–40 mm Hg; and Silver 30–40 mm Hg). Prior to participating hand strength and dexterity were tested as well as cognitive function. Stocking experts fitted each patient and instructed them on the proper technique for donning and removing the stockings. Time to don and doff was measured. Observers and subjects completed surveys regarding the ease of use for each stocking.

Results: Uniformly the silver stockings were found to require less time to don than the two standard stockings even though one of the standard stockings provided less compression. The majority of subjects and observers reported that the silver stockings were easier to don and doff.

Conclusions: The results of this study suggest that the addition of silver fibers to compression hose results in easier donning and doffing. In turn, their use should lead to greater patient compliance and a corresponding reduction in venous leg ulcer recurrence.

Case-history: A 56-year-old lady presented with chronic, painful wounds and calcified deposits in her feet, hands and abdomen. She also had calcified fibrous tumours in various other parts of her body, some dating back to childhood. The surgeries she has had for various problems healed with hard, calcified deposits, later leading to ulcerations. Attempted removal of a large, calcified fibromatous tumour from her anterior abdominal wall resulted in cavitating, non-healing wound over this area, with further calcification. Skeletal radiological survey revealed multiple, soft-tissue deposits and generalised skeletal dysplasia. Magnetic resonance imaging and biopsies revealed calcification, both idiopathic and dystrophic. Isotope bone scan revealed osteomyelitis in her foot. Serum calcium and phosphate levels, and liver, kidney, thyroid and parathyroid functions were normal. Serum alkaline phosphatase levels were elevated.

Management: This has encompassed variety of dressings and devices to treat the ulcers, numerous surgical removals of the calcified tumours (some weighing 4 kilograms), lithotripsy, drugs to inhibit calcification including bisphosphonates and phosphate-binding agents, and antibiotics for infections; the calcium deposition, extrusion and further ulcerations, however, seems unrelenting. The current management priority is to reduce pain, prevent wound deterioration and infection, and improve her overall quality of life.

Discussion: Having ruled out other causes for subcutaneous calcification (juvenile dermatomyositis, systemic sclerosis, lupus erythematosus and tumoral calcinosis), three congenital disorders of heterotopic ossification fit this patient's presentation: Albright hereditary osteodystrophy; fibrodysplasia ossificans progressiva and; progressive osseous heteroplasia. Albright hereditary osteodystrophy is unlikely since the calcium and parathyroid hormone levels are normal. Although fibrodysplasia ossificans progressiva is a possibility, progressive osseous heteroplasia is more likely, since this is associated with elevated serum alkaline phosphatase levels; a finding observed in this patient. Progressive osseous heteroplasia may result from mutations in the GNAS1 gene, a critical negative regulator of osteogenesis. GNAS1 gene mutation analysis is the focus of current investigations.

PS: Numerous clinical images will be presented.

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Chronic ulcers, calcification and calcified fibrous tumours: challenging problems in managing a patient with congenital disorder of heterotopic ossification

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Introduction: Calcification is a rarely reported cause for chronic, cutaneous ulceration. Although dystrophic calcification occurs in chronic ulcers, idiopathic calcification leading to recurrent ulcerations is seldom reported. A challenging case with various non-healing wounds, calcification and calcified fibrous tumours is presented.

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Skin and wound care in the management of buruli ulcer in the Democratic Republic of Congo

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Buruli ulcer (BU) is a severe disfiguring and disabling infectious disease caused by *Mycobacterium ulcerans*. The management of the disease is difficult and costly comprising surgical excision, dressing the wound, skin graft, antibiotics and physiotherapy for the prevention and the management of disabilities due to BU. The present report describes our experience in the management of BU at the Kimpese Hospital. Data were collected between March 2002 and March 2005 on patients admitted to the surgical ward of the hospital. Investigations used to confirm the cli-

nical diagnosis were the direct smear examination for acid-fast bacilli (AFB), histopathology, in vitro culture, and IS2404-PCR.

77 patients were admitted with a clinical diagnosis of BU. The diagnosis was confirmed by at least two of the above investigations in 36 patients. 34 of these patients had ulcerative skin lesions and two had non-ulcerative lesions (one oedema and one plaque). Superinfection of the ulcers was present in 19 of the BU patients. Initial disability was noticed in 9 patients. Mixed forms predominated in 22 patients and 12 had a single ulcerative form. Bone involvement was suspected in 13 patients. The treatment was surgical, and excision was performed for all patients, except for two patients who died before surgery; daily wound dressings were applied, and 19 patients were skin grafted. Out of the six patients with osteomyelitis, 3 were amputated. 27 patients were followed-up until the end of their treatment, two patients are still under treatment and 7 patients died (2 from severe sepsis, 2 from disseminated BU and 3 from malnutrition). The mortality rate was 19.4 %. Disabling sequelae were present at the end of treatment in 10 patients. The median duration of hospitalization for patients followed-up until the end of treatment was 102 days with a minimum of 19 days and a maximum of 449 days.

34 of the patients had presented at an advanced stage when surgical treatment as well as the disease itself has devastating consequences (long hospital stay, disabling sequelae and deformities, relapses, mortality). We recommend the setting up of a multidisciplinary team for the wound and surgical care of BU patients.

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Initial experience with a novel hydrosurgery tool for wound debridement: The Versajet™ system

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Introduction: Wound debridement is an important and necessary surgical skill. Surgical debridement may range from a single, superficial procedure to radical excision in order to permit removal of foreign material and compromised tissue. The Versajet™ system is a new development which allows simultaneous dissection, irrigation and aspiration by means of a hand piece. The hand piece delivers a high pressure fluid jet that creates a localised Venturi effect in the wound.

Methods: The Versajet™ system comprises a console with integral waste disposal and a disposable handpiece activated by a foot pedal. Its action is controlled by adjusting the intensity setting, pressure and angle of the handpiece relative to the wound bed. The action can be adjusted from excision-aspiration to suction-irrigation. Different handpieces are available to facilitate operating on different areas on the body. Surgical debridement by means of Versajet™ was prospectively determined in an open study of plastic surgery cases (n = 18, age range 19–91). Surgical indication, number of procedures, and outcome were recorded in patients presenting for late debridement of traumatic, post-surgical and dermal/full

thickness burns from August–November 2004.

Results: One procedure was required in 17/18 cases and 2 in 1/18, prior to definitive wound cover (2 flaps, 16 skin grafts). Debridement was performed of burns, of limb wounds following trauma, 1 sternal dehiscence, 3 chronic, infected wounds, 3 breast wounds following mastectomy, and a dehisced, infected knee replacement. Four patients were MRSA positive prior to debridement, none had positive wound / drain cultures or infective complications post-operatively. The system proved user-friendly, self-contained, and effective in delineating viable from non-viable tissue. Minimal sharp debridement was required, blood loss was minimal compared to traditional techniques, and surgical time was not greatly increased.

Conclusions: The Versajet™ system is an effective, safe and useful adjunct in plastic surgery. It is however slightly more time consuming in the initial learning period. This is more than compensated for by its potential for effective wound debridement and sparing effect on the healthy tissue.

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Does topical negative pressure therapy influence systemic inflammatory response syndrome in children with extensive burns?

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Introduction: Over the last 50 years the evolution of burn treatment has led to a major decrease in mortality. Major advances have been made in early resuscitation, respiratory care and treatment of inhalation injury, control of infection, modulation of hypermetabolic response, nutritional support, early wound excision and grafting by various techniques. Sepsis is a major complication in burn patients and can be defined as the systemic inflammatory response syndrome (SIRS). SIRS mirrors a clinical condition with tachycardia, tachypnoea, fever, leucocytosis, refractory hypotension and in its most severe form shock and multiple organ dysfunction syndrome (MODS), multiorgan failure (MOF). Based on the burn injury, associated ischemia-reperfusion injury, the presence of necrotic tissue or a septic episode might function as the initiating event of SIRS. The host response might be a localized inflammation or a systemic inflammatory response.

Material and methods: A six year old boy, whose clothes were captured by a burning candle sustained 40 % TBSA full thickness flame burns to his right arm, trunk and neck. Because of constrictive thorax burn eschar and impaired perfusion of the right arm the patient underwent extensive escharotomies. 38 hours after injury an epifascial level excision and grafting with 1:2 mesh graft were performed. Over the complete burn area of almost 40 % TBSA an occlusive VAC-dressing was applied. The grafts were secured by a silicone wound contact layer and the applied Polyurethane foam and continuous suction of 125 mm Hg.

Results: The most surprising observations after surgery and VAC application were an excellent overall graft survival and the

children's outstanding general condition. The patient never presented SIRS symptoms, the VAC device didn't interfere with mechanical ventilation and the patient was successfully extubated on post burn day three. The patients care with wound VAC on was totally uncomplicated and the take-rate was almost 100 %

Conclusions: We hypothesize that early wound excision and graft fixation with TNP therapy can prevent SIRS by elimination of inflammatory response mediators in interstitial fluid.

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A randomized, double-blind, placebo-controlled multicentre trial evaluating zinc oxide in acute open wounds

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Introduction: No effective topical treatments for open surgical wounds have been documented in high-quality randomized clinical trials. Locally applied zinc oxide has been reported to promote wound healing. The excised pilonidal disease wound heals in a predictable manner in two months and was used to compare the effect of topical zinc oxide with placebo meshes on wound healing in a randomized, double-blind, placebo-controlled multicentre trial.

Methods: Sixty-four consecutive patients, 53 males, aged between 18 and 60 years (median 26 years) with excised pilonidal wounds were centrally randomized to local zinc oxide (33 mg/g, n = 33) or to placebo (n = 31) mesh treatment. Patients were followed with strict recording of beneficial and harmful effects (ISRCTN35311675 at www.controlled-trials.com).

Results: The median healing times were 54 days (42–71 days, interquartile range) in the zinc group and 62 days (55–82 days) in

the placebo group. This difference was not statistically different (P = 0.32). The Kaplan-Meier plot is shown below.

Based on Cox regression analysis initial wound volume influenced healing negatively (P = 0.016) while smoking (P = 0.011) was associated with faster wound healing. Significantly (P < 0.01) fewer zinc oxide (n = 3) than placebo-treated patients (n = 12) needed antibiotics postoperatively. Zinc oxide also reduced (P < 0.05) growth of *Corynebacterium* species in the wounds. Although topical zinc oxide increased (p < 0.001) wound fluid zinc levels (1830 ± 405 µM, mean ± SEM) compared with placebo (3.1 ± 1.6 µM), serum-zinc levels did not differ significantly between the zinc (13.5 ± 0.4 µM) and placebo (12.8 ± 0.4 µM) groups on postoperative day 7. No adverse events were recorded.

Discussion: Topical zinc oxide treatment did not accelerate time to closure of open pilonidal wounds but was associated with reduced antibiotic usage. The prophylactic effect of topical zinc oxide on wound infections as well as a potential for promoting wound healing would be worthwhile pursuing in larger scale prospective trials.

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Reduction of wound contracture with the application of sprayed autologous keratinocytes in combination with meshed skin graft

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Introduction: Contracture of split thickness skin grafts (STSG) in burns injuries remains a serious problem to the burns surgeon. It can lead to a cosmetic and functional end result that is often suboptimal and is more apparent the wider the mesh ratio. In a pilot study patients who were treated with sprayed cultured keratinocytes in combination with meshed STSG it was noted that the areas sprayed with cells contracted less than those areas without.

Aim: To determine whether sprayed cultured autologous keratinocytes reduce wound contracture when applied in combination with STSG.

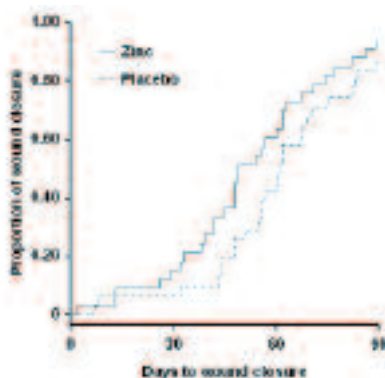


Figure 1 - P 32.

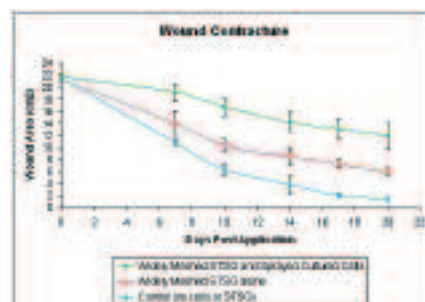


Figure 1 - P 32.

Material and methods: An established porcine chamber-less model was used. 18 wounds were created on 3 animals and divided into widely meshed STSG (4 : 1) with sprayed cells (n = 9), widely meshed STSG (4 : 1) alone (n = 6) or neither as a control (n = 3). The wounds were then photographed every three days and also measured using VISITRAKTM digital. After 21 days the wounds were harvested and underwent histological analysis.

Results: Wounds which had been sprayed with cultured cells demonstrated a slower rate of contraction and up to 50 % less contraction overall than those with widely meshed STSG alone after 21 days. The control wounds without meshed skin or cells had almost completely closed by day 21.

Conclusions: This study demonstrates that there is a significant difference in the contracture of the control wounds and wounds treated with widely meshed STSG alone and with sprayed cultured autologous keratinocytes. This has implications in the treatment of severely burned patients for the prevention of hypertrophic scars and scar contractures.

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Effects of an electrical stimulation bandage on wound healing

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Introduction: Although electrical stimulation (ES) has been successful in the treatment of various types of wounds, the popularity of the treatment has waned due to a lack of optimal methods of administration. The goal of this study has been to develop and evaluate a method of delivering ES that is easy to use and suitable for delivery in a home-health environment. Specifically, a novel bandage system developed to provide an electric field in a manner resembling the natural wound current was tested in vivo.

Methods: In this study, a full-thickness wound model in New Zealand white rabbits was used to measure the effects of such a bandage system on healing of skin defects. Different levels of current were evaluated initially, with 50 and 20 μ A selected for the focus of this study, along with a non-stimulated control. Using histomorphometry healing rates, cellularity, and blood vessels were quantified at one and two week time points.

Results: The study showed the ability of this ES bandage to speed the healing process. An increase in overall healing rate over non-stimulated wounds of 45 % ($p = 0.04$) was observed in wounds stimulated with 50 μ A of current for 1 week. In wounds treated for 2 weeks, contraction rate decreased as well as the ratio of contraction rate to epithelialization rate. The stimulated wounds also showed an increase in the amount of macrophages, with a 79 % increase in number of macrophages in wounds stimulated with 20 μ A for 2 weeks and a 198 % increase in macrophages in those stimulated with 50 μ A compared to non-stimulated wounds. The performance of the bandage in the animal model has led to a limited clinical study on pressure ulcer patients using the 50 μ A system.

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Tape blister following complex knee surgery-clinical correlation of in vitro studies of wound dressing fixation

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Digital surface photogrammetry was used to provide quantitative information about skin deformation under joint mobilisation. In vitro studies show that complex pattern of stress and strain cause skin deformation in the knee when mobilised. The dressing used in the postoperative period must accommodate this complex deformation. We correlate whether any particular type of dressing accommodates the essential curvature of the knee joint and tolerate the change of shape while mobilizing.

Introduction: The current clinical audit was conducted to correlate in vitro studies the true level of skin blistering in patients undergoing complex surgery of the knee. A secondary objective was to investigate the level of patient satisfaction with the dressing used.

Methods: The audit was conducted over a 28 month period. 81 Patients were sequentially allocated to management with either OpSite Post-op or Mepore dressings in the post operative period. All the patients undergone early mobilisation of the joint with continuous passive motion for 2 days from the immediate post operative period and weight bearing when achieved 90 degree knee flexion Blisters developed in 10 % of patients managed with Mepore dressings, but were not recorded in the Opsite Post-op group. 3 % of Mepore group had moist wound at 10 days post operative period. Significantly more patients managed with the Mepore dressing developed superficial inflammation of the wound site ($p < 0.001$) than with Opsite Post-op. Patient satisfaction was higher in the OpSite Post-op group and 92 % of patients were able to bathe.

Conclusions: The results from this audit confirm the findings of digital surface photogrammetry findings about the amount of deformation and blister formation. We found Opsite post op accommodates more deformation than Mepore. We do not have enough information whether wound fixing adhesive have any role. We conclude that Opsite post op may be a better choice in otherwise uncomplicated in joint surgery requiring early mobilization

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New approach in trauma surgery: can maggots reduce invalidating amputations in case of serious injury with severe infection?

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Aim: The experimental use of maggots (sterile larvae of *Lucilia Sericata*) can reduce the risk of amputation of an extremity in case of severe infection after trauma. Maggots can destroy bacteria by secreting enzymes such as trypsin, peptidase and lipase. The secretion of allantoin, ammonia and calcium carbonate reduces bacterial growth, stimulates new formation of granulation tissue and creates an alkaline environment.

Material and methods: In the period 4.1999 – 1.2005, 58 patients (mean age 53 years (range 16–84)) with 64 maggot treatments were included in our prospective study for maggot treatment of severe infections after trauma. Indications for maggot therapy were severe necrotic wounds and infections: osteomyelitis 34 patients with 39 maggot treatments, Soft tissue infection 15 patients with 16 treatments, Necrotizing Fasciitis 9 patients. Only in 3 patients free range maggots were used, in the other cases (55 patients) maggots were applied in polyvinyl Biobags (Vitapad[®], Polymedics, Belgium) which were replaced every 3–4 days.

Results: The average number of maggots applied per treatment per patient was 730 (range 20–6840), the mean number of maggot changes per patient was 7.6 (range 2–30), the mean duration of maggot therapy was 31 days (range 8–120). The percentage of successful treatments (defined as wound closure or improvement of the wound) was for osteomyelitis 95, soft tissue infections 87,5 and for necrotizing fasciitis 100. During the treatment of patients in our laboratories in vitro research activities were performed on endothelial cell cultures with standardized cell lesions to investigate the influence of maggot excretes on healing repair mechanisms of damaged vascular walls. Time and dose related mRNA stimulation of IL-8, IL-1 β , bFGF, TGF- β and VEGFR2 was observed during endothelial cell repair.

Discussion: In our study the experimental use of maggots could reduce the amputation rate of limbs in case of severe infections after trauma. In only 2 patients amputation was necessary. Our laboratory research investigations with analysis of the secreting enzymes of maggots, support that this "ancient" method has a place in modern traumatology to diminish the number of invalidating amputations.

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Does warming patients on admission improve infectious complications – a study proposal

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Aim: Does systemic warming of at risk patients presenting to an Accident and Emergency Department improve clinical outcome?

Methods: Adult patients presenting as: elderly fallers (over 65 years old), suspected fractured neck of femur and abdominal pain are being randomised to (1) Intervention Group in which patients are systemically warmed using a resistive carbon polymer mattress/over blanket set at 40 C during their admission period. (2) Control Group in which patients receive standard treatment. Patients with coronary syndromes, cardiac arrest, on a spine board or who are hyper-pyrexial are excluded.

Results: Primary analysis is undertaken on the basis of "intention to treat". Clinical outcome is recorded from the time of admission. Core temperature, pain score and thermal comfort score are recorded pre and post warming. Other information such as 30-day mortality, 30-day morbidity, split into infectious and non-infectious complications and length of hospital stay, are recorded. Microbiological results are used as supporting evidence for infectious episodes. Pressure sore risk assessment are performed on admission and any changes recorded.

Discussion: Patients attending the Emergency Department are often hypothermic as a result of the pathophysiological consequence of their illness or due to a low ambient temperature. There is growing evidence that systemic warming of patients improve outcomes particularly the reduction of infectious complications. This randomised controlled study is investigating whether warming patients during their initial hospital phase may result in improved clinical outcomes, especially the rate of infection.

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Vertical and horizontal distribution of exudate inside two silicone dressings

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Generally, the ability of a dressing to relieve the wound and peri-wound skin of the irritative influence of wound fluid, is considered decisive for its performance. A novel silicone sponge dressing has hyperabsorptive material (Exulock) at the back of the dressing to effectively remove the wound fluid from the wound area. We wanted to test this design against an established silicone foam dressing of a more traditional design. In a wound

model calf serum was pumped through a small hole at 5 ml/h with a dressing at the other side. With this method two types of silicone dressings were tested, two of each. When one of the dressings had reached the limits of its absorbency all dressings were snap-frozen in liquid nitrogen. Then the area of distribution of serum at the wound contact surface was measured i.e. the horizontal distribution. The frozen dressings were then cut to evaluate vertical spread inside the dressings. There was significant difference in both the horizontal area of exudate and the vertical spread. When dressing B was saturated, dressing A had horizontal spread in 45 % less area and while dressing A showed serum at all levels and mainly in the Exulock cells at the back of the dressing, in dressing B there was no serum in approximately 1/3 of the dressing at the back.

Conclusions: An additive hyperabsorptive function in a sponge dressing leads to a smaller area of wound fluid at the wound contact area and removal of the fluid towards the backing. This should reduce the risk of maceration around the wound in a real-life situation. Dressing A is Gentleheal from Ossur Inc in Iceland, dressing B is Mepilex

clinical problem. We propose that treatment of exposed bone with bone resection and a fibroblast-populated construct (FPC) (Dermagraft) accelerates healing.

Research Design and Method: Five patients with stage IV sacral or ischial pressure ulcers were randomized to the control group and underwent bone resection with wet-to-dry dressing changes. Nine other patients were randomized to the treatment group (Dermagraft) and underwent bone resection with application of FPC.

Results: The mean age of the control group was 40.2 (range 20–51) and the mean age of the treatment group was 43.1 (range 28–58). The gender of the control group was 100 % male and the treatment group was 66 % male. Both groups were clinically monitored and treated with culture-specific antibiotics. Results of FPC placed on pressure ulcers is outlined in table 1.

The data showed that patients treated with FPC had their exposed bone covered between 1 to 3 weeks, while the control group had bone still exposed after 4 weeks. Our evidence shows that the addition of a fibroblast-derived, extracellular matrix increases wound closure in infected pressure ulcers where bone was resected.

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Coverage of exposed bone in pressure ulcers with a fibroblast-populated construct decreased healing time compared to controls in a pilot randomized, control trial

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Introduction: Patients that are elderly or spinal cord injured develop stage IV pressure ulcers in sacral, ischial, and trochanteric regions. Bone exposure of pressure ulcers becomes a significant

Table 1- P 39.

	Control	Dermagraft
Stage of pressure ulcer	Stage 4 - 80%	Stage 4 - 89%
	Stage 3 - 20%	Stage 3 - 11%
Size	35.66 cm ²	30.4cm ²
Quadriplegic/ paraplegic	100 %	67 %
Diabetic	40 %	22 %
Exposed bone	80 %	89 %
Underwent bone resection	100 %	100 %
Underwent debridement	100 %	100 %
Positive bone culture	100 %	100 %
Time to bone coverage	>1 month	3 closed @ 1 week 3 closed @ 3 weeks 1 with 50% closure @ 2 weeks 1 with 80% closure @ 2 weeks 1 was lost due to infection

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Choice of dressing to improve post operative outcome in Dupuytren disease

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Appropriate bandaging technique minimises post operative morbidity in Dupuytren's disease. There is a paucity of data in the published literature as to the true incidence of post-operative complication namely hematoma, seroma and wound infection and whether this is associated with the use of a particular type of dressing or surgical procedure.

Aim: The current clinical audit was conducted to record the true level of skin necrosis, time of wound healing and development of relapsed Dupuytren's disease in patients undergoing fasciectomy. A secondary objective was to investigate the level of patient satisfaction with the dressing used.

Methods: The audit was conducted over a 24 month period. Patients were sequentially allocated to management with either Allevyn adhesive or Jelonet and gauze dressings. The average wound healing time was 17 days in the Allevyn group and 26 days the Jelonet group. Wound infection developed in 4 % of patients with managed with Jelonet dressings, but were not recorded in the Allevyn group. Patient satisfaction was higher in the Allevyn group and 81 % of patients were able to mobilise early in the post-operative period.

Discussion: The results from this short series of cases confirm the findings of other investigators that choice of dressing is important factor in influencing post-operative outcome in otherwise uncomplicated palmar fasciectomy for the treatment of Dupuytren's contracture. Controlled scar formation was obtained more rapidly with Allevyn with better functional outcome.