Myofascial Pain Syndromes–
Trigger Points

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INTRODUCTION

This set of reviews includes several noteworthy contributions. Two German papers report the use of a new modality, focused extracorporeal shockwave therapy, with strong potential for helping to diagnose and treat myofascial trigger points. One reports use of an electrohydraulic generator and the other of a piezoelectric generator to produce focused shockwaves. An Italian study compared the effects of frequency modulated neural stimulation and transcutaneous electrical stimulation. A new study on the effects of botulinum toxin type A on trigger points suffers from methodological errors. Each article review indicates whether it is prepared by Simons [DGS] or Dommerholt [JD].

CLINICAL STUDIES

Diagnosis and therapy of myofascial pain syndrome with focused shock waves (ESWT). H. Müller-Ehrenberg, G. Licht. Medizinisch-Orthopädische Technik. 5:1-6, 2005.

Summary

Thirty patients with 10 orthopedic conditions, with myofascial trigger points [TrPs] by clinical examination, and without any interfering serious disease were treated by a new modality to TrPs, focused shock waves generated piezoelectrically. When a TrP was located and identified by exhibiting referred pain on digital pressure that was recognized as familiar to the patient, application of shock waves properly adjusted for depth and accurately directed reproduced the same diagnostic findings in 95 percent of the patients, which subsided with continued exposure for a few minutes to six impulses per second. Energy intensity was adjusted based on patient reports of these sensations and ranged between 0.04 and 0.26 mj/mm^2 in five steps.

Compared to pre-treatment findings, for all patients three months after treatment pain ratings by visual analog scale 0-10 range at rest dropped from 3.6 to 1.7 and during activity from 7.4 to 3.4, both of which were statistically significant [$P < 0.001$]. These results validated the diagnostic criteria and confirmed the diagnosis. The results confirm the usefulness of piezoelectric shock waves for confirming the diagnosis of TrPs and for treating them in orthopedic diagnostic conditions. Further studies are recommended.

Comments

This unblinded study without controls is one of two papers reviewed in this issue of the journal that employs a relatively new modality for treatment of TrPs. Shock waves used for ther-

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apy of TrPs may be generated by a spark in a liquid medium [electrohydraulic type generator] and can then be adequately focused for human application. They may also be generated piezoelectrically and be very sharply focused in depth and diameter. A third, ballistic or radial, method applies a mechanical impact to the tissues that produces a shock wave radiating outward in all directions with an intensity that decreases as the square of the distance, so that the dose is highly dependent on the depth of penetration with equal intensity at a given depth in nearly all directions from the impact. It is useful only for relatively superficial TrPs and gives a lot of tissue the same exposure. This paper reports use of the piezoelectric system, the other paper by Bauermeister reports use of the electrohydraulic method.

This piezoelectric technique was not used for locating TrPs because of the small focal point of maximum energy but was useful for confirming the diagnostic criteria and for treatment. This modality apparently will be of value chiefly to only those clinicians who have already become skillful at locating TrPs. The pain reports at rest indicated a helpful degree of clinical relief [3.6-1.7]. Pain reports during activity indicated significant but incomplete clinical relief [7.4-3.5].

The introduction described reports that this modality reduced the concentration of nociceptor-stimulating substances that are present in TrPs (6), which would relieve painfulness and tend to interrupt the positive feedback cycle cited by the integrated hypothesis and help correct plastic changes at the spinal cord level that are induced by chronic pain. This reviewer does not find the other mechanisms proposed by the authors to be convincing and is unaware of the quote attributed to him. Controlled blinded studies are needed [DGS].

Diagnosis and therapy of myofascial trigger point syndrome through stimulation of sensitized nociceptors using focused electrohydraulic shockwaves–in German: Diagnose und Therapie des Myofaszialen Triggerpunkt Syndroms durch Lokalisierung und Stimulation sensibilisierter Nozizeptoren mit fokussierten elektrohydraulische Stosswellen]: W. Bauermeister. Medizinisch-Orthopädische Technik. 5:65-74, 2005.

Summary

After a detailed description of the integrated trigger point hypothesis and neurophysiologic aspects of myofascial trigger points [TrPs], Bauermeister provided a comparison between electrohydraulic and piezoelectric shockwave therapy. He suggested that the sharply focused piezoelectric shockwaves applied to TrPs elicit greater localized pain and less referred pain than the electrohydraulic shockwaves. Patients with chronic pain lasting more than six months were included in this study. Prior to the therapy, muscles were examined for painful TrPs. Shortened muscles were treated with electrohydraulic shockwave therapy. The subject-reported degree of referred pain was used as a therapeutic guideline. The intensity was increased until the subjects reported a referred pain intensity of 60 percent of maximum. The therapy was discontinued when the subjects reported a decrease of approximately 50 percent in referred pain sensations.

Scores on visual analog scales [VAS] were reported to decrease 26 percent after one treatment. After three more treatments the VAS decreased another 58.5 percent, 67 percent, and 85 percent respectively for each treatment. The author concluded that focused electrohydraulic shockwave therapy can simplify the treatment of myofascial pain syndrome.

Comments

This "study" is really no more than an anecdotal report of uncontrolled, unblinded, and poorly described observations. The author did not provide any information about the number of subjects, which muscles were treated, or any other meaningful information other than a reduction in VAS scores.

Nevertheless, the application of shockwave therapy appears to be a promising new modality for the treatment of TrPs. Consistent with the report by Müller-Ehrenberg and Licht in the same journal [reviewed above], Bauermeister emphasized that the effects of shockwave therapy occur mainly at a molecular-biological level and are not necessarily strictly due to mechanical stimulation. There are no scientific studies demonstrating the effects of shockwave therapy on muscles tissue. Yet, all scientific re-

search starts with observations and this paper may serve as one of the first descriptions of clinical observations that hopefully will initiate other controlled, double-blind and randomized studies [JD].

Effectiveness of traditional Thai massage versus Swedish massage among patients with back pain associated with myofascial trigger points: U. Chatchawan, B. Thinkamrop, S. Kharmwan, J. Knowles, W. Eungpinichpong. J Bodywork Movement Ther. 9: 298-309, 2005.

Summary

To compare the effectiveness of Thai massage and Swedish massage. One hundred and eighty volunteers with back pain were randomly assigned to the two treatment groups without controls. Every subject had pain for at least four weeks with at least one myofascial trigger point [TrP] in the upper or lower torso. The TrPs were identified by local tenderness at a palpable nodule in a taut band with pain recognition. A long list of serious medical conditions was excluded. All patients received their assigned treatment for 30 minutes followed by 10 minutes of a uniform passive stretch during six sessions in three to four weeks maximum. They all received initial verbal and written recommended home care back stretching exercises, correct posture, and correct lifting techniques. Treatment measures were assessed by a therapist blinded as to treatment group before and after the second and third weeks of treatment, before the fifth and after the sixth with follow up one month after completing treatment.

Traditional Thai massage applies pressure to pain threshold for five-10 seconds at a time at three lines of massage points adjacent to and parallel to the spinous processes from the thoraco-cervical junction to the posterior superior iliac spine. Swedish massage was applied to skin lubricated with jojoba oil with pressure applied short of pain by light stroking [effleurage] and petrissage [kneading with the thumb, digit, and palm; wringing; and skin rolling] without attention to the presence or absence of TrPs.

Improvement was nearly identical in both groups for all assessments that included clinical and statistical reduction of visual analog scale [0-10] reports to less than one half thoracolumbar spinal range of motion, Oswestry disability questionnaire, and patient satisfaction. The only exception was that at the end Thai massage improved pain pressure thresholds more than Swedish massage [$P < 0.05$]. Conclusion: both methods are recommended for treatment of back pain associated with TrPs.

Comments

It is not clear to this reviewer why the authors so carefully selected patients with TrPs if no treatment was specifically directed to them especially since their procedures included so many treatment techniques recommended for TrPs. The inclusion of randomization and blinded assessment with meticulous validation of assessment techniques gives the results high credibility.

Unfortunately, the authors discounted a control group because non-treatment was considered unethical. However, a placebo treatment such as touch-pressure only stroking of the skin parallel to the Thai treatment areas or application of non-operative ultrasound would have served the purpose.

Average reduction of visual analog scale values from 5.3 to 2.3 lasting for at least four weeks is clinically significant, especially for so many patients with chronic pain, indicating that these are worthy methods of treatment [DGS].

A randomized controlled study on the effect of two different treatments (FREMS AND TENS) in myofascial pain syndrome: S. Farina, M. Casarotto, M. Benelle, M. Tinazzi, A. Fiaschi, M. Goldoni, N. Smania N. Eura Medicophys. 40(4):293-301, 2004.

Summary

Forty subjects with upper trapezius myofascial pain were randomly assigned to one of two groups treated with either frequency modulated neural stimulation [FREMS] or transcutaneous electrical nerve stimulation [TENS].

Subjects were excluded if they had clinical signs and symptoms of fibromyalgia, were younger than 18 or older than 80, had mental retardation, or neurological deficits involving the upper limbs. Patients with specific medical problems, such as ulcers, hypertension, renal insufficiency, and several others were also excluded from this study. All subjects were examined by the same examiner who was blinded to the treatment. The treatments were performed by another examiner who was blinded to the clinical status of the subjects. Patients in each group received ten 20-minute treatments for two consecutive weeks. Outcome measures included the neck pain and disability visual analog scale [NPDVAS], pressure pain thresholds with algometry, manual evaluation of myofascial trigger points [TrPs], and range of motion of the cervical spine. Subjects were examined prior to the study and at one week, one month, and three months following the intervention. The most painful TrP was treated in those subjects with more than one TrP in the upper trapezius muscle.

The authors concluded that both FREMS and TENS are effective treatment modalities in the treatment of TrPs. The FREMS treatment did appear to have longer lasting effects when compared to TENS.

Comments

The authors reported that FREMS is a new type of transcutaneous electrical stimulation, characterized by a negative monophasic impulse, high voltage [< 300V], low intensity [< 10 μA], short duration [10-40 μs], with a spike of short duration [7 ns]. This is the first clinical study of FREMS and there are no studies investigating the mechanism of action. Based on this study, FREMS appears to be a useful modality for TrPs.

Previous studies have confirmed the utility of TENS in the treatment of TrPs [2]. The authors suggested that TENS is one of the most frequent used treatments for myofascial pain. This reviewer is not aware of any studies that indicate such. The authors list several other therapeutic approaches to treat myofascial pain. Several of these approaches have not been studied specifically for myofascial pain, but as the quoted references indicate were used in studies of either fibromyalgia or low back pain [JD].

Evidence against trigger point injection technique for the treatment of cervicothoracic myofascial pain with botulinum toxin type A: F.M. Ferrante, L. Bearn, R. Rothrock, L. King. Anesthesiology. 103(2):377-83, 2005.

Summary

One hundred thirty-two subjects with cervical and/or shoulder myofascial pain and active trigger points [TrPs] for at least six months were included in this randomized, double-blind, and placebo-controlled study of the effects of botulinum toxin type A on pain, pain pressure thresholds, and use of rescue medication. Exclusion criteria included (1) more than five total TrPs; (2) more than two TrPs in the trapezius muscle on any one side of the body; (3) more than one MTrP in any other single surface muscle on any one side of the body; (4) pregnancy; (5) age younger than 18 years; and (6) a history of intolerance to nonsteroidal anti-inflammatory drugs. All subjects were weaned of all pain medications two weeks prior to the study.

Subjects were randomized into one of four groups of 31-35 persons each, and received either placebo injections with saline, or injections with 10, 25, or 50 units of botulinum toxin type A into a maximum of five TrPs. The total volume of each injectate was limited to 0.5 ml per TrP. All subjects started a standardized pharmacological regimen consisting of 10 mg amitriptyline by mouth two hours before bedtime, 800 mg ibuprofen four times per day, and one tablet propoxyphene-acetaminophen every four hours as needed for rescue medication. The amitriptyline was gradually increased to 75 mg. Subjects also received physical therapy emphasizing myofascial release techniques. Outcome measures included a visual analog scale reflecting pain over the previous 24 hours, use of rescue medication, pain pressure thresholds measured by algometry, and the 36-Item Short Form Health Survey. Data were collected at 1, 2, 4, 6, 8, and 12 weeks after injection. After appropriate statistical analyses, the authors concluded that there were no signif-

icant differences between the four groups. However, subjects treated with botulinum toxin type A demonstrated a greater degree of improvement on three subscales of the 36-Item Short Form Health Survey, which the authors attributed to a likely type 1 error.

The authors questioned whether the results indeed suggested a general lack of effectiveness of botulinum toxin, or a lack of efficacy with the methodology of direct TrP injection. They reviewed in detail the integrated trigger point hypothesis, emphasizing increased acetylcholine release, and the potential effect of botulinum toxin, as well as other possible pain-reducing mechanisms of botulinum toxin, such as normalization of sensitized neuromuscular spindle activity, and desensitization of the central nervous system. They also reviewed several previous botulinum toxin studies, but dismissed these because of small sample sizes. The authors suggested that mechanical or postural abnormalities may need to be considered in future study protocols. The authors emphasized that botulinum toxin will be most effective when directed to motor endplates with chemodenervation occurring in a "sphere of diffusion" [botulinum toxin spreads diffusely from an injection site]. However, the use of botulinum toxin was not recommended as this study failed to demonstrate superiority over placebo treatment combined with a pharmacological and physical therapy treatment protocol.

Comments

The editor of *Anesthesiology*, Dr. Abram, prepared an editorial comment in which he questioned the accuracy of diagnosis and possible heterogeneity of the cohort in addition to the concerns the authors raised (1). Abram mentioned that further differentiation of the study subjects may be needed in future studies. According to Abram, most cohorts of patients with a given diagnosis contain individuals with diverse pain mechanisms and psychosocial backgrounds. Within a group individual patients may respond very well, while the group as a whole does not demonstrate significant improvement.

While the authors questioned the methodology of TrP injections, they should have been more concerned about the design of this study. Although the controlled post-injection treatment protocols were designed to control concomitant use of pharmacotherapy and physical therapy, the pharmacological regimen makes it impossible to determine the effects of any intervention. The authors noted that "all treatment groups, including placebo, showed a significant improvement in visual analog scale scores, use of rescue medication, and trigger point pain threshold by algometry . . . [$P < 001$]" The high doses of pain medications basically eliminated the control group and make it impossible to compare post-injection pain between placebo and intervention groups. Therefore, this paper does not provide any evidence against using botulinum toxin type A injections in the treatment of TrPs.

Even though the authors included a detailed review of the integrated trigger point hypothesis, several other issues remain open-ended. For example, it is difficult to imagine that the authors were able to find 132 subjects with more than six months of neck or shoulder pain, who did not have more than two TrPs in the trapezius muscle on any one side of the body. Clinically, it appears that most patients with neck or shoulder pain have multiple trapezius TrPs. The authors did not indicate their training and experience in correctly identifying TrPs. It is conceivable that subjects had several unidentified TrPs. The authors mentioned several times that the long-term benefit of traditional therapy is "transient, variable, often incomplete, or nonexistent." However, three of the five references they quoted to support this statement were from the same research group and did not include any outcome studies of TrP therapy. The other two references were pilot studies which the authors dismissed when discussing the differences between this study and previous botulinum toxin studies. In addition, there is evidence that TrP injections are most effective when local twitch responses are elicited (3,6). The authors did not mention local twitch responses and did not suggest that they attempted to elicit local twitch responses.

This study does not add anything to the knowledge base of using botulinum toxin type A injections in the management of persons with TrPs. The introduction of a pharmacological regimen with high-dosed pain medications is

the main reason this study deviated so dramatically from other studies, reviews, and consensus statements (4,5). It remains to be seen whether insurance companies will use this study to deny reimbursement for treatment of myofascial pain with botulinum toxin type A [JD].

CASE REPORTS

Integration of myofascial trigger point release and paradoxical relaxation training treatment of chronic pelvic pain in men: R.U. Anderson, D. Wise, T. Sawyer, C. Chan. J Urol. 174(1):155-60, 2005.

Summary

A total of 138 men with chronic prostatitis and/or chronic pelvic pain refractory [median 31 months] to traditional therapy were treated for at least one month with myofascial release therapy/paradoxical relaxation training by a team of a urologist, physiotherapist, and psychologist. Clinical improvement was identified by a 25 percent or greater improvement in scores. Global response assessment was a 7-point scale ranging from markedly or moderately improved to markedly worse.

Each patient was examined in the lithotomy position by the urologist to evaluate prostate, genitalia, external and internal pelvic muscles, and myofascial trigger points [TrPs]. Palpation of TrPs in the anterior levator ani referred pain to the tip of the penis and the most common intrapelvic location of TrPs was in the levator ani lateral to the prostate gland. The physiotherapist applied digital treatment to these TrPs using the left hand for TrPs on the right side of the pelvis, and the right hand for the left side. Myofascial release therapy included digital pressure applied to a TrP for 60 seconds to release. Trigger points were also treated by voluntary contraction and release, hold-relax, contract-relax, reciprocal inhibition, deep tissue mobilization, stripping massage, strumming of taut bands, skin rolling, and effleurage. Paradoxical release therapy was provided in conjunction with physiotherapy to decrease pelvic muscle tension. This therapy included a progressive relaxation exercise program, training in a specific breathing technique to quiet anxiety, and relaxation training sessions to focus attention on effortless acceptance of tension in various parts of the body.

Results include patients who participated in the above protocol even on a limited basis. Approximately half of the patients showed clinical improvement in either the pelvic pain symptom survey or the National Institutes of Health chronic prostatitis symptom index, and in the global response assessment questionnaire. Pain scores improved $\geq$ 50 percent in nearly half [48 percent] of the patients and $\geq$ 25 percent in 69 percent of them. Of those with initial sexual dysfunction, 69 percent improved. Global responses of markedly improved was reported by 46 percent of patients, moderately improved by 26 percent [72 percent together]. Urinary symptoms were significantly improved [P = 0.001] in those reporting marked global improvement.

Comments

This useful retrospective, uncontrolled, unblinded, multiple case study fully described treatment of pelvic TrPs, but did not identify the diagnostic criteria employed by the authors. However, it provides valuable guidelines for a more sophisticated study. Considering that many of the subjects received limited treatment, that all of them had failed conventional treatment attempts, and that most patients obtained much relief of symptoms, the results suggest that this treatment protocol, which focused on TrPs, identified a previously overlooked cause of many of the patients' symptoms. Unfortunately the authors did not identify more specifically how commonly in their opinion the patient's symptoms related primarily to TrPs, and how commonly to other factors.

A comparable study should include the prevalence of TrPs in the muscles of this patient population. Measurement of pelvic floor tension by pressure measurements and relaxation in terms of surface electromyographic measurements would clarify and help quantify the cause of symptoms. The distinction between active and latent TrPs in a study of this kind is important because active TrPs tend to cause pain symptoms, but latent TrPs disturb motor function and very likely can cause autonomic

dysfunction in these pelvic muscles, which are likely important factors in many of these patients [DGS].

BRIEF REVIEW

Breathing pattern disorders, motor control, and low back pain: L. Chaitow. J Osteopath. 7(1):33-40.

This interesting article reviews the impact of breathing pattern disorders, such as hyperventilation on motor control. Chaitow discussed in detail the many psychological, biochemical, neurological, and biomechanical consequences of breathing patterns disorders. He suggested that breathing patterns disorders can "encourage trigger point evolution" which in turn will result in pain and altered motor function [JD].

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