



Oral communications



The effect of dry needling on the quadriceps in jumping among beach volleyball players

Ana Grau-Aracil, Aitor Martín-Pintado-Zugasti, José Manuel Jiménez-Olmedo. *Clínica Noumar, Alicante, Spain.*

Introduction/aims: Latent MTrPs can cause muscular dysfunction. According to Simons & Travell (2004), the most important MTrPs that can influence jumping are those of the quadriceps vastus lateralis and vastus medialis. The aims of the present study were: (1) to assess whether deep dry needling of latent MTrPs in the vastus lateralis and vastus medialis is associated with changes in the jumping capacity of elite beach volleyball players after one week; (2) to assess the post-needling pain and disability associated with deep dry needling, and whether this affects sports performance.

Material and methods: An uncontrolled clinical trial with 7 elite beach volleyball players (all male, mean age 23 years) received dry needling on latent MTrPs of the quadriceps vastus medialis and lateralis, with a maximum of 20 insertions, and a minimum of 2 local twitch responses (LTRs). Pain, disability and jumping capacity were measured after one week using the Visual Numeric Scale (VNS), the Lower Extremity Functional Scale (LEFS) and the Ergojump jump platform.

Results: The difference between the jumps pre and post dry-needling were statistically significant with greater jumps after one week (Test de Friedman: SC Pre (Pre-intervention concentric jump): 36.94 cm, CG 7 days (concentric jump after one week): 42.30 cm, P -value: 0.004; SCM Pre (pre-intervention countermovement jump): 39.82 cm, SCM 7 days (countermovement jump at 1 week): 44.05 cm. P -value: 0.003). Pain was present until 48 h. The results for disability were non-significant ($P > 0.05$).

Conclusions: Deep dry needling on latent MTrPs of the quadriceps vastus lateralis and medialis is associated with an increased jumping capacity in these elite beach volleyball players over one week. These results should be interpreted with caution due to the lack of a control group or placebo.

The relationship between the structure of the foot and the characteristics of the patellar tendon in volleyball players

Alfonso Calvo-Gonell. *Centro de Fisioterapia Alfonso Calvo, Castellón, Spain.*

Introduction/aim: Continued sports practice without the appropriate control of intrinsic and extrinsic factors leads to overuse syndromes such as patellar tendinopathy. This injury is present in between 40% and 50% of volleyball players, and is more prevalent in males. The final aim of this study was to determine whether a relationship exists between the scores of the Foot Posture Index (FPI) and the structure and functionality of the patellar tendon in volleyball players.

Material and methods: A cross-sectional descriptive observational study. In total, 19 volleyball players were recruited from the L'Illa Grau team of Castellón, 12 men and 7 women with a mean age of 24.6 ± 4.7 years. We performed the FPI, the foot dorsiflexion test and assessed the structure of the patellar tendon using musculoskeletal ultrasound (B mode, Doppler), also, function was assessed via the VISA-P scale in April 2016. A GE Logic P9 ultrasound machine was used with a ML6-15 MHz matrix probe. Once we obtained the data from the FPI test we compared these with the characteristics of the tendon to evaluate the correlation between scores.

Results: No correlation was found between the FPI test and the structure of the patellar tendon (Spearman's rho 0.06 and 0.32 for the right and left knee, respectively; $p < 0.01$). A direct relationship was only found between the characteristics of tendon width and images of destructuration ($p < 0.05$). Furthermore, an inverse relationship was observed between the tendon width and the VISA-P scale in the right knee (Spearman's rho -0.684 ; $p < 0.01$).

Conclusions: In the sample under study there is no relationship between the structure of the foot and the characteristics of the patellar tendon in volleyball players.

Orofacial pain: Dry needling vs percutaneous needle electrolysis

Luis Sánchez-Pedraz. Private clinic. Salamanca, Spain.

Introduction/aim: The temporomandibular joint is one of the joints that works the most on a daily basis. Orofacial pain affects the joint itself as well as the muscles that act upon it. The aim of the present study was to assess the effectiveness of Percutaneous Needle Electrolysis (PNE) on the trigger points of the lateral pterygoid and masseter muscles.

Material and methods: A randomized controlled study involving twenty patients (15 women and 5 men; 49.75 ± 16.01 years of age) with orofacial pain who received a single session of treatment upon the trigger points of the lateral pterygoid and masseter muscles. Ten patients were treated via dry needling (DN), and the other ten received ultrasound-guided PNE, following the protocol described by Valera & Minaya. The EPI[®] device was used (Cesmar Electromedicina, Barcelona, Spain) together with an ESAOTE MyLab Five ultrasound machine. We evaluated the range of mouth opening and the level of pain using the Visual Analogue Scale (VAS) before treatment and after 14 days.

Results: In both groups, improvements in pain were found, according to the following findings: pre-intervention VAS (dry needling ($n=10$) = 6.20 ± 0.919 , PNE ($n=10$) = 6.80 ± 1.814) post-intervention VAS (Dry needling ($n=10$) = 3.70 ± 2.003 ; PNE ($n=10$) = 4.20 ± 2.974) ($p < 0.05$). Regarding mouth opening, improvements were found, however these were not statistically significant. Pre-intervention opening (dry needling = 46.90 ± 7.370 ; PNE = 42.80 ± 5.245) post-intervention opening (dry needling = 48.90 ± 6.740 ; PNE = 44.40 ± 5.542) ($p > 0.05$).

Conclusions: Although more studies are needed, the results suggest that PNE may be a therapeutic alternative in the treatment of myofascial pain affecting the muscles of mastication.

Autonomic response during the application of percutaneous needle electrolysis in football players

Blanca de la Cruz-Torres, Paula García-Bermejo, Manuel Albornoz-Cabello, José Naranjo-Orellana. University of Seville, Seville, Spain.

Introduction/aims: Percutaneous needle electrolysis (PNE) is a physiotherapy technique that consists of the ultrasound-guided application of a galvanic current via an acupuncture needle. Like all needling techniques, it is possible to provoke an imbalance in the autonomous nervous system during its application. Heart rate variability (HRV) is a useful test for analysing the balance between sympathetic and parasympathetic activity. Therefore, the aim of this study was to analyse the effect of the application of the PNE technique on the patellar tendon of amateur football players on sympathetic and parasympathetic activity measured via the HRV.

Material and methods: A randomized controlled trial. In total, 36 football players belonging to an amateur male football team were studied, divided into three groups of 12 players each: a control group (CG), in which the HRV was

registered during 10 min, both at rest as well as during a comprehensive ultrasound assessment of the patellar tendon and adjacent soft tissues; a first experimental group (EG-1), in which the HRV was registered during 10 min, both at rest as well as during the application of ultrasound-guided PNE on the patellar tendon; and a second experimental group (EG-2), in which HRV was registered during 10 min, both at rest as well as during the application of ultrasound-guided PNE on the patellar tendon but without applying an electrical current. The HRV was analysed via the Poincaré graph, obtaining the following variables: cross-sectional diameter (SD1), longitudinal diameter (SD2), stress strain (SS) and sympathetic/parasympathetic ratio (S/PS ratio).

Results: No differences were found between the baseline measurements upon comparison of the three groups, neither were there differences between the measurements of the control group. Only in the case of the experimental group EG-1, did we find significant differences between both measurements: we observed a statistically significant increase of parasympathetic activity (SD1: 72.93 ± 31.17 vs 42.22 ± 15.22 ; $p=0.01$) and a statistically significant decrease of sympathetic activity (SD2: 189.15 ± 55.99 vs 120.08 ± 57.74 ; $p=0.004$; SS: 5.72 ± 1.68 vs 9.73 ± 4.16 ; $p=0.03$). This means a statistically significant decrease of the autonomic balance (S/SP ratio: 0.09 ± 0.06 vs 0.31 ± 0.28 ; $p=0.03$) which means a predominance of the parasympathetic activity. Group EG-2 only displayed a statistically significant decrease of sympathetic activity (SD2: 142.06 ± 44.74 vs 103.14 ± 28.53 ; $p=0.02$; SS: 7.71 ± 2.51 vs 10.48 ± 3.26 ; $p=0.02$).

Conclusions: The application of the ultrasound-guided PNE technique triggers a vasovagal response, which should be considered in order to ensure safe praxis in the clinic.

Effectiveness of invasive techniques on chronic patellar tendinopathy: An analysis of pain

María Pilar López-Royo, Rita Galán-Díaz, María Ortiz-Lucas, Yasmina Haman-Alcober, Eva María Gómez-Trullén, Pablo Herrero. University of Zaragoza, San Jorge University, Zaragoza, Spain.

Introduction/aims: Chronic patellar tendinopathy (CPT) is one of the most common pathologies affecting the locomotor system. Currently, the gold standard treatment for this pathology is the performance of eccentric exercise (EE). Considering the clinical effectiveness that is being observed regarding treatment with percutaneous needle electrolysis (PNE) and dry needling (DN), the aim of this clinical trial was to analyse whether these treatments obtain additional benefits when these are added to EE and whether there are differences in the effectiveness of both invasive techniques.

Material and methods: A randomized controlled trial. We selected 27 subjects [24 men, mean age: 32.13 (SD 6.73) years] diagnosed with CPT with symptoms for over 3 months, and with scores on the Visa-P questionnaire below 80 points. The subjects were distributed among 3 groups of 9 subjects each: DN Group, PNE Group, and Control Group (CG). We evaluated the maximal peak of pain and the mean pain over the last 14 days using the Visual Analogue Scale (VAS). All the interventions were performed under ultrasound guidance

and all the subjects received 4 sessions with a rest period between sessions, lasting 14 days. Also, all subjects were instructed to perform a home-programme of EE for the quadriceps during the 8-weeks treatment duration. Assessments took place at week 0 (pre-treatment), 2, 4, 6, 8, 10 (post-treatment) and at week 22 (follow-up).

Results: The groups were comparable at baseline. The mean pain scores improved in all groups at the end of the treatment sessions and during the follow-up, without differences between groups. Regarding the maximal pain, differences were not found between groups, although regarding the baseline values, the PNE group obtained a statistically significant improvement in session 4 ($p=0.017$; -3.67 ± 2.30), whereas for the DN group this occurred upon completion of treatment ($p=0.002$; -4.17 ± 2.43), and in the control group these improvements were observed at follow-up ($p=0.015$; -3.67 ± 3.92).

Conclusions: The 3 treatment techniques used improved the pain in subjects with CPT without differences between groups, however in the case of maximal pain, a faster improvement was observed in the PNE group, who displayed improvements 2 weeks before the DN group, which, in turn, improved 2 weeks earlier than the control group.

Cutaneous perforating veins and acupuncture points: A thermographic study

Antonio García-Godino, David Álvarez-Prats, Óscar Carvajal-Fernández. *Clínica Fisiopuntura, Madrid, Spain.*

Introduction/aims: Despite the fact that acupuncture is an ancient technique, at present, we cannot be completely sure of what acupuncture points (AP) are. The aim of this study was to research the possible coincidence between different AP and the presence of cutaneous perforating veins (CPV) in the lower limb.

Material and methods: A cross-sectional observational descriptive study was performed by two experienced physiotherapists in both lower limbs of 6 volunteer subjects, 3 women and 3 men, aged between 28 and 40 years. In each lower limb, all the existing AP were used in the area of the thigh (a total of 13 AP for each lower limb). In total, 156 AP were analysed. In the first place, the AP were located on each individual, as described according to the different acupuncture manuals and maps published. In second place, thermography was used to locate all the existing CPV in these areas, and the percentage of coincidence between both was calculated using statistical analyses. A thermographic Flir E60 camera was used (resolution 320×240 ; FOL18 lens; serial number 64509645099) and the Physio Thermal Imaging and Flir tools plus (Quick Report) software.

Results: We have found an overall coincidence of 89% between AP and CPV in the same locations.

Conclusions: We can affirm that in the thighs of the participating subjects, there is a high percentage of coincidence between the presence of a CPV and the location of AP. Thermography may be a useful tool in physiotherapy care for acupuncture.

Effectiveness of dry needling combined with neuromuscular taping on pain and disability

Gabriele Bertotti, M^a Mercedes Franco Hidalgo-Chacón, José Luis Arias-Buría. *Francisco de Vitoria University, Madrid, Spain.*

Introduction/aims: Dry needling is emerging as one of the valid tools for the treatment of myofascial pain syndrome (MPS). It is reasonable to hypothesize that neuromuscular taping, by being able to improve histopathological processes that are inherent to the presence of myofascial trigger points, and which represent a potential modulator for the reduction of pain due to its analgesic effect, represents an effective tool for the treatment of MPS. The aim of the present study was to determine whether deep dry needling is more effective combined with the application of neuromuscular taping on pain and disability at the level of trigger point 1 of the upper trapezius.

Material and methods: A randomized controlled trial. The intervention was applied to 34 subjects aged between 20 and 40 years old (19 men, 15 women). We randomly assigned subjects to 2 groups: the control group (CG) received dry needling; the experimental group (EG) received a combination of dry needling with neuromuscular taping. This was applied at the level of trigger point 1 of the upper trapezius. Pain was measured using a numerical verbal scale, the pressure pain threshold was measured using an algometer, and disability was measured using two scales: the Neck Disability Index and the Shoulder Pain and Disability Index. The algometric measurements were collected prior to the intervention, in the immediate post-intervention, and 72 h post-intervention. The numerical verbal scale, the index of disability and the Shoulder Pain and Disability Index were gathered pre-intervention, in the immediate post-intervention, and at 24 h, 48 h and 72 h post-intervention.

Results: The groups were comparable at baseline. The results were not statistically significant. In both groups, the pressure pain threshold decreased immediately after dry needling (GC: 14.36 ± 6.30 ; GE: 13.81 ± 4.06) and increased after 72 h (GC: 19.65 ± 5.27 ; GE: 17.1 ± 3.87). The improvement was greater in the control group ($p=0.126$). The scores of the numeric verbal scale reflect that after a worsening of pain in the immediate post-intervention, progressive improvements took place in both groups (immediate post-intervention CG: 5.0 ± 2.52 EG: 3.65 ± 2.18) (after 24 h CG: 3.53 ± 2.35 EG: 2.18 ± 1.63) (after 48 h CG: 2.29 ± 2.23 EG: 1.35 ± 1.54) (after 72 h CG: 1.41 ± 1.70 EG: 0.76 ± 1.39) ($p=0.484$). The scores of the Neck Disability Index (immediate post-intervention CG: 14.41 ± 7.42 EG: 7.94 ± 8.01) (after 24 h CG: 8.65 ± 5.98 EG: 5.47 ± 6.63) (after 48 h CG: 3.53 ± 3.24 EG: 3.12 ± 3.82) (after 72 h CG: 2.24 ± 3.27 EG: 1.65 ± 3.46), and of the Shoulder Pain and Disability Index (immediate post-intervention CG: 42.76 ± 31.46 EG: 31.41 ± 26.85) (at 24 h CG: 27.06 ± 25.38 EG: 19.24 ± 20.14) (at 48 h CG: 15.94 ± 20.47 EG: 11.59 ± 14.15) (at 72 h CG: 9.41 ± 13.46 EG: 7.65 ± 10.85) displayed less intensity and duration of pain and less disability in the intervention group, ($p=0.202$) and ($p=0.968$), respectively, obtaining

improvements that were clinically greater than the control group.

Conclusions: Deep dry needling combined with neuromuscular taping does not appear to increase the effectiveness of the invasive technique compared to dry needling alone. Both applications improved both the pain and the level of disability displayed by subjects.

Poster communications

Assessment of changes in balance after treatment of the posterior tibialis muscle with dry needling in patients with ankle instability

José Luis Arias-Buría, Luis José Gómez-Redondo, María de las Mercedes Franco Hidalgo-Chacón, Alejandro Leal-Quñones. Francisco de Vitoria University, Madrid, Spain.

Introduction/aims: Ankle sprains are one of the most common neuromusculoskeletal injuries. Very often, these course with frequent relapses, residual pain and instability. Currently, the best treatment for these persistent symptoms is not well defined. The aim of the present study was to research the effects of dry needling on the tibialis posterior muscle in patients with ankle instability.

Material and methods: A randomized controlled trial, with two groups. The intervention group received dry needling in the tibialis posterior muscle and the control group did not receive any intervention. The results of the intervention were registered via the measurement of single standing balance of subjects on the affected ankle, using the NeuroCom® Basic Balance Master stabilometric platform, in three moments in time: pre-intervention, 10 min after the intervention and four weeks after the intervention. The measurements were made with eyes open and eyes closed.

Results: 12 participants were divided into 2 groups, with 4♀ and 8♂, aged 21.75 ± 0.67 years. A 3×2 repeated measures ANOVA was performed. With the data obtained in our sample, we found no significant differences between groups neither after 10 min nor in the 4 following weeks [eyes open ($F=0.36$; $P=0.43$), eyes closed ($F=0.13$; $P=0.87$)].

Conclusions: The results obtained appear to prove that treatment of the tibialis posterior using dry needling does not produce a significant improvement of single legged stance on subjects with ankle instability despite the small sample size.

A physiotherapy treatment approach for a biceps brachii muscle rupture. A case study

Ángel Yáñez-Álvarez, Manuel Alcantarilla-Pedrosa. University of Seville, Seville, Spain. AY 360° salud y deporte. Servicio Médico del Real Betis Balompié, Spain.

Introduction/aims: Epidemiology in sport is changing, with tendon and muscle lesions more common than sprains and meniscopathies. Muscle injuries are most frequent, considering the different disciplines and representing between 31 and 55% of all sports injuries. This great morbidity can lead to the decrease and/or interruption of training

with the consequent repercussion on performance as well as leading to temporary or permanent incapacitation for sports practice. Up to 11% of muscle injuries are considered severe, requiring over 4 weeks recovery. The main aim of this study was to research the effects of a physiotherapy treatment comprising ultrasound-guided percutaneous needle electrolysis (PNE), myofascial manual therapy and eccentric exercises for a biceps brachii muscle rupture.

Patient and methods: The patient is a man aged 40 years old, an expert in sports supplementation and a weightlifter. During a training session (12/5/16) performing a deadlift with a mixed grip he felt a blow in the right biceps brachii. He came to the clinic on 18/7/16 complaining with persistent pain, loss of strength and functional incapacity. The patient was followed-up throughout 3 treatment sessions. The materials used included: a goniometer, a GE Logic S7 Expert ultrasound machine, Physio Invasiva®, the VAS pain scale, and a patient-specific functional scale.

Results: We present the results for each variable in the three dates of the interventions, performed one week apart (18/7/16, 26/7/16; 2/8/16)

ROM (passive elbow extension): Goniometry = $-25^\circ / -5^\circ / -5^\circ$

PAIN: VAS = 6 severe-moderate; 4 moderate; 1 mild

FUNCTION: Patient-Specific Functional Scale (PSFS) = 9/30; 18/30; 24/30.

STRUCTURE: ULTRASOUND = $0.89 \text{ cm}^2 - 0.33 \text{ cm}^2 - 0.17 \text{ cm}^2$

Conclusions: From the first session, the subject referred evident benefits, which had a positive influence on behaviour, which was both assertive and collaborative, and patient compliance to treatment.

Sonographic morphological changes after application of muscular stimulation by ultrasound-guided needling (MSUN®) in chronic low back pain: New invasive applications

Samuel Fernández-Carnero, José Luis Arias-Buría. Francisco de Vitoria University, Madrid, Spain.

Introduction/aims: It is estimated that 80% of the population will suffer from low back pain at some point in their life. In the West, over the last 30 years, disability associated to low back pain has become a great problem, due to the high costs and due to the fact that 10–40% of these patients will develop a chronic problem or a great disability. The aim of the present study was to quantify, via ultrasound, the morphological changes of the multifidus muscles during the application of ultrasound-guided percutaneous muscle stimulation using a needle (MSNU®).

Material and methods: The patient was in the military and aged 33, weighing 86 kg and measuring 1.96 m. He was operated on for a L4–L5 discopathy, receiving a prosthesis with an abdominal approach. The first three months after the surgery, the pain disappeared although later relapsed. In the first consultation he was asked to indicate his level of pain, referring a VAS of 10/10 and a score on the Oswestry scale of 34 points. The patient received stimulation (MSNU®) with an intensity of 100 mA, 250 μs and 15 Hz with an asymmetric bipolar current + motor control exercises. A Mindray Model M9 ultrasound device (Shenzhen Mindray Co. Ltd, China) was

used with a linear probe of 10MHz and a 40mm footprint. B-mode imaging was used in the cross-sectional and longitudinal approach for the morphological evaluation. The measurements were acquired via ImageJ Software.

Results: The multifidus muscles at rest (2 week follow-up: 1.19 pre: 1.1) Δ 0.8 cm. Deep multifidus during the Active Straight Leg Raise (ASLR) (1.55–1.22) Δ 0.33 cm. Superficial multifidus at rest (1.4–1.04) Δ 0.8 cm. Superficial multifidus (ASLR) (1.8–1.22) Δ 0.58 cm. Cross-sectional area 1.27 cm² (4.8–3.53). Perimeter 0.64 cm (8.15–7.51). The shape of the multifidus was a semicircle at first and at the end, it was a semi-eclipse. The VAS changed from 10/10 to 3/10, the GROG (Global Rating of Change) was 5 (–7 to 7) and the Oswestry changed from 34/50 to 20/50.

Conclusions: Ultrasound-guided percutaneous needle muscle stimulation could be a valid tool to assist the progression and help adapt the physiotherapy treatment in patients with low back pain.

Changes in the contractibility of the cross-sectional area after ultrasound-guided dry needling of the multifidus in subjects with and without low back pain

César Calvo-Lobo, Gustavo Plaza-Manzano, Ana Serrano-Imedio, Alejandro Garrido-Marín. Centro Superior de Estudios Universitarios La Salle, Madrid, Spain.

Introduction/aims: Chronic, non-specific low back pain (LBP) is a prevalent pathology that generates changes in the motor control recruitment of the lumbar multifidus (MF). The measurement of the cross-sectional area (CSA) of the MF displays a high correlation with the electromyographic changes. Therefore, the objective of this study was to determine the changes concerning the immediate contractibility after ultrasound-guided dry needling (DN) in the lumbar MF, comparing subjects with and without low back pain.

Material and methods: A longitudinal and prospective experimental study was performed following the TIDieR criteria. The sample was formed by 8 women and 4 men, 4 with LBP and 4 without LBP. Participants were recruited at the CARMASALUS Clinical and Research Centre. All subjects were placed in prone lying, and received ultrasound-guided dry needling in the multifidus muscles of L4, via an approach in the inferomedial direction towards the laminae of the lumbar vertebrae. Deep and superficial dry needling was applied in the right and left MF, respectively. First, deep DN was performed using the Hong "fast in, fast out" technique until no further local twitch responses were elicited or for a maximum of 5 needle insertions. In second place, superficial DN was performed without reaching the superficial fascia of the L4 multifidus, inserting the needle into the subcutaneous tissue during 2 min. The main outcome variable was the variation between rest and 30° of homolateral hip extension in the CSA of the L4 MF. The SPSS version 22.0 program was used for data analysis. The Shapiro–Wilk test was used to test normality. The mean \pm SD and the median \pm IR were used for the descriptive data. The Student's *t*-test and the *U* Mann–Whitney tests were used to evaluate the descriptive data and the main variable.

Results: The sociodemographic data (age, height, weight and body mass index) and the baseline measurements of the

main variable did not reveal any statistically significant difference ($P > 0.05$) comparing subjects with and without LBP. Statistically significant differences ($P = 0.003$) were found for the increase in CSA of the L4 MF after deep DN in subjects with LBP (0.15 ± 0.39 cm²) compared to healthy subjects (-0.98 ± 0.27 cm²). However, superficial DN failed to show a statistically significant difference in the group with LBP compared to healthy subjects.

Conclusions: The immediate increase in contractibility of the cross-sectional area of the L4 multifidus after deep dry needling seems to be dependent on the existence of chronic LBP.

Electroacupuncture in low back pain: A systematic review

Marcos Sánchez-Lorenzo, Rebeca Seoane-Pardo. Tambre Fisioterapia, Sigüeiro, A Coruña, Spain.

Introduction/aims: according to the Spanish national health survey, 18.6% of the adult population presents low back pain. Acupuncture is one of the techniques used for the treatment of this complaint, and as such, a number of literature reviews have been performed on the subject to date. To the best of our knowledge, no review has been published specifically on electroacupuncture and low back pain. The aim of this systematic review was to assess the quality of the studies performed on acupuncture in low back pain and to determine whether standardized protocols exist for the application of electroacupuncture.

Material and methods: We conducted a search in the following databases: Dialnet, CSIC, IBECS, LILACS, Google Scholar, PubMed, Scopus, Cinahl and EBOSCO. An assessment of the risk of bias was performed by two blinded assessors using the Criteria List for the Assessment of Methodological Quality (Cochrane back and neck pain group).

Results: 123 studies were identified and, after scrutinising these, 17 studies were included for the assessment of risk of bias.

Conclusions: Studies with low risk of bias demonstrate that electroacupuncture is effective in the treatment of low back pain for parameters of pain, disability or quality of life. Further studies are required of a better quality, as well as standardized treatment protocols.

A comparative study on the effects of percutaneous needle electrolysis and dry needling in subacromial pain syndrome

Tomás Jiménez-Rubio. Fisiosanar, Ciudad Real, Spain.

Introduction/aims: The number of patients attending physiotherapy consultations complaining of shoulder pain is very high. In this situation, invasive physiotherapy -using techniques such as ultrasound-guided percutaneous needle electrolysis and dry needling, appears to provide benefits for the treatment of subacromial pain syndrome. The aim of this study was to compare the effectiveness of the following invasive physiotherapy techniques: percutaneous needle electrolysis and dry needling in the treatment of patients

with subacromial pain syndrome.

Material and methods: A randomized clinical trial involving 30 patients (21 men and 9 women) with a mean age of 43 years, diagnosed with subacromial pain syndrome of over 20 days evolution since the onset of symptoms. Group 1 received treatment with percutaneous needle electrolysis upon different structures of the rotator cuff and the subacromial bursa with three impacts of three seconds duration between 1.5 and 3 mA, following the protocol described by Valera & Minaya; group 2 received dry needling on demand in the following muscles that presented active MTrPs: infraspinatus, subscapularis, deltoids, supraspinatus, scalenes and teres minor. All subjects underwent an ultrasound examination and the following orthopaedic tests: Jobe, Neer and Yocum. A GE Logic S7 ultrasound machine was used with a matrix ML6-15 probe and the Physio Invasiva® device. The main variable was the percentage of patients who received discharge from physiotherapy.

Results: In the ultrasound examination, 80% of subjects presented changes compatible with tendon thickening, focal hypoechoic areas and/or irregularities in the cortical bone. A normal ultrasound pattern was confirmed in the remaining 20% of subjects in the study of the most relevant structures (supraspinatus, subacromial bursa and rotator interval). Of 80% of subjects in which there were findings in the ultrasound examination, 10% presented signs compatible with neovascularization. In group 1, 80% of patients received discharge from physiotherapy at 6 weeks after the beginning of treatment receiving a mean of 4 sessions. In group 2, 67% of patients obtained discharge from physiotherapy at 5 weeks receiving a mean of 5 sessions.

Conclusions: Both percutaneous needle electrolysis as well as dry needling appear to be two effective techniques of invasive physiotherapy for the treatment of subacromial syndrome.

The effectiveness of dry needling vs. electrical stimulation on myofascial trigger points of the upper trapezius

Pedro Saavedra-Hernández. Hospital Fremap, Majadahonda, Madrid, Spain.

Introduction/aims: The therapeutic effectiveness of deep dry needling in the deactivation of trigger points in Myofascial Pain Syndrome (MPS) has been demonstrated, however, one of the adverse effects is post-needling pain. An alternative to decrease this pain could be the application of electrical currents via an acupuncture needle. The aim of the present study was to assess the changes in sensitivity to pressure after applying dry needling to the latent trigger point n°1 of the upper trapezius in healthy subjects compared with the application of a current via a needle on the same point, evaluating sensitivity to pressure before, after the techniques, and at 3 and 7 days. At the same time, we aimed to assess which of these techniques generated more post-needling pain and whether this was associated with any type of cervical disability.

Material and methods: A randomized clinical trial on 20 healthy subjects (10 men, 10 women; aged 40.1 ± 14.18 years). Subjects were divided into two groups: group 1 ($n = 10$) received a dry needling treatment and group 2

($n = 10$) received a TENS type current via a needle. The Visual Analogue Scale (VAS) was used to evaluate the sensitivity to pressure, the pressure pain threshold was assessed using an algometer, furthermore, we used the Neck Disability Index and a diary of post-needling pain.

Results: Dry needling had a significant effect on the evolution of sensitivity to pressure (pre-intervention VAS: 29.5 (17.5–33). VAS at 7 days: 12 (3.5–26.5); $p = 0.04$). There were no differences between groups in the measurement of the pressure pain threshold or sensitivity to pressure ($p > 0.05$). There were significant differences between both groups regarding the assessment of post-needling pain on day 2 after the needling ($p = 0.03$).

Conclusions: Deep dry needling on the latent trigger point of the upper trapezius in healthy subjects is associated with a possible hypoalgesic effect which is related with an improved sensitivity to pressure on the same point. Both techniques resulted in post-needling pain, however this was greater in the group receiving dry needling. Slight values of neck disability were registered.

The effectiveness of percutaneous needle electrolysis and eccentric exercise in chronic achilles tendinopathy

Silvia Rojas-Mederos. Santa Cruz de Tenerife, Spain.

Introduction/aims: Tendinopathies affecting the Achilles tendon have a high incidence in sports. Despite this, few research studies have approached the problem of its treatment. The aim of this study was to evaluate the effectiveness of treatment of chronic Achilles tendinopathy via a physiotherapy programme consisting of percutaneous needle electrolysis and exercise with eccentric overload.

Material and methods: An uncontrolled clinical trial performed on 5 subjects (4 men and 1 woman) with a medical diagnosis of chronic tendinopathy of the Achilles tendon body, with a mean age of 39 years (SD: 10). A sample of 6 tendons was obtained, all of which had over 3-months evolution from the start of symptoms. Pain was assessed using the Visual Analogue Scale (VAS), functionality was measured using the VISA-A questionnaire and the structure of the tendon was evaluated using musculoskeletal ultrasound. All subjects belonged to the same group and received the same treatment. This consisted in three sessions of percutaneous needle electrolysis following the protocol described by Valera & Minaya, associated with two sessions of exercise with eccentric overload, with a 48-h interval between sessions. An EPI® device was used (Cesmar Electromedicina, Barcelona, Spain) and an ESAOTE MyLab Five ultrasound machine.

Results: In the initial assessment, the VAS scale score was 3.83 (SD: 1.95), the VISA-A scores were 66.17 (SD: 14.98) and the ultrasound exam revealed changes in all subjects that were compatible with a degenerative process. After 4 weeks, the values on the VAS scale decreased 53% (p -value = 0.203), the VISA-A scale increased 17% (p -value = 0.019) and the ultrasound exam revealed small changes in 33.3% of patients (the structural exam obtained a p -value of 0.6).

Conclusions: Treatment with percutaneous electrolysis and exercise with eccentric overload improved the functionality

of subjects with chronic tendinopathy of the Achilles tendon body treated in this sample. In the short term, the pain did not improve, nor were there changes in the tendon structure.

The treatment of the most common MTrPs in cervicothoracic pain via dry needling and electroanalgesia

José Ignacio Molina-Caño. *JIM Fisioterapia, Madrid, Spain.*

Introduction/aims: Myofascial pain syndrome affecting the cervicothoracic muscles is one of the most common clinical presentation physiotherapists are faced with. There is a wide variety of physiotherapy treatments, however there is a lack of consensus, with no effective physiotherapy protocol to date. The aim of this study was to assess the results of a treatment of four sessions using dry needling, combined with stimulation using an acupuncture point locator with microcurrents and an electroacupuncture device. Outcome measures included pain using a Visual Analogue Scale (VAS) and disability associated with cervical pain using the Norwick Park Pain Questionnaire (NPQ), validated to Spanish.

Material and methods: A clinical uncontrolled trial performed on 50 patients (10 men, 40 women, aged 32 ± 8.52 years) with neck pain. Active trigger points were located on the following muscles: trapezius, rhomboids, infraspinatus, levator scapulae, supraspinatus and serratus posterosuperior (in our experience, these are the most common points involved in cervicothoracic myofascial pain). We performed needle insertions until the appearance of pain, after which we applied microcurrent stimulation via a needle using the pointer Excel II point locator until achieving multiple muscle spasms that were completely pain free. Often, we obtained spontaneous movement of other needles in the territory of referred pain of the stimulated muscle. Once all the needles were inserted and stimulated, an analgesic electroacupuncture current was applied using a Ryodoraku model ES-160 device during 20 min. This treatment was applied over four sessions, performed with an interval of four days: VAS and NPQ assessments were performed before and after the four treatment sessions.

Results: This study is an analytic and longitudinal study of a case-series of 50 subjects. At the end of the described protocol of four sessions of physiotherapy, the patients displayed a complete improvement in the VAS assessment (mean \pm SD preintervention = 7.4 ± 1.4 ; final VAS = 3.5 ± 1.6 ; $p < 0.001$) and the NPQ questionnaire (preintervention = 71.1 ± 21.28 ; final = 38.9 ± 8.88 ; $p < 0.01$). Patients were discharged upon completion of the study.

Conclusions: The group of subjects who received the described treatment significantly improved both regarding their pain as well as their level of disability associated to cervical pain. The absence of a control group poses a great limitation to the relevance of these results.

Ultrasound changes in patients with chronic patellar tendinopathy after various invasive treatments

María Pilar López-Royo, Rita Galán-Díaz, María Ortiz-Lucas, Yasmina Haman-Alcober, Eva María Gómez-Trullén, Pablo

Herrero-Gallego, José Ríos-Díaz. *San Jorge University, Zaragoza; Nebrija University, Madrid, Spain.*

Introduction/aims: Chronic patellar tendinopathy (CPT) is one of the most common pathologies of the locomotor system in which a degeneration of the patellar tendon takes place. Currently, the gold standard treatment for this pathology is the performance of eccentric exercise (EE). Due to the clinical effectiveness of Percutaneous Needle Electrolysis (PNE) and dry needling (DN), the aim of the present study was to analyse whether these treatments obtain additional benefits when added to EE and to evaluate the immediate histological changes in the tendon.

Material and methods: A single-blinded randomized controlled trial. We selected 20 patients aged between 19 and 41 years old (18 men; mean age = 33.4 years [SD = 6.09 years]) diagnosed with CPT and with symptoms lasting over 3 months and with a score under 80 points on the Visa-P questionnaire. The subjects were randomly distributed into 3 groups: DN group ($n=6$), PNE group ($n=7$) and Control Group ($n=7$). All interventions were performed under ultrasound guidance and all subjects received 4 sessions. At the same time, all subjects were instructed to perform a home programme of EE for the quadriceps during the 8 weeks treatment duration. An initial assessment was performed (week 0) and post-treatment (week 10). For the ultrasound assessment we used an ultrasound device (Logic S7 Expert, General Electric Healthcare) with a linear probe (MLG15, 5–10 MHz) following the protocol proposed by the European Society of Musculoskeletal Radiology. The EPI[®] device (Cesmar Electromedicina, Barcelona, Spain) was used for the application of PNE. Cross-sectional ultrasound images were registered and image analysis (ImageJ version 1.54) was used to determine thickness, the area of the Power Doppler signal in cases of neovascularization, the echo intensity (0–255 grey levels) and echovariation (0–100 points). An analysis of the variance for repeated measures was performed with the group as the inter-subject factor (three levels) and time as the intra-subject factor (two levels). The level of significance was corrected with the Bonferroni method. The mean differences are displayed (MD) together with the 95% confidence intervals (95% CI) for each group.

Results: The total area of subjects in which the Power-Doppler was found was significantly reduced ($F=11.3$; $p < 0.02$; $\eta_p^2 = 0.69$), however between-group differences were not detected ($F=0.544$; $p < 0.611$; $\eta_p^2 = 0.18$). It is possible that in the control group (MD = 0.98 mm^2 ; 95% CI = $0.12\text{--}1.9 \text{ mm}^2$; $p = 0.033$) the reduction of the area may be more marked than in the DN groups (MD = 0.72 mm^2 ; 95% CI = $-0.15\text{ to }1.5 \text{ mm}^2$; $p = 0.087$) and PNE (MD = 0.43 mm^2 ; 95% CI = $-0.63\text{ to }1.5 \text{ mm}^2$; $p = 0.347$). Regarding the width, significant changes did not occur after treatments ($F=0.600$; $p = 0.449$; $\eta_p^2 = 0.034$) nor between groups. A significant reduction of the CG was not observed (MD = 0.062 mm ; 95% CI = $-1.5\text{ to }1.7 \text{ mm}$; $p = 0.936$), nor with PNE (MD = 0.86 mm ; 95% CI = $-0.62\text{ to }2.3 \text{ mm}$; $p = 0.239$) nor DN (MD = 0.049 mm ; 95% CI = $-1.4\text{ to }1.5 \text{ mm}$; $p = 0.936$), however, in the PNE group a greater mean reduction was observed. Regarding echo intensity, a significant change was found ($F=4.76$; $p = 0.043$; $\eta_p^2 = 0.22$) although with differences between groups. The echo intensity did not obtain significant changes

in the CG (MD=0.8 levels; 95%CI=-0.34 to 16.7 levels; $p=0.059$) and PNE (MD=-2.9 levels; 95%CI=-10.8 to 5.0 levels; $p=0.445$), however significant changes did occur in the DN group (MD=9.3 levels; 95%CI=1.4 to 17.2 levels; $p=0.024$). Finally, the echovariation increased clearly and significantly in all three groups ($F=67.3$; $p<0.01$; $\eta^2=0.80$). However, differences were not detected between groups ($F=0.119$; $p=0.889$; $\eta_p^2=0.014$). For the CG, the echovariation increased on average 30.2 points (95%CI=16.2 to 44.3 points; $p<0.001$), for the PNE group the increase was 27.2 points on average (95%CI=14.7 to 40.7 points; $p<0.001$) and for the DN group, this increased, on average, 32.0 points (95%CI=19.0 to 45.0 points; $p<0.001$).

Conclusions: The treatment of CPT with different invasive treatments seems to obtain similar results in the short term for the variables determined using ultrasound.

Variability of the distance to the pleura and muscle thickness during invasive physiotherapy techniques

Gerardo López San-Miguel. Centro de fisioterapia Eduardo Álvarez, Mieres, Asturias, Spain.

Introduction/aims: Pneumothorax is considered to be the most common severe complication associated with the techniques of invasive physiotherapy at the level of the rib cage. It is essential to continue to seek, develop and systematize prevention strategies for these techniques in the constant evolution of our profession. In this setting, ultrasound can be a great aid in the clinical context, as well as a preventative tool, also valued in research, by providing objective data to allow us to devise safer and more effective evidence-based approaches. The aim of the present study was to conduct an ultrasound analysis of the variability of the distance to the pleura at the areas of the thorax that are under the greatest risk of pneumothorax according to the literature, after the use of needling techniques, within the context of safety during invasive physiotherapy procedures.

Material and methods: A cross-sectional descriptive observational study, in which 7 thoracic areas were studied using ultrasound in a total of 30 subjects. In the first place the validation of the method of image acquisition was performed for its later statistical analysis. Based on these, the variable 'distance to the pleura' was obtained. Thereafter, these distances were grouped and analysed. A GE Logic E BT11 ultrasound machine was used with a 8 to 12 MHz linear probe and Image J v.1.46r software.

Results: The smallest difference registered was 1.2 cm in the case of a woman, at 5 cm from the anterior midline in the third intercostal space, and the greatest was 5.53 cm, also in the case of woman at the same intercostal space at the level of the clavicle midline. Regarding the mean distances according to the area of the pleura, the smallest was at 5 cm from the anterior midline, in the first intercostal space (2.32 cm) and the largest (3.91 cm) was in the midline of the clavicle. Furthermore, ultrasound has demonstrated to be a reliable tool for the measurement of the distance to the pleura in the areas under study at risk of pneumothorax (ICC of 0.871 to 0.997).

Conclusions: The data suggest there is a great variability in the distance from the surface of the skin to the pleura, with

very low values in some cases, and reflecting considerable differences among the areas studied, which calls into question the current measures for pneumothorax prevention. The results obtained and the references studied regarding past incidents in other disciplines are consistent with the fact that ultrasound may be the most appropriate strategy for the prevention of this adverse effect derived from invasive physiotherapy techniques.

The relationship between ultrasound and function in the patellar and Achilles tendons of triathletes

Manuel Camarasa-Vidal. CEFIREs, Puzol, Valencia, Spain.

Introduction/aims: Tendon pathologies are very common among triathletes due to the continuous use of the lower limb and the changes in sports discipline implied in triathlons. Overuse injuries and tendinopathies lead to changes in the tendinous system with signs of degeneration and morphological changes which may or may not provoke pain. In this study we use ultrasound as the gold standard to obtain images of both symptomatic and asymptomatic tendons for diagnostic purposes, control of rehabilitation and the development of specific plans. The aim of this study was to research the relationship between morphological changes of the patellar and Achilles tendons using ultrasound study. We also sought to relate whether the limitation of ankle dorsiflexion is involved in both types of tendinopathy.

Material and methods: A descriptive observational study. We selected 10 active triathletes (7 men and 3 women, mean age 32.8 ± 2.5 years) with or without symptoms of tendon pathology in the patellar tendon and/or the Achilles tendon; prior to the study they were given a VISA-A and a bilateral ultrasound study of both structures was performed to analyse the morphological changes, relate the width of both tendons, the neovascularization and the relationship with ankle dorsiflexion. The GE Logic P9 ultrasound machine was used with a ML6-15 MHz matrix probe.

Results: There was a weak relationship between scores on the VISA-P and VISA-A regarding the results measured in the anteroposterior diameter and in the echogenicity in both cross-sections and longitudinal sections (Spearman's rho values <0.2 in all measurements; $p>0.05$). Significant differences in the VISA-P scores were observed according to the vascularization of the left patellar tendon ($p=0.036$) which was not the case of the right patellar tendon ($p=0.273$). In the Achilles tendon, the appearance of neovascularization was practically non-determinant of the values of the VISA-A ($p>0.05$).

Conclusions: The ultrasound studies show changes in the morphology of the tendon with hyperechoic images and neovascularization, however, at times these are asymptomatic. The tendinopathy of both the patellar tendon as well as the Achilles tendon in athletes may be associated with asymptomatic processes with structural changes and that may possibly provoke a tendinosis of the affected tendon in the future.

Contributions of the application of percutaneous electrostimulation to dry needling treatment in myofascial pain among crossfit athletes

Álvaro Gómez-Molina. Madrid, Spain.

Introduction/aims: CrossFit is a training system originating from the United States. The high level of demand for this sport and the large number of injuries observed among those who practice it justifies the need for further studies such as the present report. The aims of this study were: (1) to assess the contribution of Percutaneous Electrostimulation (PE) to Dry Needling (DN) in the treatment of Myofascial Trigger Points (MTrPs), and (2) to analyse the CrossFit exercises that generate the most pain at the level of the shoulder.

Material and methods: A randomized, double-blinded, clinical trial in which 20 subjects were divided into 2 groups: placebo (DN + 20' placebo) comprised by 7 men and 3 women with a mean age of 26.7 years, and an intervention group (DN + 20' percutaneous electrostimulation at 100Hz) comprising 8 men and 2 women with a mean age of 29.8 years in CrossFit athletes with active/latent MTrPs in the infraspinatus and with shoulder pain. The variables measured were the pressure pain threshold assessed using algometry, the range of motion in internal rotation, the VAS of shoulder pain at rest, the VAS score while performing a CrossFit exercise generating pain and the post-needling VAS before, after 5 min and 72 h after the intervention.

Results: Significant decreases were found in both groups for the VAS post-needling variable ($p < 0.05$). (Placebo group: at 5 min 2.5 (0.8–3.8); at 72 h 0 (0–0.75); $p < 0.05$. Intervention group: at 5 min 2 (0.8–4.3); at 72 h 0 (0–1); $p < 0.05$) and a significant increase of the internal rotation in the intervention group (internal rotation pre-intervention: $45.6 \pm 6.99^\circ$; internal rotation at 5 min post-intervention $53 \pm 9.8^\circ$; $p = 0.001$). Significant differences were not found between both groups for any of the variables at any of the assessment moments ($p > 0.05$).

Conclusions: PE (100 Hz – 20 min) does not provide statistically significant improvements to exclusive treatment with DN in the variables studied. The CrossFit exercises that generate the most pain at the level of the shoulder are pull-ups and movements that require lifting weight above 90° shoulder flexion.

Treatment with percutaneous needle electrolysis of the deep interphase of the postsurgical Achilles tendon

Jesús Serrano-Lázaro. Clínica de Fisioterapia La Moraleja, Madrid, Spain.

Introduction/aims: One of the most common side effects after surgery for complete rupture of the Achilles tendon is the limitation of ankle dorsiflexion. The fibrosis that occurs between the tendon and Kager's fat pad, on many occasions limits the correct tendon sliding. The aim of this study was to assess the effectiveness of percutaneous needle electrolysis in the treatment of fibrosis in the Kager triangle after surgery for complete rupture of the Achilles tendon in a case-series.

Material and methods: A case study involving 6 patients (5 men and 1 woman), with a mean age of 41 ± 8.03 years, operated for a complete rupture of the Achilles tendon with over 6 weeks evolution. Ultrasound assessments of

the tendon and the subjacent fat were performed, as well as ankle dorsiflexion with the lunge test using an iPhone application called the *Tilt Meter*. All patients except one presented a movement restriction compared with the contralateral side. A pre-treatment median (Q1–Q3) of 35.9° (34 – 39.1°) and post-treatment of 37.4° (34.3 – 39.1°). Percutaneous needle electrolysis was applied following the protocol described by Valera & Minaya. A GE Logic S7 ultrasound machine was used with a matriz ML6-15 probe and the Physio Invasiva[®] device.

Results: 100% of subjects improved their joint range after a single application of percutaneous needle electrolysis. The mean percentage of improvement was 3.2% with a range of between 1.6% in the worst case and 6.8% in the best case.

Conclusions: Percutaneous needle electrolysis showed improvements in the range of dorsiflexion in the sample studied in the treatment of fibrosis occurring in the Kager triangle after surgery of the Achilles tendon.

An adverse reaction upon application of percutaneous needle electrolysis on the patellar tendon. A case report

Paula García-Bermejo, Manuel Albornoz-Cabello, Blanca de la Cruz-Torres, José Naranjo-Orellana. University of Seville, Seville, Spain.

Introduction/aims: At present, Percutaneous Needle Electrolysis (PNE) is one of the physiotherapy treatments of choice in the resolution of tendinopathies, which consists of the ultrasound-guided application of a galvanic current via a needle electrode. However, like any other invasive physiotherapy technique, it can lead to an imbalance in the subject's autonomous nervous system during application. The variability of the heart rate (VHR) is a very useful tool for the analysis of the balance between the sympathetic and parasympathetic activity. The aim of this study was to analyse the effect that the application of the PNE technique on the patellar tendon has on the sympathetic and parasympathetic activity, measured via the VHR, in an amateur football player.

Material and methods: The case was a 25-year-old man, who was a member of an amateur football club. We registered the VHR at rest during 10 min and during the application of ultrasound-guided PNE on the patellar tendon during 15 min. Any type of psychological apprehension on behalf of the subject was ruled out. The VHR was analysed via a Poincaré graph obtaining the following variables: cross-sectional diameter (SD1), longitudinal diameter (SD2), stress-strain index (SS) and the sympathetic/parasympathetic ratio (ratio S/PS).

Results: At baseline, the subject presented the following VHR values: RR interval 895.26 ms; heart rate 68.37 lpm; SD1 53.21; SD2 166.07; SS 6.00 and S/PS ratio 0.11. During the application of PNE, the subject presented the following VHR values, dividing the autonomous response in 4 phases: Phase 1 (Initial): RR interval 1325.20 ms; heart rate 46.84 bpm; SD1 1142.56; SD2 312.04; SS 3.20 and S/PS ratio 0.02. Phase 2 (Vasovagal Response): RR interval 715.15 ms; heart rate 86.43 bpm; SD1 18.14; SD2 166.2; SS 6.02 and S/PS ratio 0.33. Phase 3 (Adverse Reaction): RR interval 260.15 ms; heart rate 230.63 bpm; SD1 0.51; SD2 0.5; SS 2000.00 and

S/PS ratio 3921.57 and Phase 4 (Recovery): RR interval 772.64 ms; heart rate 78.52 bpm; SD1 21.32; SD2 109.29; SS 9.15 and S/PS ratio 0.43. Therefore, we can affirm that in this subject a vasovagal response took place in phase 2, characterized by a predominance of parasympathetic activity with all the common vasovagal signs and an adverse response during phase 3, characterized by a predominance of sympathetic activity.

Conclusions: The ultrasound-guided PNE technique can elicit an adverse reaction during its application, which we must consider, in order to act promptly and safely in the clinic, ensuring the wellbeing of our patients.

Results of the model for the implementation of percutaneous needle electrolysis in the National Health System

Mariano Martin-Macho Martínez, Adrián Ventero-Gómez. Hospital Marinasalud de Denia, Denia, Alicante, Spain.

Introduction/aims: We have implemented Percutaneous Needle Electrolysis (PNE) in our Health Department due to the large number of people suffering pathologies associated with the locomotor system, and the great cost that this entails for the national health system. The aim of the present study was to assess the effectiveness of PNE in the Health Department of Denia and to evaluate the experience of patients.

Material and methods: The PNE work system was implemented after fulfilling all the requirements on behalf of the hospital to include a new treatment indication in the corresponding physiotherapy services portfolio. The physiotherapists were previously trained in this new technique. We informed the referring physicians and completed a process of clinical documentation associated with PNE indications. The device used to apply PNE was Physio Invasiva®. The intervention procedure was ultrasound-guided to increase the safety and efficiency of the technique. The dosage followed for the performance of PNE was 3:3:3 (intensity (mA), time (s) and number of applications) according to the protocol defined by Valera & Minaya. Exercise protocols of eccentric work were elaborated for each tendinopathy and were given to the patient after their intervention. In order to evaluate the results of the implementation of PNE in the treatment of tendinopathies, the variables measured were the initial and final pain using the VAS for pain. The satisfaction index of patients was measured using a non-standardized follow-up questionnaire. Finally, we recorded the number of sessions needed until patient discharge.

Results: Pain levels were reduced, with patients presenting a mean score at baseline of 7.3 ± 3.83 and a mean score of 2.1 ± 4.62 on the VAS scale upon treatment completion. The level of global satisfaction of the patients upon treatment completion was 8.2 ± 4.58 over 10. The mean number of PNE sessions performed was 4.42 ± 4.97 sessions per patient. The mean duration per session was 20 min.

Conclusions: PNE may constitute an effective treatment for chronic tendinopathies. The number of physiotherapy sessions has decreased compared with conventional treatments, and in many cases PNE is selected as the first treatment option. A decrease in pain has been observed after completing treatment with PNE. A high level of

satisfaction has been obtained after treatment with PNE in patients who have previously received conventional physiotherapy sessions or medical injections with little or no improvement.

Effectiveness of therapeutic exercise together with dry needling in knee arthrosis: A randomized double-blinded clinical trial

Eleuterio A. Sánchez-Romero, Verónica Burgos-Caballero, María Victoria Ochoa-Sáez, José Luis Alonso-Pérez. Research Group on Musculoskeletal Pain and Motor Control, European University of Madrid, Spain.

Introduction/aims: The aetiology of knee arthrosis is still not completely known, however its incidence increases with age and obesity, as an important risk factor for the development and growth of this syndrome, which originates musculoskeletal pain and disability in the older adult. Due to the increase in the life expectancy of the population, and consequently, of the population over the age of 65, there is an urgent need to research effective and economically viable therapeutic tools to care for the older population, to generate a lower health cost as well as enable improvements in health and the quality of life of older people in the short, mid and long term. The aim of the present study was to assess the effectiveness in the short term of a program of therapeutic exercise together with dry needling compared to placebo needling in adult patients over the age of 65 who presented with pain and dysfunction due to knee arthrosis.

Material and methods: Of 30 patients with signs, symptoms and the diagnosis of knee arthrosis selected as possible candidates, 20 completed the therapeutic programme (8 men and 12 women, aged between 66 and 81 years). In the group of exercise and placebo needling, 9 patients completed the study (4 men and 5 women; mean \pm standard deviation; 70.89 ± 3.21 years), and in the group of exercise and dry needling, 11 patients did so (4 women and 7 men); mean \pm standard deviation, 71.5 ± 4.80 years. The entire sample received treatment via therapeutic exercise consisting in warm-up (aerobic 10–15 min), strengthening (25–30 min), and lower limb stretching (10–15 min), 2/week during 3 months. Both real dry needling as well as placebo needling were applied 1/week during the first 6 weeks, on the painful sites of the lower limb related with the participant's pain. The intensity of pain was measured using the Numeric Rating Scale (NRS) and disability using the WOMAC questionnaire.

Results: A statistically significant effect was found in the time factor in both groups for pain intensity ($F=53.038$; $p<0.0001$; $\eta_p^2=0.747$) and disability (WOMAC total; $F=84.826$; $p<0.0001$; $\eta_p^2=0.825$; WOMAC pain; $F=90.478$; $p<0.0001$; $\eta_p^2=0.834$; WOMAC stiffness; $F=14.556$; $p<0.001$; $\eta_p^2=0.447$; WOMAC functional capacity; $F=70.872$; $p<0.0001$; $\eta_p^2=0.797$). However, changes were not found between groups for intensity of pain ($F=0.082$; $p=0.777$; $\eta_p^2=0.005$), nor for disability (WOMAC total; $F=0.209$; $p=0.653$; $\eta_p^2=0.011$; WOMAC pain; $F=0.251$; $p=0.623$; $\eta_p^2=0.014$; WOMAC stiffness; $F=0.848$; $p=0.369$; $\eta_p^2=0.045$; WOMAC functional capacity= 0.266 ;

$p=0.612$; $\eta_p^2 = 0.015$). No further statistically significant comparisons were found between both groups ($p > 0.05$).

Conclusions: The results of this study reveal that older patients diagnosed with knee arthrosis present improvements in pain and disability after a program of evidence-based therapeutic exercise. Furthermore, needling on the affected muscles does not appear to add any beneficial effect.

Effects of dry needling (DNHS®) on stiffness, function and quality of life after stroke: A pilot study

Isabel Quintero, Sandra Calvo, Lara Torrubia, Alejandro Aniento, Pablo Herrero, Beatriz Herrero-Cortina. Universidad San Jorge, Zaragoza.

Introduction/aims: Although different studies exist regarding the application of dry needling in patients after stroke for decreasing spasticity and hypertonia, no studies to date have analysed the effects of dry needling on function and quality of life. The aim of the present study was to assess the effect of dry needling (DNHS® technique) applied to the flexor muscles of the upper limb in individuals with chronic stroke on hypertonia, function and quality of life.

Material and methods: A simple-blinded, randomized, controlled pilot study. Two DNHS® treatments were performed with a 7-day interval in between sessions. The muscles treated were the biceps brachii, brachialis, flexor digitorum superficialis and profundus, adductor pollicis and first dorsal interossei muscles. The control intervention consisted of sham dry needling. Ten participants were recruited, of which 7 were male. The mean age of participants was 66.1 (SD 9.8 years). Treatment outcomes included the Fugl Meyer Assessment Scale (FMA), the Modified Ashworth Scale (MAS) and the Stroke Impact Scale (SIS). The effect sizes (ES) and odds ratios and their 95% confidence intervals were calculated.

Results: No statistically significant results were found in any of the variables analysed. However, within the FMA scale, some subscales, such as sensitivity [ES = 0.88(-0.62;2.38)], pain [ES = 1.13(-0.32;2.58)] and upper limb function [TE = 0.11(-1.26;1.48)] displayed a greater effect size.

Conclusions: This pilot study did not reveal statistically significant changes for any of the variables analysed, possibly due to the small sample size. Future studies should consider the data of this pilot study to calculate sample sizes and to analyse whether the DNHS® technique may be a treatment option for the improvement of function, stiffness, and quality of life in individuals after stroke.

Musculoskeletal status and pain in fatigued survivors of colon cancer

Mario Lozano-Lozano, Noelia Galiano-Castillo, Lydia Martín-Martín, Irene Cantarero-Villanueva. University of Granada, Granada, Spain.

Introduction/aims: Fatigue is a common problem in survivors of colon cancer, affecting approximately 40% of patients, even 10 years after treatment. The low levels of physical activity that these patients tend to present,

together with post-intervention pain, can lead to a sedentary attitude deriving in an increase in the levels of fatigue which may explain the loss of lumbopelvic muscle mass and the greater pain in the area in the case of these patients compared to the healthy population, creating a vicious self-reinforcing circle. The aim of this study was to assess the influence of the levels of fatigue on the muscle status and pain of survivors of colon cancer.

Material and methods: A descriptive cross-sectional study. In total, 40 colon cancer survivors participated in this study (stages I to IIIA; 26 men (65%) and 14 women (35%) with a mean age of 60.80 ± 10.02 years), recruited from the Surgery Department of the University Hospital San Cecilio, Granada. Participants were divided into two groups according to the presence of fatigue, considering the Piper Fatigue Scale and the cut-off points published by Stover et al. (2013). The study of the deep abdominal musculature was evaluated via ultrasound imaging (MyLab 25, Esaote Medical Systems, Genova, Italy) with a linear 12 MHz probe and a depth of 5 points, and pain was assessed using the Visual Analogue Scale for pain.

Results: The analysis of the comparison of means for independent measures revealed statistically significant differences between groups for the ultrasound image of the internal oblique muscle, those with the least muscle width were the fatigued patients (fatigued: $\bar{x} \pm DT = 0.44 \pm 0.15$ vs non-fatigued: $\bar{x} \pm DT = 0.62 \pm 0.16$; $t = 3.02$; $p = 0.005$). Furthermore, the group of fatigued patients presented greater abdominal pain (fatigued: $\bar{x} \pm DT = 1.50 \pm 1.97$ vs non-fatigued: $\bar{x} \pm DT = 0.42 \pm 1.11$; $t = -2.19$; $p = 0.034$). Significant results were not found for the remaining variables.

Conclusions: Colon cancer survivors present a deterioration of muscle thickness and suffer from pain, which is more pronounced in those with greater fatigue. Further studies are necessary to deepen our knowledge regarding the structural changes that take place at the muscle level and regarding pain.

Immediate changes in the cross-sectional area after deep dry needling compared to superficial needling of the lumbar multifidus

Alejandro Garrido-Marín, Daniel Pecos-Martin, Tomás Gallego-Izquierdo, César Calvo-Lobo. Centro Clínico e Investigador CARMASALUD, Madrid, Spain.

Introduction/aims: Chronic, non-specific low back pain (LBP) is a common pathology that leads to disability and alterations in the motor control recruitment of the lumbar multifidus. The cross-sectional area (CSA) of the multifidus (MF) displays a high association with electromyographic changes. Ultrasound-guided dry needling (DN) may change the contractibility of the lumbar multifidus. Consequently, the objective of this study was to establish the changes in the contractibility immediately after ultrasound-guided deep dry needling compared to superficial needling on the multifidus of subjects with and without LBP.

Material and methods: A longitudinal prospective study was performed following the TIDieR criteria. Two samples were recruited at the Clinical and Research Center

(CARMASALUD), a group of 4 women with LBP, and another group comprising 4 women without chronic, non-specific LBP. Four MF were treated on the right and 4 MF on the left. All women were placed in a prone position and received ultrasound-guided dry needling bilaterally in the lumbar L4 MF via an approach performed in the inferomedial direction towards the lamina. Deep and superficial DN was applied on the right and left MF, respectively. First, deep DN was performed using the Hong "fast in, fast out" technique until no more local twitch responses were elicited or for a maximum of 5 needle insertions. Subsequently, superficial DN was performed without reaching the superficial fascia of the L4 multifidus, inserting it into the subcutaneous tissue during 2 min. The main outcome variable was the variation between rest and 30° of homolateral hip extension in the CSA of the L4 MF. The SPSS version 22.0 program was used for data analysis. The Shapiro-Wilk test was used to test normality. The mean \pm SD and the median \pm IR were used for the descriptive data. The Student's *t*-test and the *U* Mann-Whitney tests were used to evaluate the descriptive data and the main variable.

Results: Statistically significant differences were found ($P=0.043$) for the decrease in CSA of the L4 MF after deep DN ($-0.98 \pm 0.27 \text{ cm}^2$) compared to superficial DN ($-0.06 \pm 0.66 \text{ cm}^2$) in healthy subjects. However, deep DN ($0.15 \pm 0.39 \text{ cm}^2$) compared to superficial DN ($-0.35 \pm 0.62 \text{ cm}^2$) showed no statistically significant difference ($P=0.218$) in subjects with chronic, non-specific LBP.

Conclusions: The reduction of the CSA of the L4 MF after DN seems to be dependent on the depth of its application in healthy subjects. However, it seems the same does not happen in subjects with chronic, non-specific low back pain.

The influence of the body composition on the perception of pain and the ultrasound image of patients with chronic plantar fasciitis

Mario Lozano-Lozano, Noelia Galiano-Castillo, Lydia Martín-Martín, Carolina Fernández-Lao. University of Granada, Granada, Spain.

Introduction/aims: One of the most common causes of chronic pain at the heel in adults is plantar fasciitis, which is estimated to affect 11–15% of foot pathologies. One of the determining risk factors in its appearance is obesity, due to the greater internal stress suffered by the heel from experimenting higher vertical forces during gait, which can lead to damage to the structures of the soft tissue and the development of different symptoms such as generalized hypersensitivity. The most reliable diagnostic criteria is the study of the width of the plantar fascia under ultrasound. The aim of this study was to assess the pressure pain thresholds (PPT) at a local level, measure the distances and assess the differences in the ultrasound image of the foot in patients with plantar fasciitis in different groups according to their Body Mass Index (BMI).

Material and methods: A descriptive, cross-sectional study with 31 patients (16 women and 15 men, with a mean age of $=45.17 \pm 11.31$) diagnosed with unilateral plantar fasciitis and who were divided into three groups according to their BMI and based on the recommendations of the World Health

Organization (normal weight, $n=9$; overweight, $n=11$; and obesity, $n=11$). An ultrasound assessment was performed (MyLay™ 25, Esaote Medical Systems, Geneva, Italy) to obtain the quantitative measures of the plantar fascia and a pressure algometry (Somedic AB, Farsta, Sweden) was used to determine the PPT.

Results: The analysis of pain displayed statistically significant intragroup differences (greater on the affected side than the non-affected side), however no significant intergroup differences, upon the points of the plantar fascia (group: $F=0.688$; $P=0.511$; side: $F=12.236$; $P=0.001$), and the soleus muscle (group: $F=0.703$; $P=0.504$; side: $F=7.582$; $P=0.008$), without differences in the remaining points. However, the ultrasound image revealed statistically significant differences between sides and groups for the insertion on the calcaneus (the data display the means and standard deviations of the affected side and the non-affected side, respectively; normal-weight group: $0.4 \pm 0.08 \text{ cm}$; $0.35 \pm 0.03 \text{ cm}$; overweight group: $0.53 \pm 0.14 \text{ cm}$; $0.41 \pm 0.09 \text{ cm}$; obesity group: $0.64 \pm 0.10 \text{ cm}$; $0.50 \pm 0.13 \text{ cm}$. Comparison by group $F=9.668$; $p=0.001$; comparison by side: $F=9.224$; $p=0.004$) and for the plantar fascia in the mid-point (the data display the means and standard deviations of the affected and non-affected sides, respectively; normal-weight group: $0.42 \pm 0.07 \text{ cm}$; $0.33 \pm 0.04 \text{ cm}$; overweight group: $0.66 \pm 0.21 \text{ cm}$; $0.43 \pm 0.12 \text{ cm}$; obesity group: 0.74 ± 0.15 ; $0.60 \pm 0.17 \text{ cm}$. Comparison by group $F=9.564$; $p=0.001$; comparison by side: $F=9.333$; $p=0.003$).

Conclusions: Independent of their body composition, patients with chronic plantar fasciitis present generalized and bilateral hypersensitivity. However, the body composition influences the increase in thickness of the fascia, which produces bilateral affectation.

Structural changes in recalcitrant epitrochlear tendinopathy after the combined application of percutaneous needle electrolysis, PRP and active biological stimulus in a professional tennis player

Blanca Bernal Fernández-Galiano, Sergio Gómez-Domínguez. Medical Services CD CREF Baloncesto, Centro de Fisioterapia SG Élite, Madrid, Spain.

Introduction/aims: Epitrochlear tendinopathy is a degenerative pathology of the common epitrochlear tendon, which courses with pain at the medial elbow and functional impairment. In advanced stages, it incapacitates athletes and compromises activities of daily living. The aim of the present communication was to describe the case of a professional tennis player with chronic epitrochlear tendinopathy treated with percutaneous needle electrolysis, PRP and active biological stimulus.

Patient and methods: A male, professional tennis player, aged 34 years old, with a left epitrochlear tendinopathy of 7-months evolution, was forced to interrupt his sports activity due to functional impairment secondary to the injury. Imaging tests (NMR and ultrasound) confirmed the presence of an epitrochlear tendinosis with intrasubstance rupture of the epitrochlear tendon. The patient received 2 infiltrations of Celestone+Scandinibsa in the 5 months prior

to receiving treatment. A conservative, minimally invasive treatment was programmed, lasting 8 weeks, in which invasive physiotherapy techniques were combined with active loading exercises, with the therapeutic aim of restoring the functionality of the tendon, avoiding surgery, readapting it to support the loads required in professional tennis. A physiotherapist external to this process performed an initial and final assessment of the case. The invasive physiotherapy interventions were performed by a second physiotherapist, whereas the active readaptation work was planned and supervised by a third physiotherapist. The material used was:

GE Logiq S7 and S8 ultrasound machine, Indiba Activ 902, Physio Invasiva[®], Kit Orthopass 20 ml by Proteal, Agu-punt needles measuring 25 mm, and the sports installations of the Chamartín Tennis Club.

Results: The ultrasound examination on behalf of the physiotherapist who was blinded to the treatment process revealed structural changes in the tendon, with an absence of neovascularization and an increased resistance of the tissue, evaluated using elastography. At the same time, the patient's symptoms subsided and his functionality improved.

Conclusions: After 8 weeks of treatment, and considering the structural changes that were visible in the ultrasound images, we can conclude that the combination of PNE+PRP+active biological stimulus is an effective treatment option for cases of recalcitrant epitrochlear tendinopathy. The patient's functionality is optimal, returning to training periods prior to competition.

Viability of different times and intensities of galvanic current on the cell cultures of mice

José Antonio García-Vidal, Pilar Escolar-Reina, Francesc Medina-Mirapeix, Pablo Pelegrín-Vivancos, Ana Isabel Gómez-Sánchez, Carlos Manuel Martínez-Cáceres. University of Murcia, Murcia, Spain.

Introduction/aims: Percutaneous Needle Electrolysis (PNE) is a therapeutic weapon that has demonstrated its effectiveness for the treatment of tendinopathies and muscle problems. However, basic research on its effects on the cellular and histological level is scarce. The aim of the present study was to verify whether after the application of a galvanic current using different time and intensity settings, cell death or structural alteration takes place, immediately after the application and 4 h after the same.

Material and methods: Using a special device especially designed for cell cultures (Physio Invasiva[®] device, PRIM), different intensities were applied (0.3, 0.5, 1.0, 2.0 and 3.0 mA), with a varying number of impacts (1–3) and durations (2" and 6") to 10 containers with macrophage cells extracted from the mouse femur (C57BL6), the culture cells were fixed with phosphate buffered saline (PBS). Two of the containers were used as a control. Cellular integrity was analysed using optical microscopy after the intervention and 4 h later.

Results/conclusions: No change was observed in the cellular integrity and morphology of the macrophages, neither after the application of the galvanic current nor 4 h after the same.

Dry needling in the control of dystonia and functional integration in a patient with stroke: A case report

María Presa-Fernández, Cristina López-Pascua, Eduardo Ranz-Ramírez, Laura Rubio-Martínez. Centro LESCER, Madrid, Spain.

Introduction/aims: The incidence of cerebrovascular accidents has considerably increased among the young population, and over the last two decades the number of cases between 20 and 64 years has escalated. The prevalence of associated dystonia is of 16 cases per 100,000 population. The approach of this study has consisted in neurological physiotherapy complemented with dry needling. Dry needling is a recently incorporated tool which shows benefits in the normalization of tone and the control of hypertonia, as well as in movement dysfunction in general. The aims of the present study were: to display the effects of dry needling on muscle tone and the control of dystonia in a clinical case.

Patient and methods: A patient aged 24 years old with no relevant clinical history diagnosed with an ischemic right stroke with lesions to the basal ganglia. This patient received nine months of neurological rehabilitation with dry needling. The needles used measured 0.25 in diameter by 40 and 24 mm in length, applied in the following muscles: adductor pollicis and interossei, pronator teres, teres major, latissimus dorsi, trapezius and pectoralis major, with an interval of 7–10 days. The tests administered were the pre-post STREAM, Ashworth and FIM.

Results: Improvements were found regarding the normalization of tone and the quality of movement of the upper limb, as well as the functional repercussion in activities of daily living showing STREAM test values of 59/70 preintervention and 66/70 postintervention; the Ashworth scores were 30 preintervention and 17 postintervention; in the case of the FIM, these were 110/126 preintervention and 115/126 postintervention.

Conclusions: The results of the present clinical case indicate that the physiotherapy intervention together with dry needling facilitated the normalization of tone and the control of dystonia. However, the performance of future studies is highly recommended in order to demonstrate the effectiveness of dry needling in dystonia associated with a cerebrovascular accident.

Analgesic effectiveness of PENS versus TENS in chronic neck pain of myofascial origin

José Vicente León-Hernández. CSEU La Salle, Madrid, Spain.

Introduction/aims: Chronic pain is one of the most prevalent pathologies of society today. Among its origins, one of the most widely accepted is myofascial pain syndrome. Regarding methods of pain treatment, transcutaneous electrotherapy (TENS) is one of the most used techniques. Over the last years, different invasive forms of application of electrotherapy have appeared, as such, percutaneous nerve stimulation (PENS) is the invasive version of TENS. In this type of electrotherapy application, a needle is used as an electrode, thus decreasing the resistance of the skin to

the passage of the current, and therefore increasing the analgesic effectiveness. The main aim of this study was to analyse the analgesic effectiveness of PENS, comparing it with the traditional transcutaneous application (TENS). A secondary aim was to relate the analgesic effects of both applications with the level of neck disability perceived by the subject.

Material and methods: A randomized, single-blinded clinical trial with short-term follow-up (pre-treatment, post-treatment and 72 h post-treatment). A total of 58 subjects with myofascial pain syndrome and active trigger point number 2 of the trapezius muscle (PGA2) were randomized and distributed into two treatment groups. Group 1 ($n=31$, mean age 23.19 ± 4.82 years and 7 men/24 women) received treatment with low frequency TENS (2 Hz and $120 \mu\text{s}$ pulse) during 15 min, applying the negative electrode in PGA2 and the positive one 2 cm lateral. Group 2 ($n=27$, aged 26.79 ± 9.79 years and 9 men/22 women) received PENS with the same parameters, although in this case, a dry needling needle was used in PGA2 of the trapezius as the negative electrode, maintaining the positive electrode as adhesive. The measurement variables were the intensity of neck pain via the use of the Visual Analogue Scale (VAS) and the neck disability, measured using the Neck Disability Index (NDI).

Results: The group that received PENS improved the values of neck pain in all measurements of the follow-up period (VAS pre 4.74 ± 1.86 ; VAS post 3.05 ± 2.22 and VAS 72 h 2.14 ± 1.97 ; $P < 0.05$). The group that received TENS improved in all measurements, except in the post-treatment period versus 72 h later (VAS pre 6.44 ± 1.92 ; VAS post 4.67 ± 1.81 , VAS 72 h 5.18 ± 1.98), in which the pain increased, however not significantly ($P = 0.487$). Regarding the correlation between disability and neck pain, only the PENS group displayed significant values (VAS correlation coefficient pre/NDI pre; $r = 0.514$; VAS correlation coefficient 72 h/NDI 72 h; $r = 0.912$).

Conclusions: The application of PENS in patients with chronic neck pain of myofascial origin is more effective in the short term compared to traditional TENS. The effect of PENS is associated with patient-perceived improvements in neck disability. It would be recommendable to increase the follow-up period in future studies.

Growth factors as a complement to the technique of dry needling. The treatment of myofascial trigger points in elite athletes

Enrique Bordería-Carsí, Ramón E. Bordería-Vidal, Javier Ballestin-Vicente. Centro de Fisioterapia terapèutica a2 mans, Valencia, Spain.

Introduction/aims: Although people with muscle overload can pursue sports practice, this is often associated with pain (the presence of myofascial trigger points) which interferes with the correct performance of the sports technique. Dry needling (DN) is a recognized and accepted technique representing the treatment of choice; however, the use of platelet-rich plasma (PRP) as a combined treatment has no scientific evidence-base. The aim of this study was to assess the effectiveness of invasive ultrasound-guided treatment with PRP as a complement to the technique of dry needling in the treatment of trigger points.

Material and methods: A randomized clinical trial. Twenty high-level acro gymnastics athletes (10 women and 10 men) with symptoms of trigger points in the trapezius muscle, confirmed by palpation. Patients were randomized to two groups: group A exclusively received DN on the trigger point; group B received DN of the trigger point followed by ultrasound-guided injection of PRP (DN + PRP). All participants were assessed on the day of treatment, after 24 h, and after 7, 14, 21 and 28 days. Assessments included the level of pain of subjects (VAS, 0–10), the pressure pain threshold (algometry) and the intensity of provoked pain (VAS/algometry) at 4 kg/cm^2 in women and at 5.5 kg/cm^2 in men. The functionality of the upper limb was assessed via the Kerlan-Jobe scale for the upper limb and using a satisfaction survey. The ultrasound assessment criteria were the assessment of changes in the echogenicity of the tissue in the area of the trigger point, the sonoelastographic variation of the tendon (area of greater stiffness) both semi-quantitatively and considering variations in neovascularization.

Results: Statistically significant differences were not found between the groups of DN and DN + PRP in the pre and post intervention measurements, neither for any of the variables under study.

Conclusions: These findings do not demonstrate the usefulness of treatment with growth factors as a complement to dry needling.