Low-Level-Laser-Therapy (LLLT)

in Chronic Wounds

New directions in wound management:
Evidence and practice

füchtenbusch
publishing and education

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Case Reports

Case Report 1 – Diabetic Foot Ulcer

Patient, male, 70 years
Local diagnosis: diabetic foot ulcer Wagner/Armstrong IIIB, left plantar, clinically acute Charcot foot.

Known diagnoses:
Multiple layer clinical picture with the primary diagnosis of diabetes mellitus type 2 since 5/2009, yet nevertheless already evidence of peripheral diabetic polyneuropathy with hypaesthesia of both soles, i.e. considerably reduced perception of pain, as well as stage 1 diabetic neuropathy. PAOD, status after femoral-popliteal by-pass on the left due to occlusion of the left femoral artery, CHD with PTCA 2003 and 2004 and stenting of the posterolateral and circumflex branch. Arterial hypertension, hypercholesterloaemia.

External findings and treatment:
4/2009: Non-healing left plantar foot ulcer, external wound treatment, trigger: gardening injury, previous antibiotic treatment with Clindamycin, Piperacillin and Cefaclor.
6/2009: Application of a femoral-popliteal by-pass in PAOD on the left (occlusion of the left femoral artery), in spite of improvement in arterial circulation no wound healing. Resection of the left metatarsal bone due to bone involvement.
9/2009: Presented at the wound centre of the specialist hospital; diagnosis of acute Charcot foot, Sanders 1, communicating left plantar and volar foot ulcer (continuously detectable with the head probe), small lesion, reddened wound surroundings, swollen, moderately overheated, fluid retention in the forefoot (DI and DII metatarsophalangeal joint, approx. 1.5 cm); in the MRI detection of florid neurogenic osteoarthropathy (acute Charcot foot) with clear soft tissue inflammation and plantar abscess under metatarsal bone [2]).

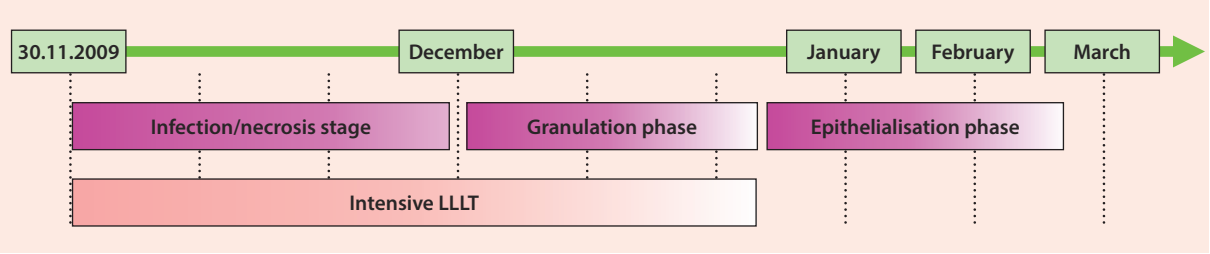
> **Wound treatment there 31.8.-16.9.09:** Surgical debridement, rinsing of the abscess cavities, insertion of flaps, antibiotic treatment in accordance with antibiogram (detection of Morganella, enterococci and streptococci viridans) with Amoxicillin and Ciprofloxacin. Regression of the infection and positive healing tendency.

Treatment of the foot ulcer at the Schwabing Wound Centre from 30.11.2009 until 04.03.2010
Findings on admission: diabetic foot ulcer Wagner/Armstrong IIIB/plantar, longitudinally oval from dorsal to ventral measuring approx. 2 cm, depth approx. 4 cm, volar lesion still detect-

able, measuring approx. 0.5 cm; wound healing disorder with open dorsum of the foot; the upper wound was repeatedly opened in the external preliminary treatments; severe inflammation; clinically acute Charcot foot; current Duplex examination of the arteries of the foot: good permeability of the by-pass, current MRI of the foot: clearly inflamed plantar tissue proliferation at metatarsal joints II and III.

Discussion with the vascular surgeon as to whether resection of metatarsal bone III would be medically sensible due to the osseous infection. Surgically resection was indicated but the patient decided, also on our recommendation, on a conservative approach to begin with; the surgeons and internal specialist had therefore proposed different treatments at this time. The deep wound swab showed enterococci and corynebacteria as well as coagulase-negative staphylococci; after discussion with the microbiologist, and because of the resistance spectrum, the reserve antibiotic Cubicin was prescribed i.v. for 14 days from 18.12.2009.

Course of treatment



Measures: Standard therapy plus LLLT

- **1. Infection/necrosis stage up to approx. 10.12.2009**
  Cleaning of the infected wound with hydrophobic gauze (Recutisorb sorbact) containing no substances, flap modified for open fistulous canal (bottom 2 cm, depth 4 cm).
  LLLT: Every 2nd day when changing dressing with Cutisorb (3 x week), in total 5 applications
- **2. Granulation phase up to approx. 21.12.2009**
  3 x/week dressing change with Promogran + Cutisorb; protection of the wound with zinc cream (D-line) and covering with Aquacell.
  As of 17.12 no more tamponage was applied, the upper wound was left; the wound surroundings had clearly improved, but there was still oedema, as well as swelling and inflammation; to keep the wound open at the bottom a wick with Cutisorb was inserted; treatment took place via the planar wound; antibiotic treatment for 8 weeks; relief with TCC plaster with open wound surroundings.
  LLLT: Every 2nd day when changing the dressing (3 x weekly), in total 5 applications

- **3. Epithelialisation phase up to 04.03.2010**
  No more tamponade as of 21.12, the wound was closed on the dorsum of the foot, wound healing stable from plantar in the direction of the forefoot; the patient wore the plaster until January and was then given an orthesis for pressure relief (risk of recurrence of osteomyelitis) for six months.
  No more LLLT as of 29.12.2009 as the wound healing was almost complete
- **4. Further course**
  - 07.01.2010 Wound now only 0.5 cm deep, no longer weeping
  - 04.03.2010 Completion of treatment, epithelialisation completed, MRI check-up: signs of now more moderate, regressing osteomyelitis.

  Since then quarterly follow-ups, so far no recurrence.

Conclusion and discussion

Wound closure within 8 – 9 weeks is a significant success in a case with such poor local findings and imminent resection of the metatarsal bone III; the consistent regression of the osteomyelitis and oedema, as well as the accelerated granulation and healing of the wound can certainly be ascribed to LLLT to a decisive degree – a great success.

Image documentation

- Male, 70 years
- Findings on admission: diabetic foot ulcer Wagner/Armstrong IIIB, left plantar, clinically acute Charcot foot
- Treatment period 30.11.2009 – 04.03.2010

Fig.1
30.11.2009
Plantar, longitudinally oval ulcer from dorsal to ventral, length approx.2 cm, depth approx. 4.2 cm

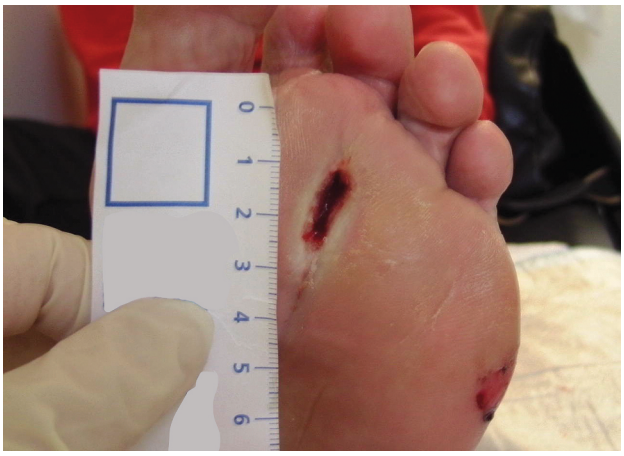


Fig. 2
10.12.2009
Start of granulation, length approx. 1.5 cm

Fig. 3
18.12.2009
Granulation phase, length approx. 1.5 cm (improved wound surroundings despite existing inflammation, swelling and oedema; kept open by means of wick with Cutisorp)

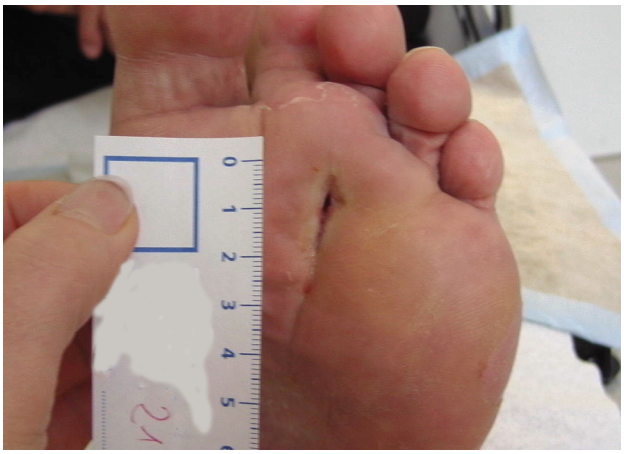


Fig. 4
21.12.2009
Granulation phase almost completed, wound on dorsum of foot closed, wound adapted from bottom plantar in the direction of the forefoot, depth approx. 2.5 cm, no further tamponade

Fig. 5
04.03.2010
Completion of treatment, wound closed and epithelialised