

*Short Communication*

# Burns in Children – Difficult Medical, Social, and Environmental Problems

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## Abstract

Year by year in Poland there are more cases of accidents, injuries, and burns that affect children. In that age group, burns are the main cause of death. From the research conducted so far, one can gather that various forms of electromagnetic fields reveal substantial therapeutic efficacy in the treatment of diseases of soft tissues and skin. Our paper presents therapeutic possibilities provided by magnetledtherapy in the treatment of consequences of burns, namely: secondary keloid of the crotch and anus areas, with insufficiency of the rectal sphincter in an 11-year-old patient, and a hypertrophied scar of the thigh in a 6-year-old patient, after ineffective topical conservative therapy. The procedures performed demonstrated substantial therapeutic efficacy in both cases presented, which – taking into account the absence of major side effects, good tolerance for procedures, and beneficial cosmetic effects, in such young patients – points to the new possibilities available in the treatment of consequences of burns in children.

**Keywords:** burns, keloids, treatment, magnetledtherapy

## Introduction

The contemporary environment poses numerous threats related, among other things, to the frequent occurrence of injuries. Burns are among the most dramatic injuries that may affect children and grown-ups [1]. The number of patients who are burned or scalded is about 400,000 a year in Poland, of which 50-80% are children. In the population of children, burns/scalds are more frequent in the age group of 2 to 4 years, due to the mobility at that age (particularly increased in that age group), and because children in that age range are interested in their environment, being at the same time unaware of the dangers it poses. In children, burns/scalds are most often suffered at home, where in a small space there are many sources of heat (gas cookes, stoves, hot pots, iron, and more) [2].

Most superficial burns/scalds heal without complications in about a fortnight, but deeper and more extensive burns/scalds inevitably lead to serious consequences for health [3]. The increasing occurrence of burns in a modern environment, as well as the specificity and severity of complications, enforces social discussions on the choice of optimal methods of treatment, in particular in children's populations. In the case of burns, oftentimes even a slight intensity of the factor causing thermal injury may become the cause of serious functional, cosmetic, and esthetic complications that have strong negative influence upon the entire life of the patient in the future. In the acute phase of thermal injury the direct consequence of burn/scald is the occurrence of the burn wound, whereas the complications of the wound healing process lead, in the distant phase, to the occurrence of hypertrophied and hardly flexible scars, called post-burn keloids, which are the cause of functional disturbances for muscles and joints located in the keloid area, as well as skin cosmetic defects [4-6].

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The treatment of hypertrophied scars after burns still poses a difficult medical problem, while the frequency of recurrence indicates the absence of a single, fully efficient treatment method [6]. The treatment of post-burn keloids is of complex character and requires doctors to know surgical techniques well, and to have extensive knowledge concerning the complex conservative therapeutic procedures, including, among others, modern methods of physiotherapy and physical medicine [7, 8].

For a few years now, a new method of treating trophic lesions of the skin – magnetledtherapy – has been around, consisting of the combined influence of variable magnetic field and optic/light radiation [9, 10]. As results from the experimental and clinical studies conducted so far, as a consequence of magnetledtherapy the injured tissues regenerate quicker, whereas the procedure itself brings about a strong analgesic effect. The method is novel, absolutely safe, and easy to apply [10-12].

The aim of our study has been to present the therapeutic possibilities of magnetledtherapy in the treatment of post-burn complications, namely: secondary keloid of the crotch and anus areas, with accompanying insufficiency of rectal sphincter in an 11-year-old patient, and hypertrophied scar of the thigh in a 6-year-old patient, after ineffective topical conservative therapy.

## Description of Cases

### Case 1

An 11-year-old patient was admitted to the Chair and Clinical Ward of Internal Diseases, Angiology, and Physical Medicine, Centre of Diagnostics and Laser Therapy of the Silesian Medical University in Katowice, Poland, due to the formation of secondary keloid after burning of crotch and anus, with accompanying insufficiency of rectal sphincter, after surgical procedure. The patient had been the subject of repeated general and topical therapy with antibiotics, without positive results. The rectal sphincter insufficiency symptoms caused did not subside completely, while the medication applied resulted in but a transient improvement, lasting a few days.

Before the therapy commenced, the physical revealed clearly delineated areas of skin with red-rose tinge, with distinct signs of fibrosis (Fig. 1). The patient reported faecal incontinence, even during daily activities (coughing, sneezing, running, laughing). Moreover, he felt pruritus and tactile hyperaesthesia in the area of skin lesions, while the keloid formed posed an enormous aesthetic problem for the patient.

The therapy conducted in outpatient mode, the patient underwent a 90-day cycle of magnetledtherapy, for which a magnetledtherapy kit Viofor JPS Classic was used (by Med&Life, Poland) with an elliptical magnet and light applicator RIR emitting optical radiation in the red and infrared ranges.

Skin lesions were irradiated from a distance of about 1 cm. During the procedure, the applicator emitted optic radi-

ation of the red and infrared ranges (wave length – 630 nm and 855 nm, respectively, energy density – 4.91 J/cm<sup>2</sup>, application time – 10 minutes), with simultaneous generation of variable magnetic field (base impulse frequency – 181.8 Hz, intensity – 7 (induction 62 µT), setting of MIP2 – constant intensity throughout the procedure time, with the use of ionic cyclotron resonance, application time 10 minutes).

The patient underwent the procedures twice a day in three 3-week cycles, comprising 15 procedures (with the exclusion of Saturdays and Sundays), with a 3-week break before each consecutive therapeutic session. After the therapeutic cycle was completed, a substantial reduction of keloid size was noticed, as well as the fact that it was growing pale (Fig. 2). Moreover, complete subsidence of ailments reported before was noted, namely of: faecal incontinence, pruritus, and tactile hyperaesthesia.



Fig. 1. Local condition before magnetledtherapy.



Fig. 2. Local condition at the end of magnetledtherapy (size of keloid reduced substantially; it is also more pale).

## Case 2

A 6-year-old patient was admitted for a hypertrophied scar on the right thigh, which occurred after skin transplantation performed because of a burn/scald. Before admission to the ward, the patient had undergone unsuccessful pharmacological treatment. The physical examination revealed substantial reddening and thickening of the scar, which significantly protruded above the surface of surrounding healthy skin (Fig. 3). The patient complained of acute pruritus, and tactile hyperaesthesia in the scar area.

The patient underwent 8 months of therapy, during which magnetledtherapy procedures were applied using the magnetledotherapy kit Viofor JPS Standard with panel applicators (by Med&Life, Poland). The scar was irradiated from a distance of some 2-3 cm. During the procedure, the applicator emitted optic radiation of the red range (wave length – 630 nm, energy density – 0.24 J/cm<sup>2</sup>, application time – 10 minutes) with simultaneous generation of variable magnetic field (base impulse frequency – 181.8 Hz, intensity – 6 (induction: 860 µT), setting of M1P2 – constant intensity throughout the procedure time, with the use of the ionic cyclotron resonance option, application time 10 minutes).



Fig. 3. Local condition before magnetledtherapy (hypertrophied scar visible on lateral surface of right thigh, protruding significantly over the surrounding healthy skin).



Fig. 4. Local condition after 32 weeks of magnetledtherapy (reduced size and intensity of scar melanoderma visible).

The patient underwent daily procedures (once a day) excluding Saturdays and Sundays, applied for 18 weeks in 3 therapeutic sessions, lasting 3 weeks each, with a 3-week break before each consecutive therapeutic session. After the entire therapeutic cycle was completed, a substantial reduction of scar protrusion was achieved, the scar also became soft, less tense, and less reddened (Fig. 4).

## Discussion

The purpose of the complex treatment of hypertrophied scars and post-burn keloids is first of all to eliminate or alleviate ailments and dysfunctions, as well as improvement of the scar esthetics that influence the improved well-being and living comfort of patients undergoing treatment [8,13].

Clinical studies conducted so far indicate high therapeutic efficiency of various forms of electromagnetic fields (both variable magnetic fields used in magnetotherapy and magnetostimulation, and optic radiation from various ranges of wavelengths) in the treatment of trophic skin lesions [14]. The basis of the therapeutic effects of magnetledtherapy lies in documented regeneration effects (related – among others – to stimulation of angiogenesis and improved utilization of oxygen in tissues affected by disease), analgesic and anti-inflammatory activity, as well as antibacterial properties of both physical factors used in that method [9, 15]. The simultaneous application of two physical factors allows for synergistic increases of therapy efficiency, as well as substantial reductions of treatment time. The high efficiency of therapy in both cases presented, with the absence of significant side effects, is indicative for potential usefulness of magnetledtherapy as a precious complementary method to the conventional symptomatic treatment of scars and keloids after burns/scalds [7, 16, 17]. The preliminary results obtained may justify conducting further randomized clinical studies in that respect.

## References

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