

Healing of Leg Diabetic ulcer treated with MLS®-MiS laser (MiS – MLS® High Peak Pulse): a case report

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INTRODUCTION

Diabetic Lower Limbs Ulcers are frequent complications in patients diagnosed with type 2 diabetes. Diabetic ulcers lead to increased overall morbidity, such as infections, and are considered a source of emotional and physical distress. They are often resistant to conventional medical treatment, and surgery in some cases is needed. Laser therapy has been proven and largely used for many years in wound therapy, with appreciable results.

In this article we are going to deal about the efficacy and safety of laser MLS®-MiS (MiS – MLS® High Peak Pulse) in a case of chronic diabetic ulcer. Laser MLS®-MiS is a Class IV laser therapy device with

high performances, which allows spatial overlap with two different wavelengths (synchronized and combined emission of a continuous emission at 808nm and a pulsed emission at 905 nm) with high peak power (1 kW). These technical characteristics allow analgesic, anti-inflammatory, anti-oedema and tissue repair effects in superficial and deep tissues. In our knowledge this is the first report of its effects in Diabetic Ulcers treatment.

CASE DESCRIPTION

The patient is a 65 years old woman, with diabetes mellitus type II, lasting for several years. The patient suffered from a chronic ulcer in her right ankle, above internal malleolus: the skin around

the ulcer was red, swollen, with no significant exudation, measuring 3 cm x 2,5 cm. There was no granulation tissue, and the surface of the wound was covered by a thick fibrin layer (Figure 1).

The ulcer started 7 month before, over a basal situation of diabetic peripheral neuropathy, with cutaneous sensitivity loss. It was a typical leg ulcers, as it often happens in long-standing diabetic patients.

The ulcer had started as a little wound, arising from shoe rubbing in diabetic neuropathy, which has caused loss of cutaneous sensitivity. The wound had progressively increased despite local dressing, and requested several antibiotic therapy over the time, for local infection. According to the Wagner Grading System, the case ulcer was Grade I, that is it did not involve ligaments, tendon or joint capsule/fascia.

The previous local and general medical treatment lasted several months. The ulcer had become chronic and stationary, and didn't show healing anymore. The situation needed yet regular medication and specialist surveillance, without appreciable results and great discomfort of the patient.

Laser protocol: After informed consent, MiS – MLS® High Peak Pulse laser device was used. Handheld probe with optical terminal of 2 cm diameter was used, helded about 1 cm above the ulcer, dressing removed. The device program for superficial wound was chosen. Each session duration was two minutes, the used frequency was 1500 Hz, Intensity 40%. Exposure fluence of 6 J/cm² was delivered. As no experience was previously available in this field with MLS®-MiS laser, the treatment started at lower intensity

(30%), in order to monitor potential local initial negative effects. During the second week intensity and was increased to 40% and maintained for the following sessions. The wound was subjected to laser light exposure for a total of 20 sessions, 4 sessions/week. Both the patient and the doctor wore appropriate laser safety goggles.

After each laser session a simple ulcer medication with local silver sulfadiazine was performed, and conventional dressing was put over the wound to protect skin.

Appreciable improvement was seen after a few laser therapy sessions: surrounding inflammation gradually decreased (see in figure 2, 3, 4 the redness and swelling reduction) and a gradual size reduction was observed, till complete closure, which was reached after 20 sessions (figure 5).

At follow up, one month and two months after the end of the sessions, the skin was completely restored and no surrounding inflammation signs were present (fig. 6, 7, respectively). No side effects were reported, and the satisfaction of the patient was high.

DISCUSSION AND CONCLUSION

High blood glucose overtime can damage nerves and blood vessels, and general metabolism disorder combined with local alterations.

Several studies show that in diabetic wounds an altered local metabolism is found, with impaired NO synthesis and angiogenesis, decreased Growth Factor and structural and functional changes in fibroblasts. Metabolic changes cause a prolonged inflammatory phase, and a consequent delay in granulation tissue formation, together with a reduction in tensile

strength. Since non-healing diabetic ulcers are resistant to traditional treatment and pose clinical challenge, adjuvant therapies have been tried to stimulate healing processes.

Low Level Laser Therapy has been confirmed even in recent studies to be a worthwhile treatment in wound care and diabetic ulcers, for its anti-inflammatory and anti-oedemic activity, and tissue regeneration stimulation [1-6]. Studies report laser therapy efficacy even in severe ulcers, but it is mainly indicated in Grade I and Grade II ulcers, which represent the main part of diabetic ulcers at the first medical attention. If not correctly treated this kind of lesions can rapidly complicate, and often became chronic. A chronic ulcer is one which do not heal within 3 months, due to a stuck process in the inflammatory phase of healing. The efficacy of Class IV laser has been investigated too [7], with highly appreciable results.

MiS – MLS® High Peak Pulse laser is a new laser device which delivers a laser impulse of two wavelengths (808 nm and 905 nm) with two different emission modes (continuous and pulsed) and high average and peak power, to effectively reach deep tissue in a safe and controlled manner. The sessions were very short (two minutes).

Treatment of diabetic leg ulcers includes optimal glycemic control, removal of dead tissue from the wound, wound dressings, and systemic medical therapy in case of infection. This common treatment not always can reach wound healing, which became a chronic open wound, with a lot of medical consequences. In this clinical case

we report the safety and efficacy of high peak pulse laser with specific characteristic (MiS – MLS® High Peak Pulse). The ulcer of the patient was a non-healing ulcer, which did not more react to therapies. In our patient laser treatment with laser MLS®-MiS was the only treatment adjunct to her customary chronic therapy.

Laser treatment gradually lead to reduction of wound area, tissue granulation induction and skin repair. In our clinical case it showed efficacy and safety, and proved to be a very high manageable device, which allows very short treatment time (a few minutes), in non invasive and pain free procedure.

More reports and clinical studies will be necessary, but this high power laser device reveals as a promising adjuvant instrument to treat diabetic wounds.

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Figure 1: pre-treatment



Figure 2



Figure 3



Figure 4



Figure 5: after 20 sessions



Figure 6: at 1 month follow-up



Figure 7: at 2 months follow-up