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Transcutaneous radiofrequency: clinical experience

Abstract

Introduction: The pulsed through transcutaneous electrode radiofrequency (TCPRFT) was described previously in the literature in a range of anatomic sites, Taverner et al 2010 reported on the beneficial effect of handling TCPRFT knee pain in patients awaiting surgery for joint replacement. Subsequently, published a series of cases in the management TCPRFT shoulder pain in 13 patients.

Methods: A retrospective study of 14 patients was performed during the period 2014 -2015 10 diagnosed with knee pathology and 4 chronic shoulder pathology. We included in our study those patients referred for specialist diagnosed osteoarticular pathology (shoulder and knee) for more than three months duration after entering your conventional therapies performed ineffectively after handling conventional, including steroid injections, hyaluronic acid or ozone, discarded for surgery. All were treated as outpatients. Patients receive 3 treatments with a monthly interval between the two, regardless of the evolution of his dolor.En here is an initial study and a month, pending realization of the other treatments. The TCPRFT was performed with a radio frequency generator 1100 using Neurotherm NT modified leads, connected to two channels in a surface mounted TENS adhesive, and managed not termoacoplado mode with manual voltage. Treatment was done always in the same position, with two parameters pps, 20 msec, 90V, for 12 minutes, providing the electrodes as images: Knee:

A. Previous Position: Suprapatellar medial, lateral suprapatellar, infrapatellar medial, lateral infrapatellar.
B. Rear-Position: popliteal fossa in four quadrants.
C. Transverse-transcutaneous Shoulder:
   a. acromioclavicular joint and deltoid insertion on the humerus.
   b. glenohumeral joint in the anteroposterior plane, and subsequent behind the spine of the scapula. 3. deltopectoral the supraspinatus muscle-Triangle.
D. Same as above, but a little more lateral delto-pectoral Triangle, and supraespoinoso muscle.
E. Triangle delto-pectoral and spine of the scapula.
F. Articulacion acromioclavicular, and under the root of the armpit.

After the patient's informed and assessment of VAS and SF-36 agreement, the above described technique is performed and 4 weeks evaluates the patient again (VAS and SF-36).

Results: Study of 14 patients aged 45-75 (mean 68.9 years), 10 women and 4 men is performed. With unpeso comprised between 45-78, 70.5 kg on average, all patients with BMI <35, the most frequent diagnosis was 10 knees and 4 shoulder osteoarthritis 85.7%, 13% muscle-tendon injuries. 28.7% of patients were under treatment for opioid. The temporal evolution of the disease in the patients was 2.2 years. In relation to the initial VAS was 88.6 on average, reducing to 42.6 after month, p <0.01; in half of the patients the pain more than 50% was reduced in 65.3% of patients pain by 30% in the first month period.In relation to the physical activity of the patient is reduced, increased activity occurs 20.5 / 44 23 0.6 / 44 once the technical as well as non-significant increase in secondary social activities and mood, because shortly after evaluation of improvement, a month.

Discussion: the available evidence suggests that treatment with TCPRF probably work with an independent temperature path mediated by the changing electric fields. Rapid changes in electric fields of sufficient amplitude, produce forces Charged molecules that cause tissue distortion and disruption of the channel ion, changing membrane potentials and altering cell function. The effect of a high current density is unknown, but the ionic movement result can be significant. There is evidence that transmembrane potential induced can warp, creating pores or break the membranes and disrupt synaptic signaling and A-delta fibers C have been described changes in the lymph dorsal root RF following treatment, the significance of this is incierto6. While electroporation is destructive to large electric fields, fields may temporarily lower electric pores. The latter may occur also "conditioned low frequency stimulation" of neurons, which induces long-term depression of synaptic transmission. This electrical change can also lead to hyperpolarization of the cell. In addition, there may be an effect in the immune system unrelated to the electric field, by reducing production of inflammatory cytokines IL1-beta, TNF -α and IL-6, which in turn reduces the C-reactive protein. TCPRF therapy is a noninvasive treatment, needle, repeatable, without pain clinic, which requires no recovery, sedation or anesthesia.

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Introduction

The musculoskeletal pain is one of the main reasons for consultation on health services. Among them, osteoarthritis, also called degenerative osteopathy, which affects the articular cartilage and subchondral bone and whose main characteristic is the loss of articular cartilage and new bone formation in the subchondral region and joint margins. Clinically characterized by pain, stiffness and functional limitation which leads to a significant decrease in the quality of life of patients. The pain is usually the most common cause of medical consultation in these cases, among the most affected joint is the knee, according to Davis et al the incidence of this disease is more than 30% in over 70 years, soliendo affect more than turn women on men. Another common musculoskeletal disease in our units of pain is chronic shoulder pain, which the AAM pain Guideliness group, more than 10% of the adult population present throughout his life shoulder pain, being the third leading cause of musculoskeletal pain, 41% of these may become chronic, recalls Van Der Heijden 1999. Many people who develop acute painful shoulder is likely to have conditions to resolve spontaneously, regardless of treatment. Actually, it is reported that 50% of people with painful shoulder do not seek medical attention. Van de Windt et al. reported that 23% of new episodes of shoulder pain completely resolved in the first month, and 44% are resolved within the first 3 months. The risk of a painful shoulder hard not persist beyond the stage Acute appears to be related to personality traits and factors occupational. It is important to consider the risk factors and early intervention to prevent progression to chronic pain. The exact mechanism of production of the osteoarticular pathology is not fully understood all can contribute increased local production of pro-inflammatory cytokines such as tumor necrosis factor (TNF-α), interleukin (IL-1β and IL-6). Cytokines are small proteins produced by immune cells well (macrophage or helper T) cells or immune cells (endothelial cells, Schwann, and their derivatives such as satellite cells in the dorsal root ganglion [DRG]). Under inflammatory conditions, cytokines are released and act on a number different cells, serving as transmitters and often as part of a cytokine cascade. In addition, pro-inflammatory cytokines will retain a upward inflammatory response. There is increasing evidence that also play a important role in the generation and maintenance of pain, contributing to loss of normal function in all phases of joint disorders. The joints are innervated by the articular branches of the nerves that innervate the muscles found in the vicinity. Numerous nerve endings Simple found in the annexes of the joint capsules and ligaments, and He believed to be the endings of nociceptive myelinated axons and sparsely myelinated. Articular nerves contain fibers Aß, Aδ and C. Found Free nerve endings in all joint structures other than normal cartilage. The generation of pain from inflammatory process is not simply due to nociceptive stimuli driving through conventional channels. Although, Research has shown that there is peripheral sensitization of nociceptors primary afferents in the joint, however, there is also a second mechanism involved. Cytokines can also be transported to the DRG, cross the blood-brain barrier to reach the dorsal horn of the spinal cord, causing activation of microglia and astrocytes. This factor can frustrate potentially attempts to treat joint pain by ablating nerves afferent.

Osteoarthritis (OA) is the most common form of joint disease, and it is common in patients over 60 years old. It has been associated with allostatic load of the immune system, and in fact, levels of C-reactive protein slightly raised (PCR) have been demonstrated in patients with early OA. Especially in the early stages, OA painless reduced amplitude movement of the affected joint. The disease typically has a chronic course, fluctuating, leading to changes in the structure of the synovium, cartilage, and underlying bone. Experimental data have shown that OA is result of a succession of mild inflammatory episodes within the joint, leading to elevated levels of proinflammatory cytokines. The destruction of articular cartilage and subchondral bone remodeling are prominent features of the later stages of the disease. Recently it has been suggested that findings of magnetic resonance imaging, such as synovial hypertrophy, synovial effusion, and subchondral bone marrow edema are most painful joints often than non-painful knee OA. The pain of OA includes a variety of conservative treatments with limited effectiveness. Corticoid infiltrations and viscosupplementation They are widely used, but apparently have short or no effect; his use is contraindicated often, especially in the small joints. He most recently for the treatment of OA by means of anti -inflammatory drugs method aimed at cytokines, to prevent progression of structural changes joint, it has been disappointing for many reasons, and it takes further investigation as to the form of administration and reducing toxicity.

For many patients, the current treatment options for OA are therefore unsatisfactory, and this leads to abuse of nonsteroidal anti-inflammatory drugs, conservative therapies faces, and repeated corticosteroid injections. Do not there is a clear consensus on the terms and indications of the main surgical procedures for OA. Radiofrequency could be considered as another therapeutic arsenals in these patients. The pulsed through transcutaneous electrode radiofrequency (TCPRFT) had described previously in the literature in a range of anatomical sites, Taverner et al reported in 2010 the beneficial effect of handling TCPRFT knee pain in patients awaiting surgery joint replacement.

Subsequently they published a series of cases in management TCPRFT shoulder pain in 13 patients.

Material and method

A retrospective study of 14 patients was performed during the period 2014 10 diagnosed with knee pathology and 4 chronic shoulder pathology. We included in our study those patients referred for specialist and diagnosed with osteo-articular pathology (shoulder and knee) for more than three months after entering your evolution conventional therapies performed ineffectively after handling conventional, including steroid injections, hyaluronic acid or ozone, discarded for surgery. All of them were treated on an outpatient basis. Patients receive 3 treatments with a monthly interval between each other, regardless of the evolution of its dolor.En this case is an initial study and a month, pending realization of the other treatments. The TCPRFT was performed with a radio frequency generator 1100 using Neurotherm NT modified leads, connected to two channels TENS mounted on a surface self-adhesive, and managed not termoacoplado mode with manual voltage adjustment. Treatment was done always in the same position, with two parameters pps, 20 msec, 90V, for 12 minutes, providing the electrodes as images:

Knee

1. Previous Position: Suprapatellar medial, lateral Suprapatellar, infrapatelar medial, lateral infrapatelar.
2. Position: popliteal fossa in all four quadrants.
3. Transverse-transcutaneous

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DOI: 10.15406/jaccoa.2018.10.00399

Shoulder

1. Acromioclavicular joint-and deltoid insertion in the humerus.
2. Glenohumeral joint in the anteroposterior plane and the back behind the spine of the scapula. deltopectoral the supraspinatus muscle
3. Triangle.
4. Same as above, but a little more lateral pectoral delto-Triangulo, and supraespoinoso muscle.
5. Triangle delto-chest and spine of the scapula.
6. Acromioclavicular joint, and under the root of the armpit.

After the patient's informed and assessment of VAS and SF-36 consent described above and at 4 weeks reassesses the patient (VAS and THREE TO SIX MONTHS SF-36) technique is performed (Table 1).

Results

The study of 14 patients aged 45-75 (mean age 68.9), 10 women and 4 men is performed. With unpeso comprised between 45-78, 70.5 kg on average, all patients with BMI <35, the most frequent diagnosis was 10 and 4 shoulders knees, osteoarthritis 85.7%, 13% muscle-tendon injuries. 28.7% of patients were under treatment opioids. The temporal evolution of the disease in patients was 2.2 years. In relation to the initial VAS it was a 88.6 average, falling to 42.6 after month, p <0.01; in half of the patients the pain more than 50% was reduced in 65.3% of patients pain by 30% in the first month was reduced. In relation to the physical activity of the patient, increased activity of 20.5/44 to 23 .6 / 44 once the technique as well as a secondary increase in social activities and mood occurs, not very significant due to shortly assessment of improvement, three to six months (Figure 1 -5).

Table 1 physical activity of the patient from 1st month to six months

	VAS I	VAS month 1	VAS six months
1	90	20	30
2	90	90	85
3	80	65	60
4	90	0	0
5	90	45	40
6	90	50	50
7	90	65	65
8	85	75	70
9	95	0	0
10	90	70	75
11	87	30	30
12	90	0	0
13	89	86	86
14	78	0	0
	90-78	90-0	90-0
Mean	88.14	42.6	42.5

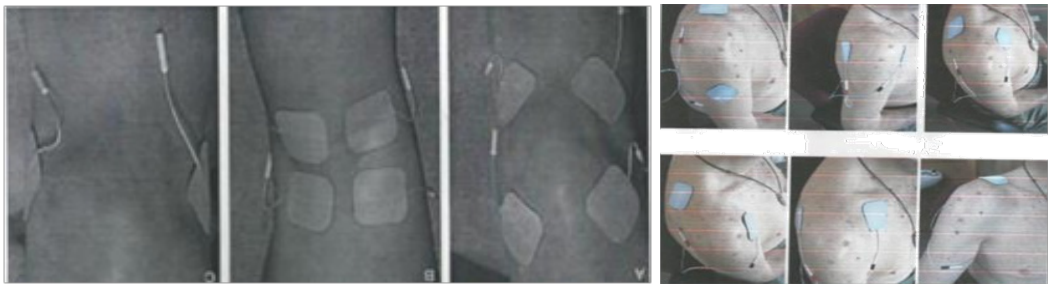

Figure 1 4 weeks reassesses the patient (VAS and three to six months SF-36) technique is performed.

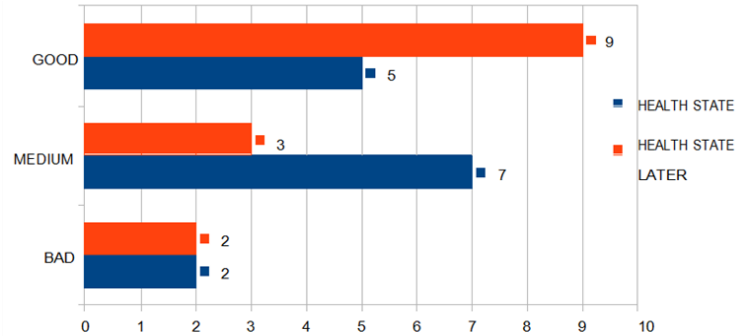

Figure 2 Patient health state.

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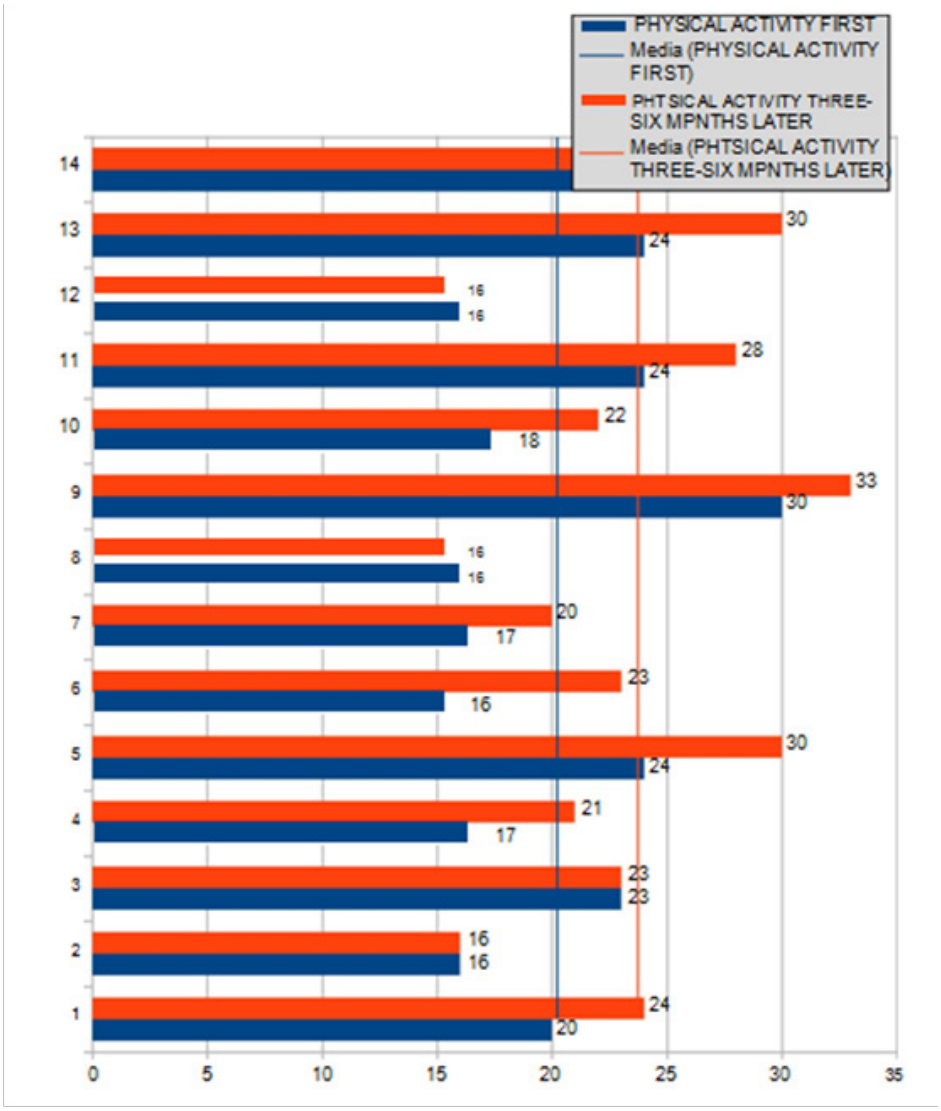

Figure 3 Physical activity of patient from first month to six months.

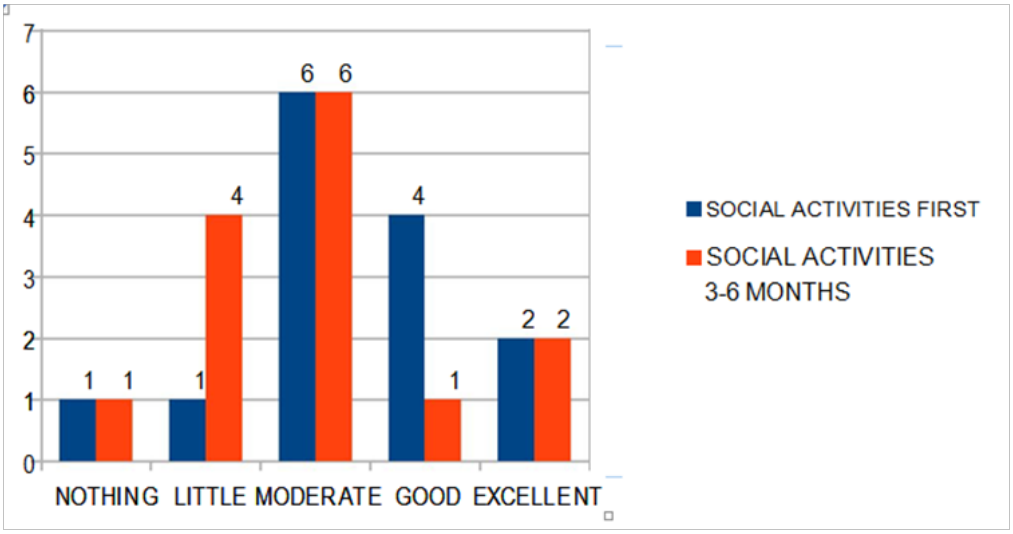

Figure 4 Social activities from first month to six months.

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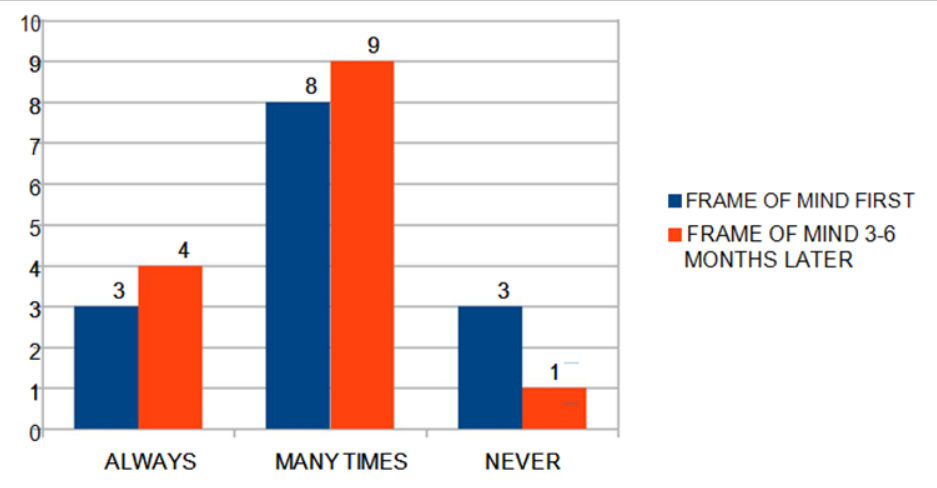

Figure 5 Moods of patient from first month to six months.

Discussion

The first study on TCPRFT was in 2004 when Balogh1 reported 4 cases; 2 of low back pain, wrist pain one, and one with neck and arm pain, describing the author's experience with TCPRFT, which was applied transdermally, and consisted in 10 minutes TCPRF current (20ms, 2 pps) being applied 60 to 80 V through transcutaneous electrical nerve stimulation (TENS) electrodes applied by superjacent to the skin, in the painful area affected. treatment was repeated at intervals of 1 to 5 weeks for a year. Three of these 4 patients reported significant relief their pain after treatment for up to 4 weeks. Taverner and ward2, reported the use of a controlled study TCPRFT double blind, active vs inactive, 50 patients with knee pain awaiting surgery. The 25 participants who received the "active" treatment had clinical improvement relevant and statistically significant 30% reduction in pain at rest, and with activities in 4 weeks. The 25 patients who received the treatment "inactive" They not obtained significant pain relief. The parameters used by us in this study, with a large electrode butterfly, with two inputs for connection with parameters 2 pps, 20 msec, 90 V, for 20 minutes with an RF generator NT1000, it was also empirical basis Taverner3 of work, and based on the principles of pulsed radiofrequency described by Cosman4. The effect of the position of the electrodes, the use of more treatment positions and increased treatment time, is impossible check with this study, and given the limited literature in this regard needs a greater number of studies to deepen the suitability of them.

However, based on studies Taverner, increased time and positions not associated with improved outcomes. Optimum positioning of the electrodes, TCPRF configuration, the number of positions, treatment time, frequency and number of treatment sessions are still issues that need to be investigated with other controlled studies. Pulsed radiofrequency (PRF) adjacent to the dorsal root ganglion selectively induces regulation of activation of transcription factor 3, a marcadorde cellular stress, fiber A-Delta and C. It is still unclear how the treatment works with pulsed radiofrequency; however, the available evidence suggests that treatment with TCPRF probably work with an independent temperature path mediated by the changing electric fields. Rapid changes in electric fields of sufficient amplitude, produce forces of charged molecules that cause tissue distortion and altered channel ion, changing membrane potentials and altering cell function. THe effect of a high current density is unknown, but the ionic movement resulting can be significant. There is evidence that transmembrane potential induced can deform, creating pores or break the membranes and disrupt synaptic signaling and A-delta fibers C. have been described changes in the ganglia dorsal root following treatment by RF, the significance of this is inciertо6.

While electroporation is destructive to large electric fields, fields Electric minor may temporarily pores. The latter may occur also "conditioned low frequency stimulation" of neurons, which induces long-term depression of synaptic transmission. This electrical change can also cause hyperpolarization of the cell. In addition, there may be an effect in the immune system unrelated to the electric field, by reducing production of inflammatory cytokines IL1- beta, TNF -α and IL-6, which in turn reduces the C reactive protein. TCPRF therapy is a noninvasive treatment, needle, repeatable, without pain, outpatient recovery that does not require sedation or anesthesia.[1–5]

Acknowledgments

None.

Conflicts of interest

Author declares that there is no conflict of interest.

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