Myofascial Pain Syndrome–Trigger Points

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INTRODUCTION

This issue has what are, to our knowledge, a number of noteworthy firsts. The Macgregor and Graf von Schweinitz study of equine myofascial trigger points [TrPs] not only introduces to the scientific literature the fact that horses are quite prone to developing disabling TrPs, but they also added substantiation to the association of TrPs with endplate noise. Kao, Hsieh, Kuo, and Hong did a well-controlled study electromyographically establishing that a pain acupuncture site was also always a TrP, further strengthening the association of endplate noise and TrPs. The fact that the reason ergonomics is so critical for relieving musculoskeletal pain in the workplace is because it addresses perpetuating factors that aggravate the TrPs that are causing the pain. Dainoff, Cohen, and Dainoff reported the presence of TrPs and the tests that detect restricted range of motion caused by them in a remarkably thorough study of this all-too-common pain problem with equally remarkable results.

Five articles [with many more on the way] from Spanish physical therapists are making it unmistakably clear that for the first time, TrPs are shown experimentally to be a major factor in most headaches and from some previously unidentified muscles. Several articles describing the successful treatment of phantom and stump pain with botulinum toxin injections in TrPs by Kern and colleagues offer hope for many patients with amputated limbs and persistent phantom pain. The systematic mapping of TrPs responsible for phantom pain is another first! The rate of progress [this is the result of publications that have been newly identified in only two months] in this field is most remarkable [DGS and JD].

Each article review indicates whether it is prepared by Simons [DGS] or Dommerholt [JD].

RESEARCH STUDIES

Kao MJ, Hsieh YL, Kook FJ, Hong CZ: Electrophysiological assessment of acupuncture points. Am J Phys Med Rehabil 85(5): 443-448, 2006.

Summary

Physiatrists in Taiwan examined by needle electromyography [EMG] an acupuncture point and a nearby non-acupuncture control site in a randomly chosen tibialis anterior muscle for the presence of endplate noise [EPN] characteristic of myofascial trigger points [TrPs] in 10

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male and 10 female normal volunteers. Each site was explored for endplate noise by slowly advancing the electromyographic needle as previously described for TrPs. Following this, all sites were examined for the following clinical evidence of a TrP: the most tender spot in a palpable taut band that referred pain to the ankle and foot and responded to snapping palpation with a local twitch. Endplate noise was found at acupuncture sites in 25 percent of both male and female subjects, and in non-acupuncture sites in six percent of male and one percent of female subjects. The difference between the two kinds of sites was statistically significant [$P < 0.001$]. Every time the needle approached one of the 127 acupuncture sites and resulted in the appearance of EPN, the subject reported pain, soreness, or an unpleasant feeling. This experience is comparable to the "Ah-Shi" [that's it] effect characteristic of acupuncture sites and was reported in only seven of the 826 times that the needle did not encounter EPN. Subjects found the sensation when a local twitch response was elicited by the needling a TrP to be comparable to the "De-Qui" effect of acupuncture.

Comments

The authors are to be highly congratulated for this first controlled well-designed study comparing acupuncture and TrP sites. This study also, for the first time, provides an experimental answer to a tricky and controversial question that the authors did not recognize. They do point out how fatally and seriously flawed previous studies have been that simply review the literature and are based on false assumptions and they concluded that this study demonstrates that the Stomach-36 acupuncture sites [for treatment of pain] seem to be TrPs, which supports the concept that some acupuncture points are actually TrPs based primarily on the strong, significant correlation between the presence of EPN and the acupuncture points compared to non-acupuncture points. This conclusion is further supported by the correspondence of the Ah-Shi and De-Qui experiences at both kinds of sites.

The authors also noted that this study strongly supports the association of EPN with TrPs, which is a basis for the integrated hypothesis explanation of the cause of TrPs.

The fact that several non-acupuncture sites showed EPN can be accounted for by another interpretation. These sites may have been subclinical TrPs that included a few muscle fibers that had all of the dysfunctions of a TrP, but too few of them were involved to be detected by the limited sensitivity of the clinical examination for TrPs. Not all TrP sites are also acupuncture sites, but likely, most pain acupuncture sites are also TrPs.

The data reported help to clarify another controversial issue that was the used as the basis for the rejection by one journal for the research paper that established the close relationship between EPN and TrPs. Is EPN only the result of needle stimulation of a normal endplate, or does it reveal an abnormality of endplate function that was already present? It is not easy to design an experiment to answer this question since the only way you can detect the EPN is by placing the needle close to the endplate and needle pressure increases the amount of EPN.

The presence of EPN at acupuncture sites demonstrated that they were in an endplate zone, and the placement of the non-acupuncture sites likely also placed them in the endplate zone. Since exactly the same search procedure was used at both kinds of sites, the needle should have encountered a nearly equal numbers of endplates. The fact that so few of the non-acupuncture [non-TrP] endplate encounters responded to needle approach with EPN is strong evidence that the presence of the needle alone was usually inadequate mechanical stimulus to produce EPN in most normal endplates. Therefore, the EPN that was observed was usually preexisting and was caused by the TrP abnormality, not just by the presence of the needle. If this degree of mechanical stimulation did happen occasionally, or the needle encountered a particularly sensitive endplate, it could account for the occasional presence of EPN at non-acupuncture sites. [DGS]

Macgregor J, Graf von Schweinitz D: Needle electromyographic activity of myofascial trigger points and control sites in equine cleidobrachialis muscle–an observational study. Acupunct Med 24(2): 61-70, 2006.

Summary

A veterinary physiotherapist and acupuncturist in the United Kingdom explored the electromyographic [EMG] and other characteristics of myofascial trigger points [TrPs] in equine muscle compared to normal muscle. They examined the cleidobarachialis division of the brachiocephalic muscle of four thoroughbred horses that had been retired from active duty and were being seen for treatment of chronic pain signs and impaired performance. The muscle was examined bilaterally at two acupuncture sites for TrPs. The sites were approved, with the owners' informed consent, for the administration of acupuncture-like treatment with an EMG needle exploring for endplate noise and local twitch responses without equine sedation. Initially, a very tender spot in a palpable taut band in the muscle identified a TrP. Its precise location was found by the very limited range along the taut band that responded with a maximum twitch response to snapping palpation. Of course, the location of induced pain and its familiarity could not be determined, but it is unlikely the horses would fake the local sensitivity, the twitch response is objective evidence, and the musculoskeletal functional disability for which the horses were being seen for treatment was very real to the owners. Needles were inserted only at acupuncture sites that were suitable for treatment, which were LI16 and LI17 using the transpositional acupoints system. LI16 was chosen as the MTrP site in all four horses, and for a clinically TrP-free EMG control site, LI17 was chosen in three horses, and ST10 was used in one horse that had a TrP at LI17.

A 50 mm long concentric Teflon coated disposable EMG needle was used to record EMG activity at each test site. Each TrP region and each acupuncture control site was explored for electrical activity by inserting the needle in five directions: perpendicularly, and at 45 degrees in four quadrants. Each needle insertion was tested for EMG at five depths, roughly 1 cm apart, and was advanced slowly with rotation to minimize insertional activity and twitch responses [instead of endplate noise [EPN]. When activity appeared the needle was left in situ to allow the activity to stabilize. The needles in the control and TrP sites were connected to a two-channel EMG machine and recorded simultaneously.

Three items were listed: the appearance of continuous spontaneous electrical activity [EPN] of at least 10 μV more than control baseline activity [generally 20 μV greater], the appearance of irregular spike activity [usually negative first and biphasic] of at least 100 μV, and the occurrence of local twitch responses. These three data were combined for all four horses. Differences of $P < 0.05$ between TrP and control sites were considered statistically significant.

Endplate noise sometimes reached 80 μV, and endplate spikes, 1,000 μV. A typical recording is included. All three phenomena observed were significantly more common at the TrP sites than at control sites. Although the authors used the outmoded SEA [spontaneous electrical activity] terminology instead of the more specific EPN designation for the first item reported, they did recognize from the literature that they were actually dealing with EPN. They were not aware of the more recent literature that has adopted the EPN designation and the paper that justifies that change (1,2). The presence at control sites of EMG recordings typical of TrPs may have been because the horse muscle is large enough that early or small or deep TrPs may not be clinically identifiable. The surprisingly high level [four times what has usually been seen in human and rabbit studies] of background noise at control sites may have been because the horses were standing, fully alert, on the legs being tested. The EPN often disappeared if the needle was advanced or withdrawn a few millimeters, consistent with its endplate origin. Although there were only four subjects, the results were statistically significant. The authors also noted that blinding of examiners would be desirable.

Comments

This is, to my knowledge, the first research paper ever published on the presence of TrPs in horses and earns our hearty CONGRATU-

LATIONS. Dr. Janet Travell often described her treatment of TrPs in her beloved horses. This paper takes a large second step of further EMG substantiation of the strong association of EPN with TrPs. This part of the paper reinforces the basic concept of the integrated hypothesis, which still needs much additional research to fully complete the picture (1). The descriptions and illustration of EPN and spikes are fully consistent with the extensive experience of Hong, Lois Statham Simons, and me, when we were intensively studying TrPs in human and rabbit subjects from 1993 through 1995 (3). We hope the authors will continue this kind of research and make the considerable additional effort required to conduct a controlled blinded study of the effectiveness of acupuncture treatment of TrPs in their horse patients. It would be another major contribution to the veterinary and TrP literature. [DGS]

Fernández de las Peñas C, Cuadrado ML, Gerwin RD, Pareja JA. Myofascial disorders in the trochlear region in unilateral migraine: a possible initiating or perpetuating factor. Clin J Pain 22(6): 548-553, 2006.

Summary

This physiotherapist from Spain and three neurologists report an unprecedented examination of the superior oblique muscle [SOM] of the eye bilaterally for myofascial trigger points [TrPs] in 20 patients [seven men and 13 women] with unilateral migraine attacks and in 20 age and gender matched healthy control subjects. All subjects were examined by a blinded examiner and patients examined at least one week following a migraine attack to avoid migraine-related allodynia and in a headache-free status. The trochlear region of the eyeball was examined for trochlear region [SOM] tenderness, referred pain evoked by digital pressure maintained for 30 seconds, increased referred pain in response to contraction of the SOM [downward and medial gaze], and increased referred pain due to stretching it [upward and lateral gaze]. A definite TrP was identified if both contraction and stretching of the SOM increased pain. Response to only one maneuver identified a probable TrP. Patient recognition of evoked referred pain as familiar during a migraine attack identified an active TrP, otherwise it was considered latent. Four visual analog scale estimates of pain level were made by subjects on initial trochlear pressure, after 30 seconds of pressure, and in response to contracting or stretching the SOM.

All migraine patients had local trochlear-region tenderness, more on the symptomatic side [VAS 4.8] compared to the asymptomatic side [VAS 2.2] [$P < 0.001$]. Sixteen patients [80 percent] perceived referred pain when pressure was maintained for 30 seconds [VAS 5.2], described as a tightening sensation in the retro-orbital region that sometimes extended to the supraorbital region and even the homolateral forehead. This pain was evoked only from an eye on one side in all patients. Fifteen patients [75 percent] had definite TrPs, 10 of these patients had active TrPs, and five had latent TrPs. In all of these cases, the TrPs were ipsilateral to the side of the headache. The presence of TrPs was essentially the same in patients with or without aura. The intensity of local pain responses to testing in controls was significantly lower than patient responses on the symptomatic side [$P < 0.001$], but equal to those on the asymptomatic side. Five control subjects reported local pain on SOM examination that rated them as probable TrPs that were all latent. Future studies are needed to clarify the cause/effect relationship between the SOM TrPs and headaches. These studies include treatment effects.

Comments

This outstandingly well-designed, innovative study is a sequel to a previous report of SOM TrPs in patients with tension type headache, that described similar pain patterns (4). I often wondered why the extraocular muscles didn't have TrPs that caused referred pain. I just didn't look hard enough. Devin Starlanyl told me how she screens for TrPs in the other extraocular muscles and occasionally finds them by having the patient gaze in each of the four directions [up, down, left, and right] sequentially for painfully restricted range of motion. Apparently there are very few headaches, including migraine, that do not have a significant TrP component (5). Eighty percent of the patients with migraine had clinical evidence of TrPs in the SOM. [DGS]

Fernández de las Peñas C, Alonso Blanco C, Cuadrado ML, Pareja JA: Myofascial trigger points in the suboccipital muscles in episodic tension-type headache. Man Ther 11: 225-230, 2006.

Summary

In this study, ten subjects with episodic tension-type headaches [ETTH] and ten healthy age- and sex-matched controls were examined for the presence of myofascial trigger points [TrPs] in the rectus capitis posterior minor, rectus capitis posterior major, and oblique capitis superior by an examiner who was blinded to the subjects' condition using modified criteria by Simons, Travell, and Simons, and by Gerwin et al. (6,7). Since these suboccipital muscles are not directly palpable, subjects were asked to extend the neck from a neutral spine position, once the examiner had elicited referred pain by compression in the area between the occiput and the posterior arch of the atlas. The active cervical-occipital extension allowed the examiner to palpate for active contractions. The presence or absence of familiar referred pain similar to pain during headache attacks determined whether TrPs were classified as active of latent respectively. On the day of the examination, all ETTH subjects received a headache diary to record the daily headache intensity, duration, and the days with headache for a period of four weeks.

All ETTH subjects had TrPs in the suboccipital muscles; six subjects [60 percent] had active and four subjects [40 percent] had latent TrPs. Two control subjects [20 percnet] had latent TrPs. Differences between groups were significant for the presence of active TrPs. The headache intensity, frequency, and duration in the ETTH group did not depend on whether TrPs were active or latent.

Comments

The authors recognized that the limited sample size designates this study basically as a pilot study with limited power. Combined with the many other headache studies by this research group, it appears that suboccipital muscles play a role in the etiology of episodic tension-type headaches. As these muscles are not directly palpable, it is conceivable that other structures in the suboccipital region could also contribute to the perception of referred pain even though the authors attempted to minimize its likelihood. Future studies should be expanded and include other posterior neck muscles, a larger sample size, and other types of headaches. [JD]

Fernández de las Peñas C, Alonso Blanco C, Alguacil Diego IM, Miangolarra Page JC: Myofascial trigger points and postero-anterior joint hypomobility in the mid-cervical spine in subjects presenting with mechanical neck pain; a pilot study. J Manual Manipulative Ther 14(2): 88-94, 2006.

Summary

Thirty patients with mechanical neck pain referred by their primary care physician were included in this study. Mechanical neck pain was defined as "generalized neck and/or shoulder pain with mechanical characteristics including symptoms provoked by maintained neck postures, by neck movement, or by palpation of the cervical muscles." One physical therapist examined each subject for the presence of myofascial trigger points [TrPs] in the upper trapezius, sternocleidomastoid, and levator muscles according to the criteria by Simons, Travell, and Simons, and by Gerwin et al. (6,7). The researchers used an algometer to reproduce familiar referred pain. A second physical therapist, blinded to the findings of the first therapist, examined the cervical spine from C3 to C7 for the presence of posterior-anterior hypomobility as described by Maitland (8).

The mean number of TrPs was 3.4 [2.3 latent and 1.1 active] with most TrPs in the sternocleidomastoid muscle [left: 66.6 percent, right: 83.3 percent], followed by the trapezius [left: 70.0 percent, right: 63.3 percent], and the levator scapulae [left: 30.0 percent, right: 26.6 percent]. Sixteen subjects had right-sided joint hypomobility and 14 presented with left-sided hypomobility with the C3 segment most commonly involved [80 percent] followed by C4

[20 percent]. The authors could not determine a statistically significant relationship between the number of TrPs in the examined muscles and the presence of hypomobility at the C3 and C4 vertebrae.

In the discussion section the authors addressed several aspects of muscle and joint dysfunction in the cervical spine and reviewed in detail the discrepancies between the current study and a previous study from the same research group reporting a significant relationship between the number of TrPs in the upper trapezius muscle and C3 and C4 hypomobility (9). In the previous study, they employed the lateral gliding test and included 150 subjects versus 30 in the current study [9].

Comments

It is encouraging to see that one of the world's leading manual therapy journals published this excellent article on the relationship between TrPs and cervical hypomobility. Even though this study could not determine statistical significance, the authors emphasized that the mere presence of TrPs and joint dysfunction dictates that in clinical practice both muscles and joints need to be addressed. It is our impression that until recently, the manual physical therapy community has not focused on TrPs. The many clinically relevant studies by this Spanish research group certainly will facilitate a re-orientation that can only benefit our patients. [JD]

Ge HY, Fernández de las Peñas C, Arendt-Nielsen L: Sympathetic facilitation of hyperalgesia evoked from myofascial tender and trigger points in patients with unilateral shoulder pain. Clin Neurophysiol 117(7): 1545-1550, 2006.

Summary

Twenty-one female subjects with chronic unilateral shoulder pain were included in this study. To be included in the study, the subjects needed to have an active myofascial trigger point [TrP] in one of the infraspinatus muscles using the criteria of Simons, Travell, and Simons (7). A tender point [TeP] in the contralateral infraspinatus muscle was identified. A TeP was defined as a point within a taut band but without referred pain with snapping palpation. A point in the right tibialis anterior muscle was used as a control point. Subjects rated their resting pain on a visual analog scale before any measurements were taken. The researchers determined the pressure pain threshold [PPT] for all three points using an algometer during normal respiration and during induced elevated intrathoracic pressure [EITP], which is described as a maneuver that increases the sympathetic outflow to the skeletal muscle when holding one's breath with the glottis closed. With this maneuver it is possible to determine the effect of increased sympathetic outflow on the mechanical sensitivity of TrPs.

In the second phase of the study, the PPT and the pressure threshold for eliciting referred pain [PTRP] were determined in eleven subjects. Next the local pain and referred pain intensities were measured at the TrP during normal respiration and during EITP during application of pressure equal to $1.5 \times$ PTRP. After all measures were completed, a local twitch response was elicited in the active TrP using an acupuncture needle.

The authors concluded that increasing sympathetic outflow to the muscle decreased PPT, PTRP, and increased local and referred pain intensities at both TeP and TrP [$P < 0.001$ for all four comparisons]. They offered several conceivable mechanisms for the observed sensitivity, including a change in the local chemical milieu at the TePs and TrPs due to increased vasoconstriction, an increased sympathetic release of noradrenaline, or an increased sensitivity to noradrenaline.

Comments

This is an important study that provides for the first time experimental evidence of sympathetic facilitation of mechanical sensitization of TrPs. Previous studies demonstrated that exposing subjects with active TrPs in the upper trapezius muscles to stressful tasks consistently increased the electrical activity in TrPs, while autogenic relaxation was able to reverse the effects (10-13). The authors offer several possible mechanisms that differ from previous suggestions that the autonomic contributions may be due to muscle spindle activity or activity of adrenoreceptors on the motor nerve terminal (11,14).

The authors' choice of characterizing a tender point in a taut band as a "TeP" is rather confusing, as these points seem to meet the criteria for latent TrPs as defined by Simons, Travell, and Simons (7). It gets even more confusing when the authors seem to equate these TePs or latent TrPs with fibromyalgia TePs in the discussion section of this paper. While it is conceivable that some fibromyalgia syndrome TePs may indeed be TrPs, the mixed use of these terms only contributes to confusion (15). Notwithstanding the confusing terminology, this study does offer support for autonomic influences on TrPs. [JD]

Kern K-U, Martin C, Scheicher S, and Muller H: Auslosung von Phantomschmerzen und-sensationen durch muskuläre Stumpftriggerpunkte nach Beinamputationen [in German: Referred pain from amputation stump trigger points into the phantom limb]. Schmerz 20(4): 300-306, 2006.

Summary

Based on their experiences with the treatment of phantom and stump pain using botulinum toxin injections into myofascial trigger points [TrPs], the authors completed a systematic analysis of the local and referred pain patterns of stump TrPs. Thirty subjects with leg amputations [12 transfemoral, 18 transtibial] were examined for TrPs. After determining the five most symptomatic TrPs, the subjects were asked to localize areas of stump pain, phantom pain, and sensations in the phantom limb.

Interestingly, patients were not aware of the presence of the TrPs. Yet, pain sensations were commonly seen in as many as 20 out of 30 patients with 60 out of 150 TrPs producing phantom sensations and 17 causing phantom pain. Fourteen TrPs caused involuntary stump movements and 10 produced stump fasciculations. Phantom phenomena were most commonly seen in the toes [62.8 percent] and midfoot [17.9 percent] with the remainder more proximal. Approximately 70 percent of the TrPs were in an area 3 to 7 cm from the stump end. The TrPs that caused toe projections were usually more distal than those with tibial referred pain/sensation patterns. Thirty percent of the TrPs were located in the dorso-lateral aspect of the stump and 18 percent were in the medio-ventral part, presumable because of greater muscle mass, but conceivably because of more dorsal nerve dis tributions in the leg. Ventral TrP did cause dorsal phantom pain in some instances. The authors concluded that latent TrPs may contribute to phantom pain and sensations and speculated whether TrP pain and phantom pain may develop from a shared etiology.

Comments

This and other articles from the same authors [also reviewed in this column] are very encouraging and should provide hope for thousands of patients suffering from daily phantom pain. A survey of American veterans revealed that 78 percent of respondents experienced phantom pain (16). To the best of our knowledge, this is the first study that systematically examined the role of TrPs in phantom pain phenomena. While the exact mechanism of action may require further studies, the results of this study justify examining and treating patients with phantom pain with inactivation of TrPs. [JD]

Arokoski JP, Surakka J, Ojala T, Kolari P, Jurvelin JS: Feasibility of the use of a novel soft tissue stiffness meter. Physiol Meas 26(3): 215-228, 2005.

Summary

This is a form of tissue compliance meter. Usually these meters measure the force required to push a plunger a measured distance into the tissue, which is a measure of tissue stiffness. The plunger usually is advanced step-wise through a hole in a footplate, which provides a skin-surface reference for measuring the force of indentation. This provides data for constructing an X-Y plot of the indentation distance versus force required. These authors devised a similar device that measure both the amount of force being applied to the skin with the plunger and to a footplate to keep that pressure applied to the skin constant and then extended the plunger a fixed [unstated] distance for the one measurement and recorded the resultant plunger force produce by that much indentation of the tissues with a measured constant footplate pressure. The only variable available with this system was a change in tissue pressure against the plunger due to a change [or lack of change] in the nature of what was being measured.

The authors applied the device to a series of elastamere samples of known elasticity, four different neck and shoulder muscles bilaterally in 12 healthy subjects, and in 16 females with chronic neck pain due to myofascial trigger points [TrPs], during forearm voluntary muscle contraction from rest to maximum effort, and during different degrees of forearm venous occlusion. Pressure pain thresholds and muscle stiffness measures of the attachment TrP area of the levator scapulae muscles were compared. A linear relationship was found between indenter force [muscle stiffness] and successive degrees of voluntary muscle contraction [from 0 to maximus] but a non-linear relationship with different degrees of venous occlusion. The indenter force recorded was different at different muscle sites between about 5.5 [deltoid] to about 7.5 [levator scapulae] Newtons. The indenter force was 13.6 percent higher at the levator scapulae sites that were on the side of the smaller [more sensitive] pressure pain thresholds. Assuming the text is correct and that the title of Figure 2 is in error, the coefficients of variation were nearly, or less than, 10 for inter- and intra-rater stiffness readings on all muscles. The authors concluded that this device is a simplified, reliable way of taking tissue stiffness measurements.

Comments

This device is simpler but also provides a more limited amount of information than previous devices. The inter- and intra-reliability values reported were good. Correlation coefficients are simply the standard deviation corrected for the average value and are most useful when you are comparing sets of values for different measurements that have different units. That permitted comparison of reliability of pressure pain thresholds with stiffness measures. The fact that TrP sites in different muscles have somewhat different stiffness values is no surprise. The fact that the more tender TrPs exhibit a greater stiffness is confirmation of the clinical finding of a firmer palpable nodule in a more active TrPs. The limited application of the device in this study does not establish it as a reliable measure of TrP activity because it did not test how well this measure can distinguish the increased tension at the TrP or of the taut band as compared to surrounding tissue. It may or may not be as prone to error as pain pressure threshold measurements when the measurement is not taken exactly the point of maximum TrP tenderness, which would be difficult to do. Properly administered, this factor gives pain threshold measurements a high degree of sensitivity to TrP activity. Being a different kind of measure, this device may be useful in addition to pain threshold measures for studying the characteristics of taut bands throughout a muscle. [DGS]

P. Dorsher: Trigger points and acupuncture points: anatomic and clinical correlations. Med Acupunct 17(3): 21-25, 2006.

Summary

This article compares the anatomical and clinical relationships between myofascial trigger points [TrP] described by Travell and Simons and acupuncture points [AcP] described by the Shanghai College of Traditional Medicine and other acupuncture publications. An anatomical correspondence was assumed when a TrP and AcP were within a 2 cm radius of each other, and the points entered the same muscle. A published cross-sectional anatomic study of AcP was used to determine whether AcPs were in the same muscle as the corresponding TrPs. Differences in depth were accepted. The author determined whether AcPs with corresponding TrPs had similar regional pain indications as the TrPs. In addition, he determined whether there was any overlap between the distributions of acupuncture meridians and TrP referred pain patterns. The degree of correspondences were graded on a five-point scale ranging from excellent to none.

Of the 255 TrPs, only eight did not have an anatomic correspondence with AcPs, and most of these points were located in the medial pterygoid, psoas, iliacus, subscapularis, and obturator internus muscles, which the author characterized as "not safely accessible by trigger point injections." Fifteen percent of classical AcPs with corresponding TrPs did not have similar clinical pain indications. Referred pain patterns and meridian distributions were nearly identical in 76 percent, partially identical in 14 percent, and had no correspondence in 10 percent of comparable points. After the author addressed possible criticisms of this study, he concluded that "the strong correspondence between trigger point therapy and acupuncture should facilitate the increased integration of acupuncture into contemporary clinical pain management."

Comments

Dowsher has undertaken a very detailed and consuming comparison between 255 TrPs and 386 AcPs. In addition to the current article, he mentioned that he has prepared computer graphic demonstrations of each of the 234 TrP-AcP anatomic correspondences, and meridian-referred pain correlations. His findings are pretty much in line with Melzack et al.'s conclusion that there is a 71 percent overlap between TrPs and AcPs (17). Dowsher dismissed Birch's arguments that most AcPs are not used specifically for pain indications (18).

Yet, it remains questionable whether it is possible to assume distinct anatomical locations of TrPs and use those in comparisons with other points. In part the *Trigger Point Manuals* are to blame for suggesting that TrPs have distinct locations (7,19). Simons, Travell, and Simons have described specific TrPs in numbered sequences based on their "approximate order of appearance," and may have contributed to the widely accepted impression that indeed TrPs have distinct anatomical locations (7). To this reviewer, the detailed numbered descriptions of specific TrPs in the *Trigger Point Manuals* are not consistent with clinical practice. For example, Simons, Travell, and Simons described seven TrPs in the trapezius muscle. In clinical practice, one frequently finds more TrPs in just the upper part of the muscle. The authors have used the terms "trigger regions with distinctive pain patterns" and "TrPs" somewhat interchangeable, which in fact may add to the confusion.

The most striking aspect of this study are the correspondences between known referred pain patterns and described courses of meridians. However, the same dilemma arises: Are referred pain patterns TrP-specific, or should they be described for muscles in general or perhaps for certain parts of muscles? Recent studies of experimentally induced referred pain suggest that individual referred pain patterns may be characteristic of muscles rather than of TrPs (20-23).

If one of the objectives of this paper is to increase the utilization of acupuncture into pain management practice, it may be preferable to conduct clinical outcome studies of the efficacy of acupuncture in the treatment of persons with pain conditions or investigate the nature of acupuncture points as several researchers have attempted (24-26). More research is needed to establish whether TrPs can be categorized with distinctive anatomical locations and whether referred pain patterns are TrP-specific or muscle-specific, before undertaking more such studies. As a side note, all the muscles the author deemed not safely accessible by TrP injections are commonly needled in clinical practice. [JD]

TREATMENT STUDIES

Rodriguez Blanco CR, Hernandez J, Algaba C, Fernandez M, de la Quintana M: Changes in active mouth opening following a single treatment of latent myofascial trigger points in the masseter muscle involving post-isometric relaxation or strain/counterstrain. J Bodywork Movement Ther 10(3): 197-205, 2006.

Summary

This study of 90 subjects [42 men, mean age 25 years] with a latent myofascial trigger point [TrP] in the masseter muscle compared the immediate effect on active mouth opening following a single treatment with either post-isomet-

ric relaxation or strain/counterstrain technique. The subjects were healthy college students without any restrictions in mouth opening. Trigger points were identified using the Simons, Travell, and Simons criteria (19). Subjects were excluded if they had no TrP in the masseter muscle, a history of fibromyalgia syndrome, whiplash, surgery in the cranio-cervical region, or temporomandibular disorders, or having undergone myofascial pain therapy within the past month before the study. Subjects were randomly assigned to one of three groups. Groups one and two were treated with post-isometric relaxation and strain/counterstrain, respectively, while the third group functioned as the control group that received no treatment. Treatment by post-isometric relaxation began with passive opening of the mouth to the barrier, followed by a gentle isometric voluntary contraction, repeated three times. Strain/counterstrain treatment began by the therapist applying pressure to the masseter TrP by pincer palpation until the subject felt pressure and some pain. Then the subject was passively positioned into a position of ease that reduced the palpable tension and pain by around 75 percent, which was usually ipsi-lateral side-flexion of the cervical sine, and a slight mouth opening [5 to 8 mm]. Blinded evaluations of mouth opening before treatment, and five minutes post-treatment found an increase of 2.0 mm after postisometric relaxation, 0.2 mm after strain/counterstrain, [$P < 0.001$], and 0.1 mm for the control group. Only the group receiving post-isometric relaxation showed a significant improvement in active mouth opening.

Comments

Spain is becoming an important source of high quality TrP research and this study follows the trend. To our knowledge, this is the first blinded, randomized, controlled study comparing the effectiveness of a manual treatment of TrPs that is comparable to strain/counterstrain, and the results were more dramatic than expected. The authors acknowledged that the results may not be typical of symptomatic patient populations, as the subjects were asymptomatic before the study. This study had no assessment of follow-up results. Yet, the study does demonstrate that latent TrPs may be clinically relevant and can cause limitations in range of motion consistent with Lucas et al.'s findings (27). Several additional considerations would have been of value in this study. Additional measures of TrP tenderness [pressure pain threshold] before and after treatment were lacking. The authors did not include TrP examinations of the temporalis and medial pterygoid muscles, which share functions with the masseter. They may have been more affected by the post-isometric relaxation than by the strain/counterstrain technique.

The question remains how actual patients with limited mouth opening would respond to either form of therapy, and we hope that this research team will consider this in future studies. [DSG and JD]

Dainoff MJ, Cohen BGF, Dainoff MH: The effect of an ergonomic intervention on musculoskeletal, psychosocial, and visual strain of VDT data entry work: the United States part of the international study. Int J Occup Saf Ergon 11(1): 49-63, 2005.

Summary

Twenty-six female employees of the Cincinnati Service Center of the United States Internal Revenue Service, who were entering data from paper copy on old computer equipment that required keyboard operation rather than mouse operation, received extensive, intensive, and relatively expensive ergonomic intervention and training in three parts that also included evaluation of multiple measures. Each subject received optometrist-prescribed corrective lenses whenever needed. Secondly, they were provided a workstation ergonomically optimized with fully adjustable ergonomic chairs, a push-button motorized work surface height adjustment for sitting or standing, a keyboards with three interchangeable sections that could be lifted or swiveled to fit the operators preferences, a copyholder specially designed for this computer application adjustable in viewing height and angle; a custom-made monitor support, and an adjustable footstool. Thirdly, training of subjects in ergo-

nomic principles included classroom training, initial on-site coaching, and subsequent follow-up coaching visits at workstations with receipt of a periodic ergonomics newsletter. Measurements were taken initially, one month after completion of interventions, and six months after completion of the study that included a final interview.

Initial physical examinations were repeated by blinded examiners at one month and one year following all interventions. Examination for the number of painful trigger points [TrPs] [no additional details] reported 128, 34, and 17 on the three successive examinations. Testing of shoulder function endurance, palpation tenderness, and mobility [no further details] for number of positive responses, reported 13, 12, and 7 on successive exams. Testing the number of participants who reported pain on passive flexion, extension, side bending, or rotation of the neck reported 19, 4, and 1 on successive exams. Overall results for all three tests for all subjects were statistically [$P < 0.001$] and clinically significant. Pain scores [visual analog scale 0-100] were successively 36, 25, and 27 for pain intensity, and 1.55, 0.97, and 0.92 for pain frequency. Both measures showed statistically [$P < 0.001$] and clinically significant improvement between initial values and at 30 days post intervention, with no indication of return of pain symptoms at one year. The estimated static load obtained by observation of the subjects working posture decreased significantly [$P < 0.001$] between the first and second a d the improvement maintained at the third evaluation. Head and trunk postural angles showed similar improved decreases, but should flexion increased, apparently as an adaptation to the new keyboard. Frequency of visual fatigue was reported as 11, 9 and 3; burning/itching of eyes as 16, 5, 0; redness as 11, 3, 0; and hazy/double vision as 13, 7, 3. These are statistically [$P < 0.001$] and clinically significant improvements. Subject estimates of comfort resulting from ergonomic intervention improved significantly [$P < 0.001$] between the first and second examinations and maintained at the third examination. Electromyographic evaluation used a strange method of calculating muscle stress from amplitude data that did not include power spectrum analysis and got confusing results. At the follow-up interview, all 23 available subjects were pleased with their physical improvement and with this intervention; several subjects experienced bolstered self-esteem because they had control of their work environment.

The authors examined the economic value of this intervention and discovered that the biggest gains were in overhead costs such as training costs of replacement employees, medical expenses, sick leave, etc., items that are rarely included in business organizational accounting systems and are therefore unnoticed by management in this context. The cost of this intervention was estimated at $2,200 per employee, while the cost of a single worker's compensation case could be as high as $75,000. This does not include the value of employee satisfaction and improvement in lifestyle of employees who generalized the ergonomic principles learned at work to their home environment also.

Comments

This paper by members of the ergonomics research center in Oxford Ohio is the most detailed, eloquent application of ergonomics I have encountered. Most interestingly, a primary set of results measures were examination for TrPs per se, and two other musculoskeletal functional measures that are widely recognized by clinicians as being highly dependent on the activity level of TrPs in the muscles being stretched. Unfortunately the authors did not report the criteria they used to identify an TrP. However, this report is fully consistent with the experiences of TrP-skilled clinicians working with this same type of patient population. Since all of the ergonomic interventions would also reduce TrP perpetuating factors, although the authors did not point this out in their paper and gave the subjects no specific TrP therapy, the outstandingly good results including marked reductions in the TrP counts and the two associated physical examination measures indicate that the muscle abuse imposed by most current work station practices is a major source of the musculoskeletal symptoms responsible for the epidemic of workman's compensation cases, lost work time, and workers' musculoskeletal miseries. The results of this study further indicate that effective resolution of this problem depends on ergonomic reform of much current practice and most important that simply treating the pain with analgesics or even inactivating just the TrPs is not a long term solution unless the perpetuating factors of work-station muscle abuse are also eliminated. This study leaves open the question of how much better the final results would have been if the TrPs responsible for the remaining musculoskeletal pain of these subjects had also been inactivated by specific TrP therapy. The remarkable and commonly overlooked economic advantages to everyone involved of investing in this level of ergonomic practice were most impressive and need to become a part of management thinking and practice. Awareness of the role of TrPs in this process helps everyone better understand the basic nature of this common problem and the appropriate solutions. [DGS]

Qerama E, Fuglsang-Frederiksen A, Kasch H, Bach FW, Jensen TS: A double-blind, controlled study of botulinum toxin A in chronic myofascial pain. Neurology 67: 241-245, 2006.

Summary

These neurologists and neurophysiologist from Aarhus, Denmark have reported a randomized, double-blind, controlled study by injecting either botulinum toxin A [BTXA] or isotonic saline solution into trigger points [TrPs] of the infraspinatus muscle in 30 patients [18 female]. All patients had pain in shoulder referred to the arm for at least six months with TrPs in the ipsilateral infraspinatus muscle and a numerical rating scale [NRS] of at least a 2 [0-10] level pain. Exclusions included current alcohol or drug abuse, participation in another research study, reluctance to stop other therapies for project period, and any TrPs in the ipsilateral trapezius, supraspinatus, and teres muscles. A TrP was identified by a painful spot in a palpable taut band, recognition of current sensory complaints with pressure applied to the tender spot, and if referred pain was in the distribution expected from a TrP in the infraspinatus muscle. The TrP was considered stable if spontaneous pain scores and range of motion improved by less than 50 percent and pressure pain threshold and tolerance increased less than 50 percent during the one-week run-in period between the first and second visit. At the second visit, each subject received an injection at the TrP site, and fluid was deposited in four sites in each of five directions. Physical testing included limitation of the Mouth Wrap-around Test and the Hand-to-shoulder Blade Test. At the second visit, motor endplate activity was recorded electromyographically in 10 of 13 patients and in 29 of 268 sites in the BTXA group and a similar number in the control group.

At the fourth [final] visit, there was a reduction in the number of electromyographically active [endplate noise] sites [$P = 0.02$] in the BTXA group, but no change in the control group, indicating that the BTXA had effectively inactivated the motor endplates at that TrP. There was no difference in the number of patients in both groups who experienced at least 30 percent pain relief following treatment. Examination of Figure E-F-1 available only at the journal's website, showed that between the first and fourth visits, spontaneous pain dropped in median of NRS from 4.2 to 2.0 in BTXA subjects and from 6 to 4 in control subjects [respectively $P < 0.05$ and $P < 0.01$], which indicated a more significant reduction of spontaneous pain reduction in BTXA subjects. The NRS for evoked pain went from 7.5 to 5.5 for BTXA subjects, and from 8 to 4.5 for control subjects. Both were statistically significant [$P < 0.01$].

The following results were obtained by calculating the percentage change between the measures at baseline and at the fourth visit from the data listed in the tables available only from the journal's website. The results are presented in percent change between the baseline and fourth visit results for each examination. Subject groups are identified as BTXA subjects or control subjects. Percent reduction in pain during the Mouth Wrap-around Test 57/33, Hand to Shoulder Blade Test [distance between hand spine of scapula in mm] 22/10, pain during same test 67/30, increase in pressure pain detection threshold [kPa] 8.7/20 and increase in pressure tolerance threshold [kPa] 0.7/24 percent. The text indicated that there was no significant difference in these results except that the

BTXA group showed significant improvement in range of motion during Hand to Shoulder Blade testing [22/10 percent decrease]. The other test commonly showed what was likely clinically significant improvement with BTXA-free needling.

Comments

This flawed-design randomized, double-blind, controlled and poorly interpreted study is, to my knowledge, the first explicitly TrP study to be published in a mainstream neurology journal and illuminates some important considerations in TrP research. Since both test and control subjects showed marked and comparable improvement, the selection of that control methodology was inappropriate, as the previous studies indicate that it would be. The authors report that all 30 of their chronic pain [longer than six months] subjects had active TrPs in their infraspinatus muscles on one side, but no TrPs in the upper trapezius, supraspinatus, teres major, and teres minor muscles. Clinicians familiar with patients with myofascial pain of that muscle for that long find it incredibly remarkable that the authors could find so many subjects with no active TrPs in any of those other muscles among only 57 candidates. This raises a question in their minds as to the credibility of the examinations. The criteria for identifying a TrP were appropriate and well described, and explicitly identified active TrPs. These authors made the common mistake that so many authors make by not screened for all of the TrPs that are contributing to the subjects' pain complaint. This failure introduces potentially critical uncontrolled variables. In that case, the results of treatment of the TrPs in only one of the muscles can be highly contaminated by pain from remaining active TrPs. This study likely suffered from this factor due to the limited identification of other muscles which one would expect to harbor TrPs in subjects with myofascial pain of this degree of chronicity.

The authors report, not surprisingly, that injecting normal saline into the TrPs was nearly equally as effective at reducing patient pain reports as injecting BTXA. They noted in their discussion that it is well established that the needling procedure alone [dry needling, which is also the nature of acupuncture] is as effective as injecting any substance, including BTXA. If both procedures were already fully effective, it is questionable how valid the conclusions are that are based on differences in the outcome. The surprising thing was that the BTXA did provide as much improvement as the saline. The one item not reported that would have helped greatly to evaluate the needle effect is how frequently the needling in either group elicited either a marked pain response and/or a local twitch response. When this occurs the needling is far more effective than when it does not occur. If this was comparable in the two groups [and based on the rigid protocol and total amount of needling at each TrP site, it very likely was], one would expect the needling to have been equally and significantly effective in both groups.

The inclusion of the detection of endplate noise as part of the protocol is to be highly complimented and assures us that the authors were dealing with TrPs. Unfortunately, their reference to the second edition of Volume 1 of the *Trigger Point Manual* had the right date, but the wrong first author and an outmoded title. Two other papers reviewed in this issue used that same measure.

The authors question the adequacy of the integrated hypothesis because they contend that if the relief of pain was equally effective with or without endplate noise, this indicates that pain relief is not dependent on abnormal endplate function. Although there was less difference than the authors called to our attention or recognized, we strongly agree that additional mechanisms very likely contribute to the clinical phenomena associated with TrPs. Pain is only one of them. It appears that the serious motor dysfunctions [e.g., inhibition causing increased fatigability and weakness] that are common in latent TrPs do not produce a clinical pain complaint. Why, at this point, is anyone's guess. We only have a hypothesis that serves as a starting point for the many questions that need to be resolved before we have a fully satisfactory understanding of TrPs and heartily welcome any research that contributes to that objective. [DGS]

Huguenin L, Brukner PD, McCrory P, Smith P, Wajswelner H, Bennell K: Effect of dry needling of gluteal muscles on straight leg raise: a randomized, placebo controlled, double blind trial. Br J Sports Med 39(2): 84-90, 2005.

Summary

Fifty-nine athletes with hamstrings pain recruited from Australian Rules football clubs, advertisements, flyers, and private referral were included in this study, which aimed to evaluate the effects of therapeutic and placebo dry needling on hip straight leg raising [SLR], internal rotation [IR], muscle pain, and muscle tightness. The symptoms had to be reproducible with pressure over gluteal myofascial trigger points [TrPs]. The SLR and IR were measured with standardized methods validated for their reliability before the start of the study. Pain and tightness in the hamstrings and gluteals were assessed on four unmarked 10 cm visual analog scales.

The dry needling procedures were performed by the same researcher. The TrPs were identified mostly in the upper outer buttock quadrant with three to five TrPs per subject. Therapeutic needling was performed with 0.30 mm diameter and 25 mm long acupuncture needles. Reproduction of recognizable pain or visualization of a local twitch response were used as indicators of correct needle placement. The needle was partially withdrawn and repeatedly advanced until the pain resolved and no further twitches were observed. Placebo needles were modified acupuncture needles. The tip had been removed and the needle was glued back into the shaft. Placebo needling involved applying the tip of the blunted needle to the skin over TrPs. The placebo needling had been assessed for reliability in 10 volunteers and found to be reliable.

There were no significant changes in range of motion in either group. The VAS scores did not change significantly either for any of the resting variables or for gluteal pain. Both groups did have significant improvements in hamstrings tightness, hamstrings pain, and gluteal tightness. Measurements were taken before, immediately after, and again after 24 and 72 hours.

Comments

This study is somewhat difficult to understand and to evaluate. Both the therapeutic and placebo group had similar outcomes. The authors raised the possibility that limited range of motion may not necessarily be associated with symptoms. But there are other, more fundamental problems with this study. Unfortunately, the authors did not indicate which gluteal muscles were included in the assessment or in the interventions. Which particular gluteal TrP reproduced the hamstrings pain? According to Travell and Simons, only TrPs in the deeper portion of the gluteus mimimus refer pain to the hamstring (19). Did the authors provoke the familiar pain by applying pressure on a gluteus minimus TrPs? If so, it would be impossible to reach this TrP with a 25 mm long acupuncture needle, especially in well-trained athletes with presumably conditioned gluteal muscles.

There may have been other structures contributing to hamstrings pain, such as the sacrotuberous ligament, or sacroiliac joints, even though the latter were excluded based on clinical evidence. At the same time, there are many other muscles that may need to be treated before changes in range of motion would be measurable, including the piriformis and other hip rotators, the abductor magnus, and of course the hamstrings themselves. Hamstrings pain is frequently due to TrPs in the hamstrings or the adductor magnus, and not from gluteal TrPs (28).

Another issue is whether the placebo needle really provided a true placebo. The researchers did stimulate the skin overlying TrPs, which may implicate a-beta fibers, which in turn may have an impact on the observed outcomes. Placebo needling is inherently difficult to accomplish. The authors suggested that the placebo stimulus may have been equivalent to a needle penetration. [JD]

CASE STUDIES

Longbottom J: A case report of postulated 'Barré Liéou syndrome.' Acupunct Med 23(1): 34-38, 2005.

Summary

This United Kingdom physiotherapist describes a case diagnosed as Barré Liéou syn-

drome with severe occipital and temporal headaches of 9-10 intensity on a verbal score of 0 to 10, visual disturbances, and breathing difficulty after a fall on her left outstretched arm two years ago. At the age of 10 she fell out of a tree, fractured her skull, and remained unconscious for several weeks, but was deemed to have fully recovered. Recent referrals to the Chronic Pain Clinic, ear nose throat specialists, and for chiropractic and osteopathic treatments had been of no help. Lately she had overwhelming physical inability to cope with even minor chores and reported a feeling helplessness and loss of control with impaired memory. Her general practitioner gave her the diagnoses of depression and anxiety, and she reported panic attacks and a feeling of inability to cope.

She had symptoms and findings consistent with the diagnoses of Barré Liéou syndrome and of complex regional pain syndrome of the left arm, serious articular dysfunctions from T2 to T8, and active myofascial trigger points [TrPs] in three neck muscles, which on palpation, reproduced labored breathing and swallowing difficulties with increased occipital pain. Previous chiropractic manipulations were of no help at best. Treatment began with acupuncture treatments selected to relieve her high level of anxiety and poor sleep, and it specifically avoided spinal manipulation because of the severely restricted range of motion imposed by both joint and muscle involvements. By the third treatment additional acupuncture sites were included to reduce pain and normalize her breathing. The patient had improved in these issues sufficiently that during the 12th through 15th treatments the therapist needled TrPs in the sternocleidomastoid, scalene, trapezius, and levator scapulae muscles bilaterally. The procedure elicited a jump reaction. The patient required daily myofascial stretch and exercise regimes in order to keep pain and anxiety at reasonable levels. On reassessment at 18 weeks, the patient was again working full time, sleeping, and maintaining an improved lifestyle with control of her pain without opioids. Although the TrPs were not active, they were threateningly latent.

Comments

This is an outstanding example of effective management of a very complex neuromusculoskeletal pain and dysfunction problem that combined judicious selection of a combination of acupuncture and TrP treatments with avoidance of counterproductive spinal manipulation in this case. No mention was made of investigation of perpetuating factors of the remaining TrPs such as foot dysfunctions, unequal leg or pelvic lengths, vitamin inadequacies, anemia, or low thyroid function that could very likely have needed attention. Patients benefit greatly by close cooperation between a competent physical therapist like this and a patient-oriented physician sensitive to these systemic perpetuating factors. [DSG]

Kern U, Martin C, Scheicher S, Muller H: Langzeitbehandlung von Phantom- und Stumphschmerzen mit Botulinumtoxin Typ A uber 12 Monate. Eine erste klinische Beobachtung [in German: Long-term treatment of phantom- and stump pain with Botulinum toxin type A over 12 months. A first clinical observation]. Nervenarzt 75(4): 336-340, 2004.

Summary

A male patient with a right-sided above-the-knee amputation suffered from severe phantom and stump pain over a period of more than five years. The phantom pain started about six weeks after the amputation and was described as “cutting like a knife.” He experienced eight attacks per day rated at an intensity of 10 on a visual analog scale from 0-10 and lasting several hours. Stump pain was so severe that the patient could not tolerate any touch. The patient’s quality of life was very poor, in spite of taking high doses of gabapentin and intrathecally administered morphine and clonidine.

Five years after the amputation, the patient was treated with botulinum toxin [BTX] injections into four very painful myofascial trigger points [TrPs] in the stump musculature. The injections were extremely painful. After two

days, the patient experienced a significant reduction in pain. The intensity of the phantom pain was only 2/10 and pain attacks occurred only once per day, lasting a few minutes. After 14 weeks, the severe pain returned within a matter of days. The BTX injections were repeated, again with dramatic reductions in pain. The pattern repeated itself several times and the injection therapy was administered every 11 to 14 weeks. The patient discontinued the clonidine and significantly reduced the morphine therapy. In the discussion section, the authors discussed several possible mechanisms of the dramatic reduction in phantom and stump pain following BTX injections into TrPs.

Comments

Already in 1980 did Sherman include the treatment of TrPs in the treatment of patients with phantom pain (29). The work by Kern and colleagues follows in the footsteps of Janet Travell, who already reported incorporating TrPs in the treatment of persistent and severe phantom and stump pain (7). In Volume 1, 2nd edition of the *Trigger Point Manual*, Travell reported the successful treatment of a patient with upper limb phantom pain by inactivating scalene TrPs (7). In this study, the authors elected to use BTX injections and were able to give the patient significant relief and an unparalleled quality of life he had not experienced since the amputation. It is conceivable that phantom pain may be another manifestation of TrP referred pain. The treatment with BTX clearly gave the patient in this case his life back. That leaves the question whether TrP manual treatments, dry needling, or injections with an anesthetic would be effective in the treatment of individuals with phantom and stump pain. [JD]

REVIEWS AND COMMENTS

Kern U, Martin C, Scheicher S, Muller H: Does botulinum toxin A make prosthesis use easier for amputees? J Rehabil Med 36(5): 238-239, 2004.

Kern and colleagues described four more brief case reports of the successful treatment of phantom and stump pain using botulinum toxin injections into myofascial trigger points. Not only were the patients able to tolerate wearing their prostheses after the treatment, secondary symptoms including hyperhidrosis also improved significantly. Further studies are needed to determine the optimum dosage, number of injections, and should include non-botulinum toxin treatments. [JD]

Staud R: Are tender point injections beneficial: the role of tonic nociception in fibromyalgia. Curr Pharm Des 12(1): 23-27, 2006.

This fibromyalgia syndrome [FMS]-oriented rheumatologist in Florida reviewed the nature of FMS and myofascial pain. He clearly distinguished tender points of fibromyalgia from trigger points of myofascial pain and reviewed the literature reporting injections in both locations and concluded that the literature indicates injections seem to reduce local FMS pain, but need to focus less on tender points and more on trigger points. We heartily agree. [DGS]

Fabiano JA, Fabiano AJ, Anders PL, Thines TJ: Trigeminal neuralgia with intraoral trigger points: report of two cases. Spec Care Dentist 25(4): 206-213, 2005.

The authors' use of the term "trigger points" is confusing here, because they were not referring to myofascial or any other kind of trigger point, but to a trigger area or region in the mouth that contributed to attacks of trigeminal neuralgia. [DGS]

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