Physical treatment of post traumatic gonalgia by NIR laser therapy: a case report.

G. Caruso, S. Gervasi, D. Salvadori
Caruso Physiotherapy out-patients, La Fontina, Ghezzano, Pisa

ABSTRACT

In this paper we present a case report that refers to a female patient, aged 54, who suffered from post-traumatic knee pain. The clinical case described was part of a clinical trial whose purpose was to investigate the therapeutic effects of NIR laser therapy on knee pain.

The laser source was a Multiwave Locked System (M6 device) provided by ASA s.r.l. (Arcugnano, Vicenza, Italy). The instrument consisted of two assembled laser diodes with synchronized emissions at 808 and 905 nm, respectively. The patient was treated 3 times weekly, for a total of 10 treatments. The patient's pain, both before and after each session, was measured by using VAS scale, in order to evaluate the effect of the laser therapy. The data obtained show that, during the treatment, the patient had a progressive improvement in pain relief. At 60 days follow-up, it was observed that the effect of laser therapy persisted. The results we obtained in this study indicate that, with the chosen laser source (MLS) and treatment parameters, NIR laser therapy had beneficial effects on knee pain.

INTRODUCTION

Gonalgia, or knee pain, is a common problem, which requires medical examinations and treatments, both in sportsman and in non-sportsman [1]. It is a symptom that can be due to many different causes: it can occur in young persons hurting after a distortive trauma (with related joints or menisci lesions), in elderly persons suffering for knee arthrosis, in athletes with an inflamed rotular tendon (jumper knee), in teenagers feeling pain at the tibial apophysis (Osgood - Schlatter disease). More specifically, according to their etiology, the patellofemoral disorders are distinguished with the classification of Merchant [2].

Obviously symptoms can be more or less acute, depending on their gravity, on which structure of the knee has been affected, on the type of pathology which caused gonalgia. In general it is possible to distinguish between acute pain, usually as a consequence of a trauma, and chronic pain.

The difficulties in diagnostic classification of knee pain and subsequent treatment are related to the nonspecificity of subjective and objective symptoms [3].

Since many years, laser therapy has been widely used to control pain in different musculoskeletal conditions. Despite its widespread use, the results of the experimental and clinical studies are conflicting. In particular, relatively few controlled clinical studies on laser therapy applied for the treatment of knee pathologies have been reported and the findings from these studies are also contradictory [4, 5]. The results obtained from the trial of Stelian et al. suggest that laser treatment may be useful in reducing the pain and disability associated with knee osteoarthritis [4]. In contrast, in a double blind, placebo controlled study on the efficacy of LLLT on knee pain, no difference between the actively and the placebo treated groups was detected [5]. Since the results following the application of laser therapy show a significant variability, also according to the laser source and the treatment parameters used, we evaluated the effect of the MLS laser on knee pain. Here, we report the particular case of a female patient, 54 years old, who suffered from severe post-traumatic knee pain.

MATERIALS E METHODS

The patient, a cook, aged 54 years, female, belonged to a group of several patients, males and females of different ages, that were recruited for the trial from our outpatients aid physiotherapy. Patients presented a generalized pain of the knee. Inclusion criteria was based on pathology, pain symptoms reported and treatability with laser therapy. Exclusion criteria were: other physical instrumental therapies, except for electrical stimulation for muscle reinforcement o strengthening of the district considered (ex. femoral quadriceps in pathologies of the knee), as this physical therapy has not analgesic and

biostimulation effect on joint tissues. The patient that we present in this case report turned to us following a post-traumatic knee pain.

Patient was treated with ASA M6 laser device provided by ASA s.r.l. (Arcugnano, Vicenza, Italy). The instrument consist of two assembled laser diodes, with synchronized emissions at 808 and 905 nm, respectively. The diode with = 808nm may emit in continuous mode, with a power P = 1.1W, or pulsed mode with an average power Pa = 0.55W and a maximum frequency of 2000Hz.

The diode = 905 nm is characterized by a pulsed emission with a maximum frequency of 2000Hz and an average power Pa = 60mW.

Therefore, the MLS emission can occur in different modes, according to the operator's choice:

Continuous Mode (Continuous Mode Operation, CW): diode with λ = 808 nm, continuous emission and diode with λ = 905 nm, pulsed emission. Pulsed mode (Pulsed Mode operation): diode with λ = 808nm, pulsed emission with pulses repetition frequency f808 (Max value 2000Hz) and diode with λ = 905nm, pulsed emission with pulses repetition frequency f905 = f808.

When frequency changes, the emission features allow the average power of the 905nm diode emission to change, while the average power of the 808nm diode emission does not change. In fact, when the frequency changes the 808nm diode emission duration changes in proportion, in this way the average power remains the same, while the temporal distribution of the released energy changes. With the same emission time (and spot sizes), the whole energy (808nm + 905nm) changes when the set frequency changes.

In the present case, the following treatment parameters have been applied: 2 min time exposure, 900 Hz frequency, 72,45 J energy delivered.

SCALA VAS										
Session	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°
Pre-therapy pain	4	4	4	4	3	3	2	2	1	0
Post-therapy pain	4	4	4	3	3	3	2	1	0	0

Table I: Visual Analogue Scale (VAS)

Patient was also subjected to a progressive personalized functional rehabilitation, consisting of passive mobilization, assisted or active at natural load.

The protocol consisted in 10 sessions (3 sessions per week) and in the drafting of a specific patient form prepared by ASA S.r.l. and optimized by outpatient of Dr. Caruso.

The patient form reported:

1. the progressive number of session,
2. personal data of patient (personal details, profession, etc...),
3. the beginning and end of sessions,
4. pathology (location and cause),
5. indication of the instrumental tests provided for the initial evalutation,
6. a table for indicating the parameters set during the sessions,
7. a second table for the evaluation of the patient (pain and muscle strength),
8. a section dedicated to the ongoing evaluation
9. diagrams for the anatomical location of the point of treatment.

Treatment was carried out on a Bobath bed, electrically adjustable in height, which made the treatment even more versatile for the use of MLS device which has a swivel head on one arm also adjustable for height and angle.

The room used was dedicated to laser therapy, with doors closed and monitored by the operator. Patient and therapist wore for the entire duration of the session appropriate protective eyewear provided by ASA s.r.l. Where necessary, regions adjacent to the treated area were shielded with charge material (lymph node regions, etc..).

The patient's evaluation was performed during treatment sessions. In each session, the sensation of pain reported by patient, both before treatment and at the end of it, was assessed. Patient was reassessed after 60 days to evaluate the post-treatment course. The evaluation of pain was made through the visual analogue scale (VAS).

PATIENT

Sex, age: F, 54

Profession: cook

Treatment start: 24/5/2011

Treatment end : 4/7/2011

Sessions: 10

Pathology: post-traumatic knee pain

Follow-up: the patient was reassessed 60 days after the end of treatment. Result was the same, except for occasional relapse in their efforts.

RESULTS

The patient subjected to M6 laser treatment showed a marked improvement in knee pain. At the beginning of treatment the patient reported a knee pain that can be placed at level 4 on the VAS scale. During the 10 sessions pain progressively decreased to level 0 (Table 1). At the end of the therapy the patient did not complain of any pain, as well as at 60 days follow-up, except for occasional relapse during intense efforts.

DISCUSSION

Acute or chronic pain, is an unpleasant subjective sensory experience and is the leading cause of functional limitation in patients who have undergone trauma.

Pain may resolve in a few days or may persist over time and then determine actual degenerative tissue anatomy as a result of alterations in the recruitment and muscle control. When pain interest one of the joints of the lower limb, as in the case report, also determines changes of deambulation, posture and functional limitations that affects negatively on the recovery [6, 7].

In the present study, the patient had a marked improvement in the knee pain until the complete disappearance at the end of treatment and at 60 days follow-up.

Possible contributing factors related to the results, such as the absence of work efforts, must be examined. These factors can have favoured the disappearance of pain acutely. The patient performs a job where she needs to maintain an orthostatic position for long periods and submit the knee to intense and continuous efforts.

CONCLUSION

The instrument used in this case report belongs to the group of NIR, class IV laser systems and seems to be very effective in the treatment of pain caused by trauma, also thanks to the in depth effect of biostimulation. Furthermore, activation of the microcirculation and anti-edema action, are effective when pain is predominantly inflammatory.

A further advantage of MLS therapy, is the control of heat produced in the tissues by the treatment. The control of the heat minimizes the contraindications to the use. For these reasons, NIR laser therapy, administered by a M6 laser device, may play an important role in the treatment of acute pain and its effectiveness has been reported by our patient.

Finally, it is hoped a large-scale research to obtain scientifically significant results on the effectiveness of this device in pain syndromes of different tissues.

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