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Case Report | Open Access

Aggressive Massage Techniques can Accelerate Safe Return after Hamstrings Strain: A Case Study of a Professional Soccer Player

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Abstract

Study Background: Hamstrings strains are very common in soccer players and their rehabilitation involves a demanding process which may be considerably time consuming depending on the severity of the injury. Traditional treatment for these injuries includes conservative forms of treatment such as gentle massage, passive stretching, electrotherapy and functional exercises during training. The aim of this case study was to evaluate the effectiveness of an aggressive rehabilitation program in the treatment of grade I hamstring strain in a professional athlete.

Methods: A 30 year old professional soccer player clinically diagnosed with grade I hamstrings' strain underwent a 15 days aggressive rehabilitation program. This included aggressive massage techniques with cups, instruments and stripping techinques, cryostretching/cryokinetics exercises, core strengthening and supervised functional exercises in the field.

Results: The applied aggressive rehabilitation techniques reduced the conventional time of the athlete's absence from sports participation by almost 50%. In addition, further relapses in the following period were prevented.

Conclusion: This case study provides some evidence that aggressive physiotherapy techniques can reduce the absence from sports participation after hamstrings strain. Implementation and testing of these techniques in large randomised control studies is necessary for securing firm conclusions regarding their effectiveness in muscle strain rehabilitation.

Keywords: Hamstrings strain; Aggressive physiotherapy; Stripping massage; Cryostretching; Soccer

Introduction

Lower extremity injuries are very common among professional soccer players with reported incidence rate varying from 7.4-47.5 injuries per 1000 hrs of play. The vast majority of these injuries refer to the lower extremity (68–88%) [1,2], approximately 25% of which are non-contact hamstring muscle strains [3,4].These injuries are mainly caused by an excessive stretch of an eccentrically contracted muscle [5,6]and etiology is attributed to both extrinsic and intrinsic factors [7,8]. The main extrinsic factor, recorded in 44–74% of the injuries [9,10], is the physical contact between opponent players (contact injury). Contrariwise, asymmetries in muscle strength, flexibility, proprioception, anatomical and anthropometric characteristics [9-16]and previous injury [5,6] constitute the main intrinsic etiological factors for hamstrings' strains.

Hamstrings' strains are classified into three grades (grades I, II, III) with regard to the severity of symptoms. Grade I refers to a mild strain where few muscle fibres are torn while grade II strain is a moderate injury associated with a greater number of injured fibers. Symptoms of both Grades I and II muscle strains include pain and tenderness upon pressure, local swelling, muscle spasm and a decrease in the range of motion. Pain becomes stronger during passive stretching or contraction of the muscle. Grade III strain is a complete tear of the muscle causing absolute loss of muscle function, as well as considerable pain, swelling, tenderness and ecchymosis [17].

Physiotherapy techniques applied to treatment at the acute and sub-acute stages of muscle healing are primarily aiming at reducing inflammation, pain and swelling and secondary at early muscle loading and strengthening. The reduction of swelling and intramuscular hematomas is of critical importance since it relates directly to the speed of the healing process [18].

For this purpose, different types of sports' massage, electrotherapy and cryotherapy are being used by physiotherapists. The massage performed in most cases includes pain-free superficial and deep effleurages (strokings) in an effort to mechanically enhance the venous blood return and decrease muscle spasm and pain [19]. Nevertheless, techniques of aggressive massage (cupping massage, stripping massage and massage with the use of instruments-Instrument Assisted Soft Tissue Massage-IASTM) which have been developed in the last years are being carried out with particular intensity and pressure causing considerable pain (VAS=4-5) [20,21].

These aggressive procedures have not yet been tested in the treatment of muscle strain. This represents a challenge worthy of investigation, given their obvious contribution to accelerating reduction of swelling and hematoma after a strain. In that direction, this case study presents the application and effect of an aggressive rehabilitation programme which included a combination of aggressive massage with cupping therapy–IASTM, cryostretching-cryokinetics and progressive core and lower extremities strengthening on a professional soccer player of the Greek Second National Division diagnosed with a Grade I hamstring muscle strain.

Case Report

In April 2013, a 30 year old soccer player suffered a right hamstrings' injury during soccer speed drills. The evaluation of the injury from the team of orthopedic physicians identified the presence of a grade I biceps femoris muscle strain near the musculotendinous junction. MRI examination showed a 3-4 mm lesion and confirmed diagnosis

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(Figure 1). Physical examination revealed a 10° deficit in hip flexion with extended knee, compared with the healthy limb, due to pain and increased muscle spasm. The compression of the area caused moderate pain (3-4 Vas scale) and the athlete reported a feeling of tightness in the hamstrings region during daily living activities (walking, ascending and descending stairs etc.)

Aggressive rehabilitation program

Physiotherapy: The rehabilitation process began immediately after the injury and its contents are presented in table 1 below. The first two days after the strain, during the acute phase, the main objectives of rehabilitation were (i) decreasing swelling and hematoma, (ii) preventing re-injury, (iii) decreasing pain, and (iv) accelerating the healing process. In this regard, R.I.C.E. (Rest-Immobilisation-Cryotherapy-Elevation) and therapeutic non-warm ultrasound were applied daily. To prevent further swelling a soft wrapped bandage and therapeutic non-thermal ultra sound were used [22].

First (A) sub-acute phase treatment took place from the 3rd until the 7th day with the main objectives of (i) reducing/removing the hematoma and swelling, (ii) initialising alignment and reattachment of muscle fibers and minimising the risk of developing scar tissue. The treatment started with 10 min of thermotherapy (short-wave diathermy) followed by cupping, stripping and IASTM stripping massage techniques.

The application of negative pressure massage (suction cups) started with static applications over the injury site for 5 min and progressed to dynamic application and movement of the cups towards the heart (Figure 2) [23,24].

Stripping massage with or without instruments was performed with high pressure intensity (pain perception VAS6-7)in two phases: initially to the region centrally to the injury for "draining" of the thigh great vessels and then directly upon the site of the injury for the mobilisation-decrease of muscle hematoma-swelling (Figures 2 and 3) [23].

In addition, cryotherapy, pain-free cryokinetic isometric and cryostretching exercises were used to achieve the aforementioned objectives [25,26]. These cryostretching exercises were performed with an ice bag attached to the injury site, passively by the physiotherapist.

The program concluded with therapeutic ultrasound, TENS and gentle passive stretching. Core stabilisation was enhanced through plank exercises in all directions [27]. In order to prevent a subsequent injury, kinesiotaping was applied on the hamstrings at the end of each treatment session.

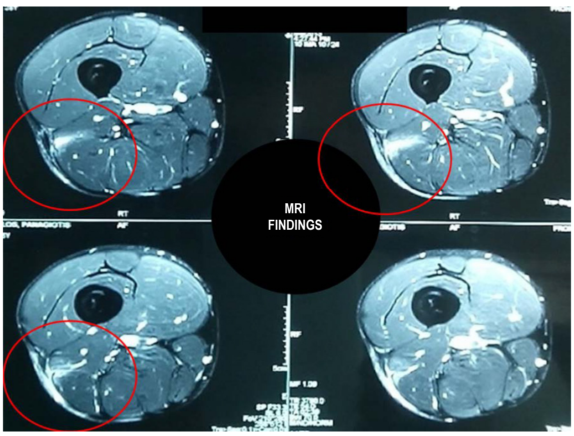

Figure 1: MRI findings from the site of injury.

Figure 2: Aggressive massage techniques.
1: Static cupping therapy, 2: Dynamic cupping massage, 3: Striping massage, 4: IASTM massage.

Figure 3: Phases of aggressive massage techniques: (i) A Phase=centrally from the injury site towards the trunk, (ii) Phase B=directly upon the injury site with direction towards the trunk.

Figure 4: Initial appearance and gradual reduction of superficial hematomas after aggressive forms of sports massage.
4.1 Echymosis after 1st day of treatment, 4.2 Echymosis at 4th day of treatment
4.3 Echymosis at 8th day of treatment, 4.4 Echymosis at 12th day of treatment.

On the 4th and 5th day, after the injury began to emerge signs of surface displacement of intramuscular hematomas, the patient reported significantly less pain during massage and passive hip flexion improved by 5°. The skin ecchymosis was progressively removed until 10th-2th day (Figure 4).

On the 7th day, treatment had successfully progressed and the

Phase/Programme description	Acute Phase (Days 1-2)	Sub-acute Phase A (Days 3-7)	Sub-acute Phase B (Days 8-15)
Physiotherapy Objectives	**1. Swelling–Hematoma stabilization** **2. Prevention of relapses** **3. Pain reduction** **4. Initializing-Accelerating inflammatory rehabilitation process**	**1. Reducing/removing hematoma - swelling** **2. Initializing alignment and reattachment of muscle fibres** **3. Minimizing development of scared tissue** **4. Reduce pain** **5. Regaining strength and agility**	**1. Achieving elasticity of the scar tissue** **2. Regaining functional muscle ability (agility-strength-endurance-proprioception)**
Aggressive Physiotherapy Techniques	**1. Cryotherapy** **2. Elevation** **3. Immobilization** **4. Use of crutches** **5. Compression (Soft-wrapped bandage)** **6. Therapeutic non-warm ultrasound** (0.5 W/cm^2 /1-3-MHz/10΄**)**	**1. Diathermy (10΄)** **2. Massage (15΄)** **3.Cupping massage (8΄)** a) Static application on the injury site (5') b) Dynamic application with cups motion towards the core (3') **4. Stripping massage (5΄)** **a**) centrally to injury site b) directly upon injury site with direction towards the trank 5. **IASTM Stripping massage (2')** (application same as above) 6. **Cryotherapy (20΄)** 7. **Cryokinetic** Isometric exercises of hamstring muscles (4 sets with 10 isometric contractions) (6΄΄of progressive contraction -2΄΄ break) 8. **Cryostretching** Stretching through active motion -Stretching of antagonist muscles (12΄΄ stretch -12΄΄ relaxation) 9. **Electrotherapy** Therapeutic Ultrasound- TENS 10. **Core stabilisation exercises** (planks in supine - lateral and prone position)	**1. Diathermy** (15') **2. Massage** 2.1. Stripping massage (5΄) **a**) centrally to injury site b) directly upon injury site with direction towards the trank 2.2 Stripping massage in combination with gentle eccentric hamstrings' contraction (with elastic band/5') **3. Cryotherapy (20΄)** **4. Cryokinetic** Isotonic- concentric contraction of hamstrings with the use of elastic bands (4-5 sets 10-12 repetitions) 5. **Cryostretching** 2 sets x 5 stretching repetitions for 30΄΄ (1 set with extended knee – 2nd set with flexed knee) 6. Electrotherapy **T.E.N.S ,Therapeutic Ultrasound** 7. **Core stabilisation exercises** (planks in supine - lateral and prone position) **8. Balance exercises**
Home-based Rehabilitation	Rest/ Cryotherapy (Continuous application 20΄-30΄ with a 90΄ break.)	1.Hamstrings' stretching (2 sets of 7 repetitions for 30΄΄ with extended and flexed knee position) 2.Isometric exercises (4 sets of 10 contractions (6΄΄of progressive contraction-2΄΄ of relaxation) 3. Low resistance exercises in a pool – swimming	1. Hamstrings' stretching: 2 sets of 7 repetitions for 30΄΄ (with extended and flexed knee position) 2. Strengthening with elastic bands : (daily 6-7 sets of 10-12 repetitions in sitting and standing positions) 3. Myofascial release exercises with Foam roller on hamstrings (10 repetitions for 1΄ with a 1΄ relaxation break)
Functional rehabilitation in the field		1. Trunk and upper limbs strengthening exercises in the gym 2. Upper body ergometer 3. After day 4, beginning organized gait (forward and backward) 5th day-walking 10΄ 6th day- walking 15΄ 7th day-walking 20΄ (2x10΄)	**8th-10th Days** Aerobic training: Running (2x10΄/ 30-40% Vo_2 max) Skipping routines/Stretching Trunk-pelvis stabilisation exercises Combined exercises (proprioception-agility-balance) **11th-13th Days** Aerobic training: Running (2× 10΄/ 50% Vo_2 max) Skipping routines - Stretching/pelvis stabilisation exercises 10x50 m (60% Vo_2 max) / 5x100 (60% Vo_2 max) Ballistic hip exercises (dynamic stretching)/10x50 m (60% Vo_2 max) /5x100 (alternating intensity rhythm: 50 m at 50% and 50 m at 60-70% Vo_2 max) **14th-15th Day** Aerobic training: Running (2x10΄/ 50% Vo_2 max) Isokinetic strengthening (concentric –eccentric contraction)/ Skipping routines – Stretching/ Pelvis stabilisation exercises / Ballistic hip exercises/5x100 m (70% Vo_2 max) Dynamic proprioception exercises of lower limbs 5x100 (alternating intensity rhythm: 50 m at 60% and 50 m at 70-80% Vo_2 max)/10x40 m (alternating intensity rhythm: 20-20 m at 60%/80-90% Vo_2 max) Soccer mimetic exercises- plyometric strengthening
Precaution - rehabilitation		Kinesiotaping	Kinesiotaping
Criteria for progression to the next phase		1. Swelling–pain minimization 2. <5° range of motion deficit 3. Minimum pain (2-3 VAS SCALE) during compression of the area	1. Isokinetic strength symmetry (concentric 60° /180° /300° sec.-eccentric 60/180° sec) 2. Full range of motion 3. Performing soccer burst exercises (changing direction-sprint etc.) without discomfort 4. Good psychological state -confidence of the athlete

Table 1: Aggressive rehabilitation program for grade I hamstrings strain in a professional soccer player.

athlete was able to meet the criteria which would allow treatment to progress to the next stage, namely (i) reduction of swelling and pain, (ii) full range of hip flexion with knee extended and (iii) minimum pain (VAS =1-2) during compression (Table 1). It must be noted that during the A subacute phase, the athlete reported daily improvement, either in terms of pain or of his functional ability (flexibility, strength etc.).

Second (b) sub-acute phase treatment aimed at (i) ensuring elasticity of the scar tissue and (ii) regaining functional muscle ability, strength, endurance and coordination. From the 8th until the 15th day, the athlete was subjected to roughly the same techniques as in the previous phase with minimum qualitative adjustments such as the application of stripping massage combined with eccentric exercise [20] and incorporating hamstrings isotonic exercises with elastic resistance (Table 1).

IASTM stripping massage and cupping therapy were not used at this stage since swelling and hematoma had already retreated. Balance exercises were also added to the program in order to prepare the athlete to rejoin regular training. Isokinetic strengthening began on the 14th day after the injury while kinesiotaping application continued to be used in order to prevent further injury. Criteria set to determine completion of this phase and the ability of the athlete to rejoin regular training were met on the 15th day including (i) isokinetic strength symmetry, (ii) full range of motion in hamstrings' movement, (iii) the ability to perform soccer burst exercises without experiencing discomfort, and (iv) positive psychology and confidence (Table 1).

Home-based rehabilitation program

During all phases the athlete was given instructions to follow a daily home-based physiotherapy program. During the acute phase, the athlete was expected to rest with repeated intermittent cryotherapy application on the injured muscle. Sub-acute phase homework included hamstrings' stretching up to the limit of pain, and isometric exercises. Sub-acute phase B home-based rehabilitation comprised of hamstrings' stretching, muscle strengthening exercises with elastic bands in standing position and foam roller myofascial release exercises (table 1).

Progressive Sports Rehabilitation program

Following the acute phase, the athlete also followed a progressive sports rehabilitation protocol which was executed in the field. During sub-acute phase A, strength building exercises for the trunk and upper extremities were performed under the guidance of the team physiotherapist. After day 4, organised gaiting was added to the program in forward and backward motion. During sub-acute phase B, a progressive rehabilitation program was designed to be executed from the 8th until the 15th day in order to prepare the athlete for safe reintegration to normal training schedule. Cardiovascular conditioning was achieved through an aerobic running regime of gradually elevated duration and intensity. The athlete also performed several skipping routines and dynamic (ballistic) stretching exercises. Special attention was paid to the trunk and pelvis stabilisation exercises throughout this stage. The program gradually progressed from isokinetic strengthening and dynamic stretching to dynamic stabilisation and proprioception exercises of lower limbs. Soccer mimic exercises and plyometric training were initiated on the 14th day (table 1).

After 15 days, full strength and range of motion were achieved, the palpation of the area was pain-free and the athlete was released to return to full competition.

The athlete was monitored for six months following completion of rehabilitation in which nore-injury episode occurred. This period represents an extended timeframe within which the injury at the same site can be characterised as a recurrence injury. More specifically, although the site of the injury is active and sensitive for the following several months, [28] no recurrences of muscle strains have been reported in sports literature after a period of 5-6 months from the initial injury [29].

Conclusions

The implementation of an aggressive rehabilitation protocol in the treatment of a grade I muscle strain of a soccer player decrease recovery time by 50% approximately compared with traditional muscle strain rehabilitation protocols [17,28] proposing absence from sports and physiotherapy for 20-30 days. In this case study the athlete was able to return to full training within 15 days from injury and did not experience re-injury in the following6 months.

The proposed treatment protocol was based on aggressive techniques which were performed under considerable pain. This method has not been reported in international literature since techniques that cause pain are avoided in classical physiotherapy [17,30] because of the belief that these cause re-injures and increase the recovery period. In the present case study, massage techniques performed with great intensity directly on the injury site provoked significant temporary pain. However, they also significantly accelerated the mobilisation of hematoma and edema without causing any other problems to the athlete besides temporary pain. The pain exacerbated by the execution of these massage techniques is attributed to temporary increase in pressure on pain receptors from mechanical stress and not from deterioration of the injury [31]. This theoretical assumption is reinforced by the fact that the athlete reported significant improvement in his symptoms and functional capacity after each treatment.

The intense pressure and cephalic direction of massage strokes mobilise the swelling-hematomas in the superficial layers of the muscle, through myofascial pathways. This "draining" adaptation creates favourable conditions for the re-union of the injured muscle fibers and preliminarily explains the significant reduction in recovery time from grade I hamstrings strain observed in our case study.

In relation to the positive results of massage, it has been observed that cryostretching also contributed to a faster recovery of the passive range of hip flexion. These techniques have limited research support but are generally considered safe when performed with care and to the limits of pain [26]. Furthermore, integrating core exercises also helped the dynamic stabilisation of the trunk-pelvis of the athlete and probably reduced his risk of re-injury, confirming previous research findings [27]. The findings of the present case study are very encouraging. Further research with large randomised controls studies is deemed necessary in order for the effects of aggressive physiotherapy techniques to be clarified.

On the basis of the aforementioned results, the preliminary conclusion may be drawn that aggressive massage techniques have a positive effect on reducing edema-hematoma after hamstrings strain. In addition, they significantly reduce the recovery time in comparison to the standard approach.

These techniques need to be tested also in treatment of more severe muscle strains (grade II). However, based on the promising findings of this case study, it can be assumed that such techniques are likely to have an equally important impact on reducing the time of absence after more severe muscle strains. This is being amplified by the fact that reduction of post-traumatic edema-hematoma constitutes the predominant problem in these cases. Future studies should also compare traditional and aggressive physiotherapy in restoration of other important parameters such as elasticity, strength and proprioception.

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Research Article Open Access

The Effectiveness of Instrument-assisted Soft Tissue Mobilization Technique (Ergon© Technique), Cupping and Ischaemic Pressure Techniques in the Treatment of Amateur Athletes´ Myofascial Trigger Points

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Abstract

Objective: To compare the effectiveness of a novel Instrument-assisted soft tissue mobilization technique (Ergon© Technique), cupping therapy, and ischaemic pressure technique in the treatment of active myofascial Trigger-points (MTrPs) at the low-back region of amateur soccer players.

Design: Randomised controlled clinical trial.

Methods: Seventy (70) amateur soccer players (age=24.76 ± 4.39; height=174.98 ± 8.31 cm; weight=73.26 ± 11.21 kg) were evaluated for the presence of active MTrPs in their low-back region and were randomly allocated to three subgroups. The first group (N=20) was treated with Ergon-IASTM Technique©, the second (N=20) with a static application of cupping therapy and the third group (N=20) with ischaemic pressure. Ten (10) players received no treatment and served as controlsgroup. All athletes received one (1) therapeutic intervention per week for three (3) weeks. Outcome measures were MTrPs pain pressure threshold (PPT) and pain sensitivity (VAS).

Results: All three therapeutic interventions led to a significant ($p<0.05$) reduction in MTrPs pain sensitivity and an increase in PPT at the end of the treatment compared with controls. The Ergon©-IASTM Technique produced a significantly larger effect ($p<0.05$) in the reduction of pain and PPT during compression of MtrPs compared with cupping and ischaemic pressure technique. These therapeutic adaptations after Ergon©-IASTM Technique application were evident even from the first treatment ($p<0.05$) and reinforced by the end of the third treatment ($p<0.001$). No significant difference ($p>0.05$) was observed between cupping and ischaemic pressure techniques for their impact on MTrPs.

Conclusions: The Ergon©-IASTM technique can serve as a first treatment options for sports physiotherapists when they manage Low-back MTrPs in amateur athletes. More research is needed in order definite conclusion to be drawn regarding the effects of this novel therapeutic intervention on MTrPs.

Keywords: Myofascial trigger points; Ergon instrumment assisted soft-tissue mobilization technique; Cupping; Ischaemic compression technique

Introduction

Myofascial pain syndrome is defined as sensory, motor, and autonomic symptoms resulting from painful spots in the fascia surrounding skeletal muscle known as myofascial trigger points (MTrPs) [1,2]. MTrPs are associated with palpable nodules in taut bands of muscle fibers. Compression of these points may elicit a) motor dysfunction, b) local and referred tenderness, b) pain perceived at a different spot than the site of the painful stimulus (referred pain), c) transient contraction of the muscle (local twitch response) and d) autonomic phenomena. Diagnostic findings of MTrPs include severe ROM limitation, a palpable taut band with exquisitely tender nodule and familiar to patient pain elicited from pressure on painful Spots (jump sign) [3,4].

Etiology of myofascial pain is multifactorial including poor ergonomy and body biomechanics, acute or repetitive trauma, excessive or no exercise and vitamin deficiency [5,6]. Other factors contributing to the development of MTrPs include psychosocial factors, such as high job pressure, psychological stress and anxiety [7,8]. MTrPs are thought to be involved in pain in tension headaches, low back pain syndromes; pelvic pain; and musculoskeletal pathologies such as bursitis, tendinopathies, and muscle strains [9,10].

MTrPs can be seen in the setting or athletic injury due to muscle asymmetries and imbalances, postural deficiencies, or secondary to repetitive injury and training overloading. Evidence to date reinforces the theory that MTrPs develop after muscular overuse and especially after eccentric overloading and submaximal-maximal concentric contractions [11,12]. A key factor is a localized ischemia, leading to the subsequent release of several inflammatory mediators in muscle tissue through a pH reduction [7]. Examples of the latter include MTrPs in quadratus lumbar in association with lumbar pathologies or gluteal trigger points in the presence of hip and pelvis overloading. More specifically, myofascial pain arising from trigger points in the low-back and gluteal region is a typical presentation in athletes who overload the hip area with shear forces like soccer players [13]. This type of myofascial pain may be local or referred and in the majority of the cases, is reproduced by the application of digital pressure to gluteal muscle trigger points [14].

Treatment of myofascial trigger points in non-athletic populations during the past has been based on invasive and noninvasive techniques. Invasive therapies include acupuncture, dry needling and injections [15]. Non-invasive techniques are osteopathic manual techniques, massage, stretching, application of heat and ice, TENS, ethyl chloride Spray and Stretch technique, ischemic pressure, cupping therapy, instrument-assisted soft tissue techniques (IASTM) and a combination of them [16,17]. Nevertheless, the efficacy of the above methods is not clear since several researchers reported that many myofascial treatment techniques are poorly validated and not necessarily more effective than placebo [5,18]. It seems that the application of a noxious stimulus may be the key to obtaining improvements in pain sensation perception. Likewise, ischaemic pressure and dry needling, have shown benefits in releasing myofascial induced muscle spasm and aches [19,20].

Ischaemic compression using local application of sustained pressure over the MTrPs has been reported that reduces muscle spasm and therefore deactivates the MTrPs [21,22]. The benefits of ischemic compression that were described by several investigators have been attributed to several adaptations like a) separation of the actin-myosin cross fiber links, b) reflex vasodilation and subsequent flushing away of metabolites and substances that maintain muscle contraction and c) temporary suspension of the involuntary motor neuron activity. Lastly, it is also thought that the deep pressure also results in the release of endorphins which mask the perception of pain [21,22].

Instrument-assisted soft tissue mobilization techniques (IASTM) and cupping therapy techniques are procedures rapidly growing in popularity amongst athletes due to their effectiveness and efficiency in treating soft tissue restrictions while remaining non-invasive. IASTM techniques use special stainless steel instruments that enable clinicians to locate efficiently and treat soft tissue dysfunctions, such as fibrosis, adhesions, chronic inflammation, or degeneration [23,24]. Benefits from IASTM use include increased fibroblast proliferation, reduction in scar tissue and adhesions, increased vascular response, and remodeling of disorganized collagen fiber matrix [25]. IASTM technique also has been found that it results in clinical benefits such as improvements in range of motion, strength and pain perception following treatment [26,27]. Despite extensive use of IASTM techniques research regarding its effect on myofascial pain reduction, is limited. Gulick reported that IASTM (Graston Technique) does not differ regarding effectiveness on upper back MTrPs release compared to the control group [28].

Cupping is a therapeutic method that utilizes a glass or plastic cup to create negative pressure on the skin over a painful area for muscle spasm and pain reduction. The mechanism of cupping therapy is not clear, but some researchers suggest that placement of cups on the skin produces hyperemia, fascial release, and local stretching. Nevertheless, its therapeutic effect has not been proven through valid randomized control studies [29].

Although myofascial pain arising from MTrPs is a common problem in athletes, effective treatment strategies still elude us. Only one study in 59 male runners from Huguenin et al. [30] showed that dry needling and placebo needling of the gluteal trigger points resulted in subjective improvement in activity related muscle pain and tightness but not in straight leg raise or hip internal rotation range of motion. Unfortunately, we have no data comparing results between effective techniques like ischaemic pressure and novel therapeutic techniques like IASTM and cupping techniques from which to draw clinical conclusions about their effectiveness in athletic populations.

The purpose of the present study was two-fold to examine the presence of MTrPs in the low back and gluteal region of amateur athletes, and to compare the effectiveness of IASTM, cupping and ischaemic pressure techniques in MTrPs treatment. The following null hypothesis was tested: no difference exists among groups of amateur athletes′ receiving ischemic pressure, IASTM and cupping therapy versus control treatment in reducing MTrPs pain pressure sensitivity and pain intensity.

Methods

The study took place during the three-month period from June to August 2015. Following approval from Research Ethical Committee of the School of Health Sciences of Technological Educational Institute of Western Greece, seventy (70) male amateur soccer athletes (Age=24.76 ± 4,39; height=174.98 ± 8.31 cm; weight=73.26 ± 11.21 kg) recruited from local soccer clubs, advertisements, and referral from private medical clinics. The eligibility criteria were: a) amateur soccer players, b) aged 18 to 30; c) approximately same training regime (2-3 training sessions per week), d) presence of active MTrPs identifiable by spot tenderness in a taut, muscular band of quadratus lumborum and gluteal muscles (Maximus-medius) of the dominant side.

Exclusion criteria were: a) injury to the low back and lower extremities over the last six months; (b) skin lesion, (c) infection or inflammatory edema at MTrPs site. All athletes were given a full musculoskeletal physiotherapy assessment by KF, an experienced sports physiotherapist with training in MTrPs identification. After this first assessment seventy (70) soccer players met inclusion criteria and included in the study.

All subjects informed about the goals of the survey and agreed to participate. Patients gave written informed consent and randomly allocated to four experimental subgroups: a) the ischaemic compression (IC-TrPs, N=20) group, which received sustained ischaemic pressure on the MTrPs, b) the IASTM group that received Ergon© IASTM therapy to trigger points (IASTM-TrP, N=20), c) the group that received cupping therapy (C-TrP, N=20) or d) the control group (N=10). The three groups received three treatments over a three week period in total.

MTrPs evaluation

MTrPs were identified by palpation of taut muscle bands in the low back and gluteal region with the presence of a "jump sign" and referred pain when a firm pressure was applied. This task was performed by KF a licensed clinical physiotherapist with almost 20 years of clinical experience. Pressure sensitivity (in kg) of the MTrPs was assessed by a mechanical Algometer (Wagner Pain Test™ instrument - Model FPK/FPN-Greenwich-USA) with a 1-cm diameter tip. Test-retest reliability of such equipment in assessing muscle function is reported to be relative high [31].

Interventions

Iscaemic pressure: The IP-TrPs group received ischemic compression treatment at the three MTrPs of the gluteal and low-bak region. For this therapeutic procedure, the athlete was lying prone with the cervical spine in a neutral position. The therapist (KF) applied gradually increasing pressure to the MTrPs with the tip of his thumb until the sensation of pressure became one of pressure and pain (Figure 1). At that moment, the pressure was maintained until the discomfort perceived by the patient eased by around 50%, at which time pressure was increased until pain appeared again. This process was repeated for 90" [3].

Figure 1: Ischaemic compression of lumbar MTrPs.

Instrumment-assisted soft tissue mobilization techniques (Ergon© Technique)

The IASTM-TrPS group received particular instrument-assisted soft tissue technique called Ergon© Iastm Technique on MTrPs [32]. Ergon© Technique is an innovative therapeutic approach that combines static and dynamic manipulation of soft tissues with specific clinical tools (Ergon© tools) aimed at treatment of myofascial dysfunctions. These techniques, when applied to specific areas of myofascial restrictions, can improve facial mobility and decrease muscle spasm and pain. For the application of Ergon© Technique, the patient was lying prone on the couch [32]. The therapist applied four (4) Ergon© strokes for two (2) minute on each MTrP with specific Ergon© IASTM Tools. Ergon© strokes used were a) the wave (Figure 2) b) the cyriax in star type of application (Figure 3) c) the m-cut stroke (Figure 4) d) the double stroke (Figure 5). The wave stroke involves linear facial applications, respectively, performed in all directions above and around the MtrPs. Cyriax-Star stroke is a therapeutic intervention applied just above the trigger point pain spot and with direction from the center to the periphery with the purpose of localized release and tissue stretching. M-cut stroke refers to a saw motion of IASTM tools which covers the entire area combining linear and vertical tools applications on soft tissue. The double-stroke technique involves the simultaneous use of two tools (Ergon© tools I and II) in a procedure where one tool stabilizes the anatomical spot to allow the "compression" and "lifting" of the MTrPs from the other tool. Ergon©IASTM techniques were applied by two researchers (KF and KM) which are Ergon© Technique certified trainers.

Figure 2: Wave stroke over gluteal MTrPs (Ergon© IASTM Technique).

Figure 3: Cyriax-star stroke over lumbar MTrPs (Ergon© IASTM Technique).

Figure 4: M-cut stroke over gluteal MTrP (Ergon© IASTM Technique).

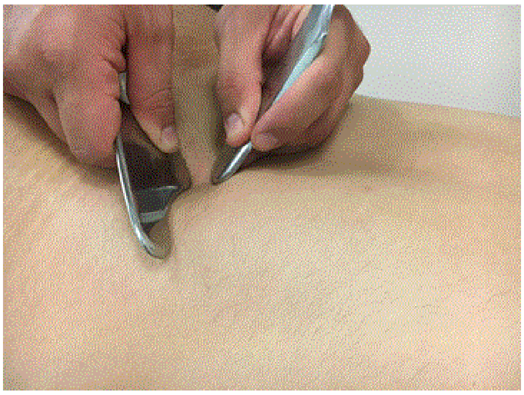

Figure 5: Double stroke over lumbar MTrPs (Ergon© IASTM Technique).

Cupping

Cupping was performed by the study researcher (SD), who is trained in cupping and regularly performed cupping in his clinical practice. For cupping procedure patients were asked to lay prone on the massage couch. The cupping technique involved the static application of high-quality polycarbonate cupping jars (meridian cupping set, Durham-USA) on the three tTrPs for 5 minutes. Negative pressure inside cups was produced through a rubber pump which sucked the air out of the cups (Figure 6).

Figure 6: Cupping technique over lumbar MTrPs.

Evaluation

Ischaemic pressure technique: Primary outcome measures of the study were PPT and pain sensitivity. PPT of the primary MTrPs was measured in kg/cm^2, using a mechanical Algometer (Wagner Pain Test™ instrument-Model FPK/FPN-Greenwich-USA) with a 1-cm diameter tip. Pain intensity over the active MTrP evoked by a second application of 2.5 kg/cm^2 of pressure on the MTrP was measured on a visual analogue scale (VAS), where 0 (cm) was 'least pain imaginable and 10 (cm) was 'worst pain imaginable', 'as proposed by Fernández-de-las-Peñas et al. [33]. These outcomes were assessed pre-and post-treatment by an examiner blinded to a) the treatment allocation of the subject and b) the body side treated. Each athlete received three treatments (1/week) and six evaluations in total (pre and post each intervention).

Statistical method

Data were analyzed with SPSS version 11.5 (SPSS Inc., Chicago, Ill, USA) and ensured for their normal distribution using numerical (Shapiro-Wilk Test) and graphical methods (Normal Q-Q Plots). Comparison of treatment effects of tested techniques was achieved using one-way analysis of variance (ANOVA) after Bonferonni corrections. Statistical significances were tested at $\alpha=0.05$ probability level.

Results

Pain Pressure Threshold (PPT) and Visual Analogue Scale (VAS) data before and after the implication of Cupping, Ergon© IASTM and Ischaemic pressure technique for the treatment of MTrPs in athletes are presented in Table 1. Descriptive data showed that although there was no differentiation in the control group [1st Measurement=7.94/3rd measurement=7.66], PPT scores for both three treatment techniques increased from the 1st till the 3rd evaluation.

One-way ANOVA testing revealed statistically significant differences ($p<0.05$) between the effects of treatments tested. More precisely, post-hoc comparisons showed a statistical significant PPT rise in the athletes received IASTM-ERGON treatment compared with those received cupping (Pre 2nd evaluation: p=0.030, Post second evaluation: p=0.015), iscaemic pressure (Pre 2nd evaluation: p=0.003, Post 2nd evaluation: p=0.003) and controls (Pre 2nd evaluation: p= 0.007 , Post 2nd evaluation p=0.000) at the time pre (p=0.009) and post (p=0.002) 2nd application of techniques (Figure 7).

This superiority of athletes receiving ERGON© IASTM in PPT scores in comparison with athletes receiving Cupping and Iscaemic pressure was further reinforced pre (p<0.001) and post (p<0.001) the 3rd application of therapeutic techniques.

PPT scores of athletes received cupping and ischemic pressure as a treatment of their MTrPs were almost identical (p>0.05) from the start till the end of the study. Nevertheless both of these techniques led to a significant increase in PPT scores after the 2nd and 3rd interventions compared with the control group (p<0.05).

The application of Ergon© IASTM technique led to better results compared with other treatment methods in terms of pain sensitivity (VAS, Figure 8). Even after the 1st treatment Ergon© IASTM technique resulted in significant decrease in pain sensitivity compared with cupping technique (p=0.014).

As for PPT scores, the pain sensitivity of MTrPs in athletes receiving Ergon© IASTM was significant lower than those receiving the other two techniques (iscaemic/cupping) and controls at the evaluation pre-(p=0.001) and post(p=0.001) 2nd application of the techniqes.

No significant differences (p>0.05) was observed for the effects of cupping compared with those of iscaemic pressure during the 3 phases of the study. Neverthelles, both of three therapeutic interventions (Ergon© IASTM, Cupping, Ischaemic pressre) led to significant decrease (p<0.005) in MTrPs pain sensitivity compared with control group at the 2nd and 3rd evaluation.

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Variables	Techniques	1st Intervention		2nd Intervention		3rd Intervention	
		Pre	Post	Pre	Post	Pre	Post
		Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
PTA	Cupping	7,63 ± 1.68	7.75 ± 1.65	7.93 ± 1.66	8.23 ± 1.78	8.56 ± 1.68	8.83 ± 1.71
	Ergon© IASTM	7.35 ± 1.61	7.59 ± 1.73	8.58 ± 1.74	9.05 ± 1.86	10 ± 1.75	11.26 ± 1.83
	Ischaemic Pressure	7.49 ± 1.41	7.40 ± 1.52	7.7 ± 1.42	8.06 ± 1.68	8.57 ± 1.66	8.88 ± 1.65
	Controls	7.94 ± 1.55	8.14 ± 1.59	7,6 ± 1.56	7.6 ± 1.63	7.66 ± 1.41	7.66 ± 1.21
VAS	Cupping	6.25 ± 1.57	6.56 ± 1.28	5.7 ± 1.38	5.57 ± 1.62	4.74 ± 1.45	4.20 ± 1.73
	Ergon© IASTM	5.77±1.62	5.71 ± 1.54	4.93 ± 1.38	4.44 ± 1.47	3.36 ± 1.53	2.17 ± 1.72
	Ischaemic Pressure	6.2 ± 1.58	6.12 ± 1.58	5.74 ± 1.25	5.22 ± 1.70	4.37 ± 1.61	3.89 ± 1.80
	Controls	5.92 ± 1.66	6.29 ± 1.51	6.18 ± 1,33	6.29 ± 1.56	6.22 ± 1.59	6.22 ± 1.20

Table 1: Pain pressure threshold (PPT) and visual analogue scale (VAS) descriptive data before and after the implication of cupping, Ergon© IASTM and Ischaemic pressure technique for the treatment of MTrPs in athletes.

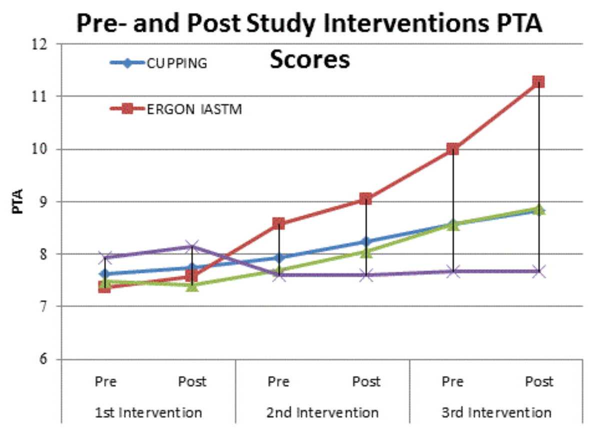

Figure 7: Pain Sensitivity threshold (PPT) scores during the 3 phases (pre-post) of interventions application.

Discussion

Myofascial pain syndrome (MPS) is presented with motor, sensory, and autonomic manifestations. Motor aspects of MTrPs may include disturbed muscle functional capacity regarding muscular weakness due to motor inhibition and restricted ROM due to muscular stiffness [34].

Sensory adaptations may include local tenderness and referral of pain to a distant anatomical site. MTrPs also are associated with peripheral sensitization and an increase in responsiveness of nociceptors. Signs of peripheral awareness are allodynia and hyperalgesia [34].

Several possible aetiological factors and mechanisms can lead to the development of MTrPs, including amongst others: a) myofascial overload with maximal/submaximal concentric or eccentric contractions, b) direct trauma c) low-level muscle contractions and d) uneven intramuscular pressure distribution.

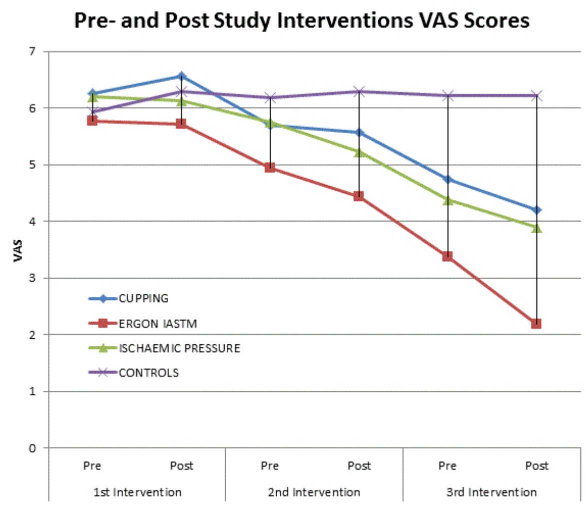

Figure 8: Visual analogue scale (VAS) scores during the 3 phases (pre-post) of interventions application.

Concentric and eccentric contractions inevitably lead to capillary constrictions, impaired blood flow, ischemia, and hypoxia. Hypoxia, which appears to be one of the most important precursors for the development of MTrPs in athletes contributes to the development of more muscle damage (a local acidic milieu) and sensitization of muscle nociceptors [7].

The findings of the present study reinforce previous theories about etiology of MTrPs as the vast majority of amateur athletes evaluated in the present study had active MTrPS in areas particularly strained with concentric and eccentric contractions as the lower back and gluteal regions. More precisely 88% of athletes evaluated for inclusion in the study had active quadratus lumborum MTrPs and 99% of them had gluteal MTrPs and included in the survey.

Al three therapeutical techniques (Ergon© IASTM, Cupping, and ischaemic pressure technique) evaluated in the study increased pain pressure threshold (PPT) and decreased pain sensitivity (VAS) of myofascial TrPs at the low back and hip region of amateur soccer players compared with controls. These positive adaptations were evident even at the time of one week after the initial application of techniques implicating that a single bout of therapy is by far better than doing nothing for MTrPS. These findings were in agreement with those reported from several studies evaluating the effect of ischaemic pressure as a treatment of MTrPs [35-37]. The positive effect of Ischaemic pressure in alleviating symptoms of TrPs can be attributed to ischemia and hyperemia that follows. Local ischemia is connected to a lowered pH and a subsequent release of several inflammatory mediators in muscle tissue while hyperemia can contribute to clearance of the muscle from the derivatives of inflammation and pain metabolites and thus desensitize nerve endings [36,37]. Cupping therapy, although not studied efficiently, seems that it also has a critical impact on myofascial MTrPs treatment that can also be attributed to tissue stretching and hyperemia provoked by their application on the body [38].

The Ergon© IASTM technique used in this study was proved superior in decreasing myofascial pain originated from lumbar and gluteal MTrPs in amateur athletes comparatively with ischaemic pressure and cupping therapy. The athletes reported better results even after the 1st application of Ergon© IASTM technique in comparison with the other methods and this gain in pain sensitivity and PPT was reinforced after the next two applications. Disabling myofascial pain after IASTM application can be theoretically attributed to three main mechanisms that have been reported in the literature: a) local temperature and blood flow increase, b) localized tissue manipulation and stretch and c) reduction of fascial adhesions and restrictions. IASTM techniques have been reported that effectively affects the fascial system of the human body treating fascial adhesions and constraints. These "adhesions" can affect the muscular functions, reduce blood flow and nutrition of tissues, and can lead to the development of myofascial MTrPs. The blood-flow theory is lately supported by the findings of Portillo-Soto et al. [39] in a study aiming at evaluating the effects of the IASTM (Graston © Technique) and massage therapy on calf blood flow, using skin temperature measures. The researchers reported that massage and IASTM techniques increased skin temperature and thus local circulation significantly in twenty-eight participants. Furthermore, the researchers showed that the peak temperature was achieved at 25 minutes after treatment indicating that the therapeutic effects of IASTM therapy remain in the place for several minutes after the end of the treatment. Findings of the present study are in disagreement with those of Gulick [28] reporting no effect of Graston IASTM technique in the therapy of upper-back MTrPS compared with control group. These differences can be explained by the types of IASTM techniques applied as well from methodological issues (type and time of application). The Ergon© IASTM technique used in this study is a more aggressive technique and with different application strokes than Graston© Technique. Furthermore, the selected Ergon© IASTM strokes were applied directly over the each MTrPS unlike Graston IASTM maneuvers chosen by Gulick [28] which were implemented in a more general fashion. The time of application also was different as each Ergon© IASTM stroke was applied for 3 minutes continuously on the MTrPS while the Graston© IASTM strokes were applied consistently for one minute in the study of Gullic [28].

The main limitations of the present study include deficits in participants selection technique as well as methodological issues. All study participants were athletes of local amateur soccer clubs, and their selection was not based on random sampling. Also, the evaluation of the effect of therapeutic techniques in the treatment of MTrPs was based only on the assessment of the sense of pain and pressure pain threshold. Other possible critical adjustments to the functional capacity of athletes from the existence of trigger points as negative adaptations in joint range of motion, strength and neuromuscular control were not evaluated in this study. Moreover, the evaluation of the impact of therapeutic applications had short-term character and was limited to three (3) weeks that lasted the research. Another significant methodological issue that has been recognized as a possible source of measurement errors is the amount of pressure exerted through algometer as maintaining a constant pressure rate reported as the most challenging aspect of algometer [40,41].

An ideal study evaluating the effect of various techniques on the reduction of adverse effects of MTrPs should assess the therapeutic effect of applied techniques in all the aspects of the functional capacity of athletes and must have long-term evaluation and re-evaluation planning. However, the present study is innovative as it assessed comparatively the effect of two novel therapeutic applications such as the Ergon© IASTM and cupping technique alongside with ischemic pressure method for which there is moderate evidence that positively contributes to MTrPs symptoms reduce. Moreover, the present study also assessed MTrPs in lumbar and hip region, which are areas that have been poorly studied.

Conclusions

MTrPs evaluation and treatment is a challenging condition for both the sports physical therapists and athletes. Ergon© IASTM, cupping, and ischemic pressure techniques are effective, but not comparable, in reducing tenderness of myofascial trigger points (MTrPs). Ergon© IASTM technique seem to has significantly better results in reducing the adverse effects of MTrPs than both other two techniques as its application resulted in a meaningful statistical improvement of pain symptoms. The findings of the present study should be confirmed by future trials with better methodological designs so as to draw definitive conclusions.

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Short Communication Open Access

Aggressive Musculoskeletal Physiotherapy: Should We Treat Pain with Pain?

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Introduction

Musculoskeletal physiotherapy (MP) is a non-invasive intervention which uses specific therapeutic techniques to help overcome pathologies and injuries of the human musculoskeletal system [1]. These kinds of pathologies include musculoskeletal disorders with high epidemiological incidence rate such as low back and cervical pain, myofascial trigger points and sports injuries [2-4]. All such musculoskeletal injuries and pathologies include, among others, a common clinical characteristic the musculoskeletal pain.

Musculoskeletal pain is one of the most common types of pain, arising from the skin, fascia, bursa, muscle, ligaments, tendons and bones [5]. Etiology of this kind of pain is multifactorial including a) acute injury (e.g., Muscle strain, ligament sprain, bone fracture), b) repetitive strain and overuse (tendinopathies, bursitis, myofascial trigger points), and c) work- and posture related musculoskeletal disorders. This type of pain can be acute or chronic, local or diffuse [6]. The pathophysiology of musculoskeletal pain is not entirely clear, but inflammation, fibrosis, tissue degradation, neurotransmitters, and neurosensory disturbances have been implicated in pain process. Clinical symptoms may also include local discomfort or tenderness, peripheral nerve irritation, and decreased functional capacity regarding strength, flexibility, and neuromuscular control [7,8].

Management of musculoskeletal disorders is typically multimodal including a) physical therapy techniques like manual therapy, massage, electrotherapy and physical modalities (heat, ice), Instruments-assisted soft tissue techniques (IASTM), stretching and exercise prescription, b) use of nonsteroidal anti-inflammatory drugs (NSAIDs) and c) biomechanical corrections with the use of prosthetics and orthotics and targeted reduction of workload [9]. The predominant feature that determines the application intensity and dosage of above therapeutic interventions is, amongst others, the use of therapeutic techniques associated with causing or not musculoskeletal pain during their implementation.

For many years the most important educational instruction for clinical physiotherapists was to apply techniques up to the threshold of pain and no more [10]. This educational instruction was given on the basis that the infliction of pain when using therapeutic techniques implies tissue re-damage and recurrence of injury.

But is this the Right Script?

Several well-designed research efforts evaluating treatment strategies effectiveness for a) tendon overuse injuries, b) myofascial trigger points and c) specific sports injuries provide a negative response to this theoretical question.

First of all Alfredson et al. [11] showed that heavy- Load, pain provoking, eccentric calf muscle training for the treatment of chronic Achilles tendinosis is a very efficient and safe method for reducing pain during activity and restoring functional capacity. It is important to notice that in this pioneering study, the patients were advised to continue performing the eccentric exercise even if they experienced pain and had to stop exercising only in the case of disabling pain. When they could perform the eccentric loading exercise without experiencing any minor pain or discomfort, they were instructed to increase the load by adding weight, thus increasing again the level of pain perceived by the patients. Alfredson's proposal was followed many other researchers in the treatment of tendinopathies in other body parts. Several other authors reported that noxious eccentric training for tendinopathies can decrease tendon volume and Intra tendinous signal, which correlated with improvement in pain sensation and individual performance [12]. Furthermore, this kind of intervention increase healthy collagen deposition and Type I collagen synthesis [13]and normalize tendon thickness structure [14]. Thus, the high intensity-eccentric exercise accompanied by mild or moderate musculoskeletal pain is one of the approaches to treatment for the rehabilitation of tendinopathies of the shoulder [15], elbow [16,17], hand [18], knee [19,20], and ankle [11].

Another pathological manifestation where effective treatment involves techniques that are aggressive and accompanied by the infliction of pain is the myofascial trigger points (MTrPs). In this case, several also researchers [21-23] reported that that the application of a noxious-painfull stimulus is the key to obtaining improvements in pain pressure threshold and pain sensation perception from MTrps. Likewise, ischaemic pressure, Ergon®IASTM Technique and dry needling, have shown benefits in releasing myofascial induced muscle spasm and aches [21-23]. Less pain stimulatory interventions, such as laser and ultrasound, have not convincingly been shown to be beneficial [24-26]. In our recent study [21], it was demonstrated that aggressive therapeutic techniques such as Ergon®IASTM Technique, ischaemic pressure, and cupping treatment are useful in reducing tenderness of myofascial trigger points (MTrPs). The effectiveness of such therapeutic interventions in MTrPs treatment can be theoretically attributed to a) local temperature and blood flow increase, b) localized tissue manipulation and stretch and c) reduction of fascial adhesions and restrictions.

Furthermore, specific massage (deep stripping and Dynamic Soft Tissue Mobilisation) and soft tissue techniques like cupping massage, and instrument-Instrument Assisted Soft Tissue Mobilization Techniques (IASTM) which have been developed in the last years are performed with particular intensity and pressure causing considerable pain (VAS=4-5) [27-29]. Hopper et al. [29] showed that subjects who received dynamic Soft Tissue Mobilisation followed by distal to proximal longitudinal strokes performed during passive, active, and eccentric contraction of the hamstring achieved significantly greater hamstring' flexibility improvement than the control and those receiving classical massage techniques. We have also showed [28] that aggressive massage and mobilization techniques such as stripping, Ergon IASTM and cupping massage performed with great intensity directly on a muscle injury site though provoked significant temporary pain, significantly accelerated the mobilization of hematoma and edema after a hamstring' strain without causing any other problems to the athlete besides temporary pain. It seems that these aggressive and noxious interventions can mobilize the swelling-hematomas to superficial layers of the muscle, through myofascial pathways and creates favorable conditions for the reunion of the injured muscle fibers decreasing thus significantly recovery time from grade I hamstring strain observed in this case study [28].

It should be emphasized that the pain exacerbated by the application of dynamic therapeutic techniques can be attributed to a temporary increase in pressure on pain receptors from mechanical stress and not solely from deterioration of the injury. This theoretical assumption is reinforced by the fact that as shown, subjects with different musculoskeletal pathologies reported significant improvement in their symptoms and functional capacity after each noxious treatment procedure. Additionally, we should remember that it is also thought that dynamic and aggressive therapeutic manipulation of the body (deep-pressure massage with hands or clinical instruments) also results in the release of endorphins which can mask the perception of pain [30,31].

A key conclusion from the above reports is that clinical physiotherapists must not be afraid, but to respect the pain that causes to their patient. In too many cases the pain is not a sign of recurrence of injury but merely a clinical manifestation of dynamic therapeutic interventions, non-hazardous for the rehabilitation process of the injuries. Nevertheless, the pain that will result from implementing aggressive techniques should not be excessive and should not lead to a protective muscle spasm and development of new signs re-injury such as swelling and persistent pain.

So to the question that has been raised to the title of the article "should we treat pain with pain?" the answer in some cases can be YES.

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The acute effects of Ergon® IASTM therapy on superficial back myofascial chain flexibility: A comparative study regarding the site of the treatment

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Study Background: The most significant myofascial chain of the human body that connects and controls the entire posterior surface of the body is the superficial back line (SBL). Part of the SBL is formed by the biceps femoris and erector spinae muscles bonded through the sacrotuberous ligament and lumbar fascia. Given that postural compensation patterns associated with SBL dysfunction include increased lordosis and hamstrings shortness, this study examined the acute effects of Ergon® IASTM Therapy (EIT) application on upper and lower part of SBL on hamstring flexibility.

Methods: Sixty college students were recruited from the Technological Educational Institute of Western Greece, who had hamstring flexibility deficiencies. The participants were randomly divided into three groups and received either a single, 10-minute myofascial EIT treatment of either the upper part-trunk- (n=20) or the lower part–the lower extremities- (n=20) of the SBL or served as control group (n=20). Hamstrings' flexibility was measured both before and after the therapy with the Sit and reach test. A one-way ANOVA was used to determine if there were differences in flexibility gains between the pre and post measurements between groups.

Results: Statistically significant differences (f=29.11, p=0.00) in flexibility benefits were found for the groups receiving Ergon® IASTM Therapy, regardless of the site of the treatment, compared with the control group. More specifically, SR values gains for both subgroups that received treatment of the upper (trunk) and lower (lower extremities) part of the SBL were significantly higher (p=0.000, respectively) than those of the control group. No significant difference was identified for the SR gains between the treatment groups (P=1.00).

Conclusions: The results of the present study suggest that Ergon® IASTM Therapy application on either the trunk or the lower extremities is an effective therapy for improving the SBL flexibility immediately following the therapy.

Biography

Konstantinos Fousekis is an Associate Professor in Sports Physiotherapy at the Department of Physical Therapy, Technological Educational Institute of Western Greece. He is a Physiotherapist specializing in soft tissue mobilization techniques (IASTM). He has years of experience in treating musculoskeletal and sports injuries and is a Professional Physical Therapist for several professional soccer teams. His research interests deals with the assessment and rehabilitation of sports and musculoskeletal injuries using IASTM techniques. In cooperation with Konstantinos Mylonas, he created the ERGON® IASTM Technique as a basic treatment of painful and non-musculoskeletal disorders.

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Treatment of adhesive capsulitis with Ergon® IASTM technique and stretching exercises: A case study

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Study Background: Adhesive capsulitis is a common condition involving significant shoulder pain and loss of range of motion attributed mainly to a combination of synovial inflammation and capsular fibrosis. Traditional treatment for this type of injury includes traditional forms of treatment such as massage, stretching, electrotherapy and active exercises. The aim of this case study was to evaluate the effectiveness of Ergon® IASTM Technique and shoulder stretching exercises in the treatment of adhesive capsulitis.

Methods: A 62-year-old patient clinically diagnosed with adhesive capsulitis presented with significant a) pain on palpation b) pain during shoulder flexion and internal rotation and c) decrease in shoulder passive flexion and internal rotation. His treatment plan included 8 treatment sessions involving the application a) of Ergon® IASTM Technique over specific shoulder points and b) of targeted stretching exercises of the shoulder. Pain produced during passive motion was evaluated with a visual analogue scale (VAS). The range of motion (ROM) for both shoulder flexion and internal rotation was measured with a goniometer. The patient was evaluated before, and at the 4th and 8th treatment session.

Results: The patient experienced a significant decrease in pain and an increase in shoulder ROM regarding internal rotation by both the 4th and 8th treatment session (Figure 1). More specifically, pain, as measured by VAS scale, was decreased from 5 and 7, respectively on the passive flexion and internal rotation of the shoulder, to 3 and 5 by the end of the 4th week and to 1 and 2 after the 8th treatment. Internal rotation ROM in the painful shoulder at 90° of abduction progressed from 50° at the baseline to 78o and 85o after 4th and 8th treatment, respectively.

Conclusions: This case study provides some evidence that Ergon® IASTM Technique in association with stretching exercises is an effective technique in the rehabilitation of the patients with adhesive capsulitis.

Biography

Konstantinos Fousekis is an Associate Professor in Sports Physiotherapy at the Department of Physical Therapy, Technological Educational Institute of Western Greece. He is a Physiotherapist specializing in soft tissue mobilization techniques (IASTM). He has years of experience in treating musculoskeletal and sports injuries and is a Professional Physical Therapist for several professional soccer teams. His research interests deals with the assessment and rehabilitation of sports and musculoskeletal injuries using IASTM techniques. In cooperation with Konstantinos Mylonas, he created the ERGON® IASTM Technique as a basic treatment of painful and non-musculoskeletal disorders.

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Treatment of supraspinatus tendinopathy with Ergon® IASTM technique and neuromuscular control exercises: A case study

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Study Background: Supraspinatus tendinopathy is an important cause of pain and dysfunction in the adult shoulder. Traditional treatment for this type of injury includes traditional forms of treatment such as massage, stretching, electrotherapy and functional exercises. The aim of this case study was to evaluate the effectiveness of Ergon® IASTM Technique and shoulder neuromuscular control exercises in the treatment of supraspinatus tendinopathy.

Methods: A 50-year-old patient clinically diagnosed with supraspinatus tendinosis presented with significant a) pain on palpation b) pain during passive and active internal rotation and c) decrease in shoulder passive internal rotation. His treatment plan included 8 treatment sessions involving the application a) of Ergon® IASTM Technique over specific shoulder points and b) of targeted neuromuscular control exercises of the shoulder. Pain produced during passive internal rotation was evaluated with a visual analogue scale (VAS). The range of motion (ROM) for the internal rotation was measured with a goniometer. The patient was evaluated before, and at the 4th and 8th treatment session.

Results: The patient experienced a significant decrease in pain and an increase in shoulder ROM regarding internal rotation by both the 4th and 8th treatment session (figure1). More specifically, pain, as measured by VAS scale, was decreased from 8 and 7, respectively on the passive and active internal rotation of the shoulder, to 6 and 4 by the end of the 4th week and to 3 and 2 after the 8th treatment. Internal rotation ROM in the painful shoulder at 90° of abduction progressed from 60° at the baseline to 73o and 78o after 4th and 8th treatment, respectively.

Conclusions: This case study provides some evidence that Ergon® IASTM Technique in association with shoulder neuromuscular control exercises is an effective technique in the rehabilitation of the patients with supraspinatus tendinopathy.

Biography

Konstantinos Fousekis is an Associate Professor in Sports Physiotherapy at the Department of Physical Therapy, Technological Educational Institute of Western Greece. He is a Physiotherapist specializing in soft tissue mobilization techniques (IASTM). He has years of experience in treating musculoskeletal and sports injuries and is a Professional Physical Therapist for several professional soccer teams. His research interests deals with the assessment and rehabilitation of sports and musculoskeletal injuries using IASTM techniques. In cooperation with Konstantinos Mylonas, he created the ERGON® IASTM Technique as a basic treatment of painful and non-musculoskeletal disorders.

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Treatment of shoulder myofascial trigger points in amateur athletes with Ergon® IASTM Therapy, cupping and ischaemic pressure techniques: a randomized controlled clinical trial

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Introduction and Aims. Myofascial trigger points (MTrPs) can be seen in the setting or athletic injury due to functional asymmetries, postural alterations, or secondary to repetitive injury and training overloading and are thought to be involved in several musculoskeletal pathologies in athletes.[1] Based on the above, this study examined the effectiveness of Ergon® Instrument-assisted soft tissue mobilization technique (Ergon© Technique),[2] of cupping therapy, and of ischaemic pressure technique in the treatment of active myofascial Trigger-points (MTrPs) at the shoulder region of amateur soccer players.

Methods: Fifty-five (55) amateur soccer players (age=24.4 ± 4.39; height=176.78 ± 8.31 cm; weight=75.16 ± 11.21 kg) were evaluated for the presence of shoulder (levator scapulae, infraspinatus, and trapezius) active MTrPs and were divide into 3 subgroups. The first group (N=20) was treated with Ergon-IASTM Technique©, the second (N=20) with cupping therapy and the third group (N=20) with ischaemic pressure. Ten (10) players received no treatment and served as controls. All athletes received one (1) treatment per week for three (3) weeks. Outcome measures were MTrPs pain pressure threshold (PPT) and pain sensitivity (VAS).

Results: All three therapeutic techniques led to a significant ($p<0.05$) reduction in MTrPs pain sensitivity and an increase in PPT compared with controls. These therapeutic adaptations were evident even from the first treatment ($p<0.05$) and reinforced by the end of the third treatment ($p<0.001$).The Ergon©-IASTM Technique and ischaemic pressure technique produced a significantly larger effect ($p<0.05$) in the reduction of pain compared with cupping therapy after the 2nd treatment. No significant difference ($p>0.05$) was observed between Ergon©-IASTM Technique and ischaemic pressure technique for their impact on MTrPs after the first two therapeutic interventions. A significant better effect of Ergon©-IASTM Technique on trapezoid MTrPs PPT and VAS compared with both cupping therapy and the ischaemic pressure was evident after the 3rd treatment.

Conclusions: The Ergon© IASTM and ischaemic pressure techniques can serve as a first treatment option for sports physiotherapists when they manage shoulder MTrPs in amateur athletes. Evaluation of these techniques on more randomized control studies is necessary for securing firm conclusions regarding their effectiveness in myofascial trigger points rehabilitation.

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Treatment of the trunk and lower extremities with Ergon® IASTM Technique can increase hamstrings flexibility in amateur athletes: a randomized control study

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Introduction and Aims. The superficial back line (SBL) covers and controls the entire posterior surface of the body. It is formed mainly by the erector spinae muscles and the biceps femoris bonded through the sacrotuberous ligament and lumbar fascia.[1] According to Mayers myofascial restrictions to a given point of the SBL can affect total or partial flexibility of the entire chain leading to pathological disorders such as increased lordosis and hamstrings shortness.[2] Based on the above, this study examined the acute effects of Ergon® IASTM Therapy (EIT)[3] application on the upper part and lower of the SBL on hamstrings flexibility.

Methods. 60 amateur athletes (college students) were recruited from the Technological Educational Institute of Western Greece, who had hamstring flexibility deficiencies. The participants were randomly divided into three groups and received either a single, 10-minute myofascial EIT treatment of the upper part-trunk- (n=20) and lower part-lower limbs- (n=20) of the SBL or served as control group (n=20). Hamstrings' flexibility was measured both before and after the therapy with a) the Sit and Reach (SR) test, b) the passive straight leg raise (SLR) test and c) the Fingertip-to-Floor (FTF) Test. A one-way ANOVA was used to determine if there were differences in flexibility gains between the pre and post measurements between groups.

Results. Statistically significant differences ($P<0.05$) in flexibility benefits were found for the groups receiving Ergon® IASTM Therapy, compared with the control group. More specifically, SR, SLR and FTF values gains for both subgroups that received treatment of the upper (trunk) and lower (lower extremities) part of the SBL were significantly higher ($p=0.000$, respectively) than those of the control group. No significant differences were identified for the SR, SLR, and FTF values gains between the treatment groups ($P>0.05$).

Conclusion. The results of the present study suggest that Ergon® IASTM Therapy application on the trunk or the lower extremities is an effective treatment for improving the hamstrings flexibility in amateur athletes with hamstrings shortness. Implementation and evaluation of Ergon® IASTM technique on more randomized control studies is necessary for securing firm conclusions regarding its effectiveness in hamstrings injuries prevention and rehabilitation

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