Bulletin of the *Transilvania* University of Braşov
Series IX: Sciences of Human Kinetics • Vol. 13(62) No. 1 – 2020
https://doi.org/10.31926/but.shk.2020.13.62.1.34

THE USE OF MODERN TECHNOLOGIES IN THE POSTTRAUMATIC RECOVERY OF PATIENTS

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Abstract: *The TECAR therapy is a non-invasive, painless procedure, which reduces the treatment period, and results may be visible from the first sessions. It may be used immediately after the trauma, given its relaxing effect and its high pain mitigation rate. The purpose of the paper is to improve and enhance the posttraumatic effects of deficiencies and traumas. The research subjects were two patients – one with a mild brachial plexus narrowing with C3-C4 cervical compression, the other with operated cervical hernia, with Parkinson's disease and left hemiparesis, emerged due to the C3-C4 CH surgery. Besides the kinesiotherapy program, as a support in the rehabilitation process, we have used the elongations table and the TECAR therapy. Following the clinical, imaging exam, the, Rx, MRI, pain scale, we have concluded a favourable and faster recovery of the two patients. The study hereof confirms the efficiency of the TECAR therapy, a kinesiotherapy adjuvant, perfectly completing the recovery picture.*

Key words: *recovery, therapy, traumatism.*

1. Introduction

The year 2020 is the year when technology is in full change, improvement and development, a period that sets an increasing mark on kinesiotherapy and on recovery medicine.

The impact of traumatology issue has a well-determined circuit: the patient goes to the family physician, the specialist; interdisciplinary and multi-professional co-operation is necessary.

Once in the medical practice, the patient undergoes certain investigations: X-ray, MRI; the diagnostic will be supported by medication: myorelaxant, muscle relaxant, antalgic, and anti-inflammatory, successfully combined with kinesiotherapy.

The cure of the traumatism, of the disease, and daily care remain the central elements of kinesiotherapy. To them, we add specific care of each patient and of the people around them. The end goal is for the patient to spend the next period of his life in an atmosphere that responds perfectly to the physiological needs.

In a study, states that capacitive-resistive electric transfer therapy is capable of treating rapidly and efficiently the knee, shoulder, the hip, the calf, the spine, the hand, the muscle lesions,

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besides the painful inflammatory processes, the osteoarticular and muscular disorders (arthrosis, lumbago, sciatica). [6].

Furthermore, underpin that Tecar Therapy has proven its effectiveness in mitigating muscle pain in the first 24 hours from the application. They mention that the persons treated using Tecar Therapy had a favourable recovery of the muscle strength and function at the end of the 72-hour protocol [5].

Upon analysing another research, it may be stated that in the last decades, instrumental therapies have been included in the arsenal of recovery specialists. Increasingly used, such therapies make the object of scientific research to demonstrate their relevance in daily care. Tecar Therapy is used in the field of recovery, in a capacitive-resistive manner, beneficial in certain pathologies and traumatisms, being present ever more often in scientific research, too. [12].

Whereas indication for this therapy is dominant in the disorders of the musculo-skeletal system, the device remains controversial, including the application of the short wave.

Other authors describe the efficiency of the device and of Tecar Therapy combined with ultrasound therapy – as two therapies that generating statistically significant efficiency, in terms of pain mitigation and physical performance improvement of the patient. The device may be useful for shoulder pain and for the improvement of physical exercise among patients with pathologies specific to shoulder joint. [7].

In another study, they compared the efficacy of Tecar Therapy with another type of treatment for patients with low back pain using laser therapy. As a conclusion, Tecar Therapy is efficient, but the physical therapist's intervention is essential, as this therapy facilitates said intervention. [10].

The association of high-power laser therapy and Tecar Therapy mentioned in the research carried out in low back pain, with or without irradiation on the lower limb, is a real success, thus reducing the pain significantly, improving t a great extent the quality of life for persons with degenerative inflammatory conditions. [11].

Most patients benefitting from the results of capacitive-resistive electric transfer therapy have reported that it is a useful tool in the treatment of pathologies of the locomotor system in sport. It overlaps other therapies in what concerns the presence or absence of certain positive, effects, but it also has distinct characteristics, efficient even in cases where other treatments fail [3].

Furthermore, others argue that Tecar Therapy combined with conventional treatment, alternative medicine and Korean medicine may be efficient for patients with cervical dystonia. [8].

Another research shows that they corroborated the validity of both treatments (kinesiotherapy and Tecar therapy) for improving symptomatology. Authors, the authors have concluded that hyperthermia therapy seems to cure pain. [4].

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Another study suggests that Tecar therapy improves the biomechanical parameters in leisure runners after an exhaustive training session more than

passive rest, thus generating a more effective rolling model, without affecting the selected physiological parameters. [2].

Other studies have reported clinically relevant differences concerning the variability of pain value and the implication of diathermia and manual massage. Improvements have also been recorded in what concerns the global impression of the patient's vision. Future studies are necessary to certify and to get a better insight into the nature, origin and cause of muscle pain with delayed effect [13].

The purpose of the pilot-study was to determine whether Tecar Therapy (TT), delivered in two ways (resistive and capacitive), affects the perfusion of skin microcirculation and intramuscular blood flow. By using Laser speckle contrast imaging, it has been demonstrated that Tecar Therapy had an important contribution to blood circulation [1].

2. Objectives

In the study we started from the premise that by applying the recovery protocol of the two patients, through kinetotherapy, associated with capacitive-resistive therapy and elongations, favourable results can be obtained that confirm the research objective.

3. Material and Method

In what concerns disorders of the patients who came in for recovery, the type of pain is considered: acute and chronic inflammatory pain at spine level, muscle lesions, functional impotence, and tremor.

To document for this study, we have also used anamnestic information, featured in the general clinical observation chart, i.e. age, disorder type, presence of comorbidities and of extra articular manifestations, previous and current medication, kinetic recovery treatment.

For an accurate diagnosis, we took into account the Para clinical explorations: imaging – X-ray, MRI. The devices used for the recovery program applied to patients were the ones within the kinesiotherapy practice, from Liamed, Tecar Fisio Warm 7.0.

Tecar Therapy is a revolutionary form of therapy, mainly used by kinesiotherapists, osteopaths and sports medicine physicians, due to the rapid effects. Tecar Therapy may be applied during active movements and it does not entail the immediate mobilisation of the patient during its application, such as other forms of physiotherapy; it is very well tolerated by patients. Radiofrequency therapy transfers high frequency electromagnetic current throughout all tissues of the body, generating a good localisation of the thermal effect in the tissue, thus supporting healing at both macroscopic and cellular level and ensuring the contact between patient and therapist (hands-on therapy), is safe and efficient, non-invasive; it is a treatment that may begin in the acute phase (48 hours after the emergence of the lesion).

The therapy may be applied in working modes, with the same electrode: capacitive (superficial structures), resistive (tendons and ligaments). The change is made simply, without changing the electrodes, because it is a state-of-the-art device; it works with a Tablet app, Fisiowarm.

TECAR is an electronic equipment capable of generating a high-frequency sinusoidal current to be applied on the patient's body using two steel electrodes,

for the capacitive and resistive transfer of energy [15].

Contraindications of diathermy and TT are: pacemaker, pregnancy, cancer, fever, grafts, pacemakers and artificial organs, coagulation disorders, insensitivity to thermal variations, burns, infectious states, hypotension, pain insensitivity, osteoporosis.

Concerning the last-minute information, it is worth noting that, more recently, recovery physicians have indicated exclusively the state-of-the-art devices, to the detriment of kinetic programs and techniques.

We have put together the kinetic program (comprising active mobilisations, active-passive mobilisations, exercises with a cane, exercises with objects – thorn ball, wooden blocks, plastic blocks, plastic ring, Lego set, playdough, occupational therapy), elongations table and Tecar 7.0 radiofrequency device.

The implication of Tecar brought a contribution regarding tissue heating, having as effect increased blood flow in the area, thus providing more oxygen and nutrients in a shorter time, local heat – muscle relaxation, wellbeing and pain mitigation during joint mobilisation in case of already painful joints.

Participants: 2 patients who came to the kinesiotherapy practice within the Integrated Outpatient Service of the Military Hospital "Dr. Alexandru Popescu", U.M. 02417, Focșani, Vrancea.

The first patient: C.A., aged 41, reported during the orthopaedic exam pain in the cervical area, with paraesthesia on the right upper arm, marked vertigo, intense nagging pain.

After the consult by the orthopaedist, the patient was diagnosed with mild brachial plexus narrowing and C3-C4 cervical vertebral compression, a diagnosis supported by the X-ray and the MRI.

The physician set a prognostic of 6-9 months as a period of recovery.

The patient came to the recovery practice daily, where he respected rigorously a well-determined program by the kinesiotherapist: Tecar therapy, kinesiotherapy, cervical elongations.

In the first 10 days of treatment, active mobilisation exercises were performed subsequently, by combining radiofrequency therapy with active contractions with or without the resistance of muscles within the impaired area, thus facilitating the creation of new muscle fibres and optimising the efficiency of muscle activity.

For the first patient, before the onset of kinesiotherapy program, the Tecar radiofrequency therapy was used: phase 1, bipolar mode, continual emission, frequency 500 KHZ, capacitive transfer for muscle relaxation, for 15 minutes; phase 2, bipolar mode, continual emission, frequency 500 MHZ, resistive transfer, for 20 minutes.

With these coordinates, at the end of the Tecar therapy session, the final power reached 21456 Jtot.

For the patient C.A., the elongations table was also used, by setting the harness for cervical elongation, with the weight on the pulling point of 8.5 kg, and of the relaxation side, of 3.5 kg. The period of the puling and tension time is 13 seconds, the period of the relaxation point is 11 seconds. The time allocated to the elongation session was 20 minutes. The elongations in the first week were performed daily, from Monday to Friday, while in week 2, every other day. Kinesiotherapy was applied strictly every day in the gym.

In what concerns the recovery of the patient C.A., the following plan was designed: Tecar therapy 35 minutes, kinesiotherapy, cervical elongations 20 minutes.

After the two weeks in the gym, the elongations were discontinued; the patient benefitted only from Tecar Therapy and kinesiotherapy, with amazing results in what concerns the mobility of the cervical area; paraesthesia disappeared, vertigo mitigated, sensitivity for fingers III-IV remerged; the pain simply disappeared.

The second patient G.A., aged 54, after a doctor's visit and a neurological consult (following a surgical intervention in Germany), where he came with cervical pain, with lack of sensitivity, vertigo, marked nocturnal pain – lack of sleep, all of them emerging post-surgical intervention for CHD (cervical herniated disc- diagnosed through an X-ray). Post-surgical intervention, the patient remained one day in the ICU, where after a specialised consult, he was diagnosed with Parkinson's disease and treated for a month with anti-Parkinson medication. Post Parkinson's treatment, he also acquired left hemiparesis, upper and lower limb plus marked tremor of the higher limb.

For muscle relaxation, given the very tense muscles on the higher limb, the first phase comprised Tecar therapy, phase 1 with bipolar mode, continual emission, 1 MHZ, capacitive transfer, for 15 minutes. Phase 2, bipolar mode, continual emission, frequency 500 MHZ, resistive transfer, for 20 minutes.

With these coordinates, at the end of the radiofrequency session, the peak value was 19457 Jtot.

After the radiofrequency session, the patient G.A. was presented with a kinesiotherapy program, active mobilisations on the gym bench, exercises at fixed ladder, exercise bike for 8 minutes, treadmill for 5 minutes, 50 repetitions on the stepper with handle.

At the end of the two therapies, the patient also benefitted from elongation sessions, with the weight on the pulling point of 7.5 kg, and of the relaxation side, of 2.5 kg. The period of the puling and tension time is 13 seconds, the period of the relaxation point is 11 seconds. The time allocated to the elongation session was 15 minutes. The elongations in the first week were performed daily, from Monday to Friday, while in week 2, every other day, then discontinued, because the protocol in this case comprised eight sessions.

In what concerns the recovery of the patient G.A., the following plan was designed: Tecar therapy 35 minutes, kinesiotherapy + exercise bike + treadmill + stepper, cervical elongations 15 minutes.

After a period of 3 weeks, when the patient G.A. observed strictly the therapeutic plan, the following were concluded: the left lower limb hemiparesis was completely gone; on the higher limb, paraesthesia was gone; mobility regained; good muscle tone; optimal range of motion; tremor mitigated by 80%.

TT (Tecar Therapy) automatically regulates strength throughout therapy with radiofrequency. Tissue impedance is measures throughout the entire therapy, while power is modulated to match accurately the characteristics of the tissue treated.

Because energy is controlled and maintained at optimal level, the tissue receives even heating, regardless of its immediate impedance.

4. Results

After using the Tecar therapy, it may be stated that this is an effective therapy for the two patients, only if it is always accompanied by other therapies, which may help reduce significantly the bone and bone pain at mitigate to a great extent the pain located on a certain segment or region, in order to help the specialist in his activity.

The two patients were present daily in the kinesiotherapy practice; they observed strictly the recovery program, executed 3 times a day, once at the kinesiotherapy hall, twice at home, Tecar therapy and elongations at the hospital, bike for the arm - 15 minutes a day, bike for the legs - 15-20 minutes a day, swimming, free walk at least once a day.

It had an important contribution in case of the two patients because it was used during passive and active mobilisations, bringing something some in what concerns the decrease in nocturnal pain – for rest without medication, i.e. anti-inflammatories and sleeping pills, as well as daily – for daily activities – passed the border from a dependent to an independent person.

At the end of the recovery treatment round of kinesiotherapy – accompanied by therapy through radiofrequency and elongations – the two patients were assessed through imaging at the end of the period, thus observing the disappearance of brachia plexus narrowing, the disappearance of paraesthesia and vertigo, the discontinuation of treatment with anti-inflammatories and sleeping pills.

The most important immediate effects felt by the two patients were: the sensation the patient perceives during therapy is pleasant, like warmth, like a massage; the effect is rapid. From the first session, the patient's pain reduced considerably; the natural regeneration of the biological tissues accelerated and produced a speedier recovery after the traumatism, muscular issues or subacute, acute osteo-articular pain.

Given the low intensity, it is totally non-invasive and 100% natural for the human body. In most pathologies, treatment is safe and very well tolerated by the patients, all due to the state-of-the-art advanced technology. High frequency electrical power generated by the device penetrates the epidermis without energy losses, thus the skin does not get warm, thus excluding any possible rash. This is why – to accelerate the recovery – several sessions may be conducted in one day.

The outcome of using the TECAR therapy may be observed from the first application**,** the patient benefitting from the unique combination between the therapeutic effects per se, the analgesic influence of electrical power and the relaxation provided by the massage using the hands-on technique of the kinesiotherapist.

5. Discussions

After a study conducted in the field of sports traumatology, Melegati et al. have concluded that for the most common injuries in the sports field, ankle sprains, pain during gait mitigated significantly only due to the association of recovery using the Tecar therapy. [9].

In this respect, we mention that the entire recovery process has an essential role, reason for which it cannot be overlooked. The sooner a patient goes to the physician, the sooner he may begin

recovery, to avoid the sequelae. There are physicians for whom the notion of kinesiotherapy is present in the recommendations of each visit to the practice, which represents a real advantage for the patient.

There are also specialists in the field of medical recovery involved along with the patient, and he is not recommended recovery, then all is at risk: the quality of life and life itself.

The kinesiotherapy sessions thus help regain muscle strength, muscle tone, muscle balance; it prevents the complications of disorders; it presents the onset of post-disease sequelae that may determine motor and/ or mental disabilities.

In another study is compared the efficacy of Tecar Therapy to another type of treatment for patients with low back pain using laser therapy. As a conclusion, Tecar Therapy is effective, but the physical therapist's intervention is essential, as this therapy facilitates said intervention. [10].

6. Conclusions

From the perspective of efficiency, it may be states that the Tecar therapy is efficient, effective, beyond doubt an adjuvant of kinesiotherapy, (a field that can accomplish things without miracle technologies).

These technologies, however – as miraculous as they are, presented as wonders – cannot hold on or succeed without support from recovery exercises; the effect is yoyo.

The efficiency of the Tecar device leads to brilliant results in a rather short period, to major benefits, (this is an advantage for the patient, because everyone wants to get back to normal as soon as possible).

This may represent a genuine turning point and moment critic, when a patient may be tempted to give up on recovery, reason for which the kinesiotherapist's intervention is crucial.

Vertebral mobilisation and kinesiotherapy have visibly better outcomes if they are performed after a session of TECAR energy transfer in a capacitive or resistive field, or even during the session.

Depending on the evolution of the disorder, of the traumatism of the pathology displayed by the patient, the number of Tecar therapy sessions is determined; the minimum should be 10, for efficiency higher outcomes.

The use of Tecar Therapy has been found to: decrease the value of muscle and bone pain at the level of the cervical spine; eliminate fault postures; to reduce tremor. Patients regained their tone and strength on the segment of the impaired limb; they regained the mobility before the surgical intervention for the lower limb; paraesthesia disappeared; medication was discontinued.

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