Chronic Refractory Myofascial Pain: Characteristics of Patients who Self-select Long-term Management with Electrical Twitch-Obtaining Intramuscular Stimulation

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Abstract

Introduction: Noninvasive Electrical Twitch-Obtaining Intramuscular Stimulation (eToims) is safe and efficacious in long-term management of chronic refractory myofascial pain (CRMP).

Objective: To evaluate factors influencing patient self-selection for long-term eToims management of CRMP.

Methods and materials: Included were 133 consecutive CRMP patients (65 males, 68 females) who opted to pay for eToims treatments between 12/1/09 and 12/31/11. Each session involved treatment to large muscles of C3-C7 and L3-S1 myotomes. Outcome measures include immediate pre-post-treatment session visual analogue scale (VAS), symptomatic (S) and asymptomatic (A) side range-of-motion (ROM) for neck rotation (NR), shoulder external rotation (ER), shoulder internal rotation (IR), straight leg raising (SLR) and FABERE (FAB). Analysis performed by grouping results as follow: Group0: ≤ 10 treatments and immediate reduction of VAS<2; Group1: ≤ 10 treatments and immediate reduction of VAS ≥ 2; Group2: >10 treatments and immediate reduction of VAS<2; and Group3: >10 treatments and immediate reduction of VAS ≥ 2. Safety precautions include interval history and vital signs before and after treatment.

Results: Groups 0 & 1 comparison showed no measured ROM difference. Group 3 & Group 2 comparison demonstrated shorter interval between treatments (15±47 vs. 138±167 days respectively, p<0.001), longer treatment duration/session (52.0±26.0 vs. 49.0±22.0 minutes, respectively), and immediate improvement in all ROM measured. Group pain relief appears influenced by age, symptom duration, treatment session, pulse reduction and improvement in ROM. No eToims-associated safety issues noted.

Conclusions: Safe and efficacious pain relief with concomitant immediate improvement in ROM and pulse rate reduction correlates with patient satisfaction and self-selection to return for multiple eToims treatments over time.

Keywords: Chronic refractory myofascial pain; Electrical twitch-obtaining intramuscular stimulation (eToims); Safety and efficacy; Range of motion; Pain relief; New non-invasive treatment for pain relief

Introduction

Patients with myofascial pain syndrome present with painful muscles, which tend to restrict the range of motion of the joint upon which they act. Tender points on palpable taut muscle bands, that when compressed produce stereotypical referred pain patterns, are named myofascial trigger points (MTrPs). On physical examination MTrPs are the main and pathognomonic finding of myofascial pain syndrome. Snapping palpation of the myofascial band also produces a local twitch response [1]. MTrPs merit special attention because eliciting local twitch response and referred pain requires skill and experience, with difficulty in reproducibility. Currently, meta analysis suggests that physical examination cannot be recommended as a reliable test for the diagnosis of trigger points, based on limited number of available studies, along with concurrent problems in their design, reporting, statistical integrity, and clinical applicability [2]. Additionally, deeper MTrPs appear beyond the reach of manual palpation, especially those involving huge muscles of the pelvic girdle, such as gluteus maximus and adductor magnus, or in other similar deeply situated and/or large muscles.

With eToims, MTrPs are located and identified by electrical stimulation [3]. Classic motor point definition describe these points as areas requiring the shortest duration pulse widths with least stimulus intensity for muscle contraction, i.e., twitch elicitation. Consequently, using this principle, when Twitches can be evoked, identification of MTrPs becomes more objective, enabling the twitch in myofascial pain syndrome to be diagnostic and, at the same time, therapeutic. Twitch force, firing pattern, characterization of elicitation (ease or difficulty) provide quantifiable and reproducible identification of MTrPs. MTrP identification and localization has become standardized as the area where the twitch force produces a palpable recoil effect on the hand holding the twitch-eliciting probe. Deeper MTrPs are identified when twitches, from the stimulated muscle, produce on the joint upon which it acts, discernible movement, ranging from rocking/shaking to actual movement of the joint, even in an anti-gravity direction. Anti-gravity movement of the limb indicates full contraction of stimulated muscle (s) opposed to bone and joint, in contrast to partial or fractional contraction of said same muscle (s) from ineffective or distant stimulation of involved MTrPs.

With awareness of the high incidence of myofascial pain syndrome in the general population [4], to develop safe and efficacious methods for long-term management of chronic refractory myofascial pain, leads one to consider this pain’s mediate cause.

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The integrated hypothesis of Simons et al. [1] for MTrP formation suggests that muscle trauma, overload, or strain causes damage to the endplate, which results in release of excessive acetylcholine (Ach). This causes a local, partial contraction of a muscle fiber beneath the endplate. Muscle fiber contracture leads to ischemia and pain.

Myofascial pain, as postulated by Gunn, is caused by spondylotic radiculopathies in which pain arises from mechanical traction of muscle fibers, shortened by denervation, causing intramuscular entrapment of nerves and blood vessels and a tension effect on pain sensitive regions, such as annulus fibrosus, bones and joints [5]. Others have also found MTrPs in radiculopathies [6]. Intravertebral disc degeneration, with nerve root compression or angulation due to reduced intravertebral space, results in paraspinal muscle spasm. This causes a neuropathy, leading to distal muscle spasm in the distribution of the nerve root and contributes to another degenerative changes in tendons and ligaments within its distribution, that ongoing muscle shortening overall self-perpetuates [7].

Gunn’s postulated muscle traction effects, secondary to denervation, constitutes one instance and, possibly, the major instance of how, in the theory of Simons et al. [1], initial muscle injury can result from excessive release of Ach. Another mechanism by which muscle fibers become shortened involves denervation supersensitivity to Ach, which develops within two weeks of denervation [8]. Increase in Ach receptors at extrajunctional areas and decrease in acetylcholinesterase activity contribute to the phenomenon of denervation supersensitivity [9]. Additionally, denervation supersensitivity can occur in muscles subjected to prolonged conduction block [10]. Muscle fiber shortening compresses small blood vessels and the tissue becomes ischemic. Ischemia leads to bradykinin release and sensitization or excitation of nociceptors [11]. Reflex spasm in a given muscle can be induced by nociceptive input from neighboring joints or muscles. If the force generated by a spasm is relatively high, it will compress large blood vessels supplying the involved muscle, causing more ischemia. This can lead to a drop in pH. The resulting acidic environment, as well as bradykinin and other neurochemical release in conditions attributed to hypoxia and ischemia, are known stimulants for muscle nociceptors, resulting in myofascial pain [12]. Impaired regulation of the microcirculation in a local muscle is of central importance in chronic trapezius myalgia, causing nociceptive pain, which can be objectively differentiated from neuralgic neck-shouder pain [13].

Hypothesized is that eToims, through twitch elicitation, stretches problematic tight and shortened muscle fibers, thereby reducing traction effects on pain sensitive structures, such as entrapped intramuscular nerves and blood vessels, bone surfaces and joint capsules. Within muscles, twitch-induced exercise effects promote local blood flow, improving microcirculation, tissue oxygenation, and removing local accumulation of pain-producing Neurochemicals, which either individually or taken together promote healing of MTrPs.

Receiving eToims at our facility involves fee-for-service in which a patient self-selects affordable treatment session duration, intersession interval (time between sessions), total number of sessions, determining time period over which treatments provided, that met the individual’s need. Some become and stay pain-free or sufficiently pain-relieved to discontinue treatments and those who do not feel sufficient pain relief also do not return for more treatments early on. Other patients self-select treatment over significant periods of time. This latter group is the subject of this study. We aim to demonstrate that patients, who self-select repeat eToims treatment sessions over prolonged periods of time, do so because of receiving pain-relieving results, indicating patient satisfaction. One common outcomes measure in chronic neck and lower back pain assessment is measurement of range of motion [14,15]. We intend to demonstrate that eToims effectiveness is partly due to reduction of muscle tightness and stiffness, related to internal stretching of problematic tight and shortened muscle fibers at MTrPs, shown by pain relief and improvement in range of motion.

Methods and Materials

Longitudinal prospective observation was performed on consecutive outpatients with CRMP who gave informed consent and were treated between 12/1/09 to 12/31/11. Included patients had classical MTrPs. These patients requested eToims treatments and self select to pay for treatments since they had no appreciable pain relief from multiple treatments that involved medications including opioids, physical therapy and chiropractic treatments, psychological support, spinal injections, neck and lower back surgeries. Patients were not excluded even when MRI scan studies showed various degrees of degenerative spinal conditions including central or foraminal spinal stenosis. Patients included also had symptoms and signs of chronic partial spinal nerve root involvement documented on electromyography. The symptom durations ranged from 12-72 months. VAS levels range from 2-7/10 with a mean pain level of 3/10.

Treatments were performed using the CE approved ET127 constant current evoked response stimulator with bipolar probe (eToims Medical Technology LLC, PA, USA). The bipolar probe uses non-allergenic and biocompatible specially designed proprietary single use, disposable electrodes that are 100% cotton. The electrodes consist of a plug electrode (1.6 × 3.0 cm) placed inside each receptacle of the bipolar probe stem and covered with a pad electrode with a stimulating surface of 5 cm and draped over to be fastened to each probe stem with latex free Veloce straps. The electrodes are wetted with tap water for conduction purposes. The probe has an adjustable inter-electrode distance, up to 6”. Treatments were performed with probe interelectrode distance set at 6”, stimulus rate of 1 Hz with 0.2-0.5 ms pulse width, with stimulus strength adjusted from 40-80 mA and titrated according to both the size of the muscle and patient tolerance to electrical stimulation, to elicit twitch force sufficient to enable therapeutic effect.

Routinely treated were muscles of bilateral cervical myotomes: levator scapulae (C3, C4), trapezius (C3, C4), and rhomboid major (C5), deltoïd (C5, C6), triceps (C7, C8) and latissimus dorsi (C6, C7, C8). Routinely treated for bilateral lumbosacral myotomes include: glutaeus maximus (L5, S1), glutaeus medius and tensor fascia latae (L5, S1), adductor magnus (L2-S1), and quadriceps (L3, L4). Also treated were bilateral paraspinal muscles from C4 - S1 levels. The principle of treatment involves finding irritable MTrPs that, when stimulated, elicit brisk, rapid twitch contractions at a stimulus intensity tolerated by the patient, that cause, the joint upon which the stimulated muscle acts, to at least shake or rock. To locate such MTrPs, the least stimulus intensity with the shortest duration pulse, sufficient to stimulate the classic motor point definition for muscle contraction, i.e. twitch elicitation, was utilized and then titrated to obtain supramaximal stimulation, within patient tolerance, applied with its muscle positioned at a slight stretch.

Once an initial twitch is noted, the probe has to be carefully positioned with 0.5-1 cm movements to obtain the point that elicits the most forceful twitch. When the most brisk and vigorous twitch is elicited, repetitive re-stimulation is performed in that zone with 1-4 stimuli at each stimulus point to obtain at least twitches in this affected zone. The twitches mobilize muscle tissues such that constant repositioning of the probe has to be done to recapture and focus the stimulation onto the MTrP. In chronic pain, the search for such twitch
zones is very difficult and if other areas do not provide therapeutic
twitches, the best zone is re-stimulated to elicit at least 100-200 twitches.

Muscles treated in all patients included the paraspinal muscles
from the neck to the lumbosacral region. Trapezius and latissimus dorsi
were always included in the treatment for those with cervical problems.
For those with lower back problems, gluteus maximus and adductor
magnus muscles were always included in the treatment. For those with
total body pain, the spinal muscles and these four large muscles were
always treated.

The total treatment time varies from 30-60 minutes depending
on the session time requested by the patient. The time spent on
each important muscle is dependent on the treatment session time
requested. The clinician has to be skilful enough to be able to give pain
relief with every treatment even when the treatment session time is
short, by treating only the important muscles relevant to the patient’s
pain site.

A count-down timer in the ET127 system terminated the treatment
session after sounding a warning audio signal during the last five
seconds. Patients were usually positioned in supine, prone, side-lying
and opposite side-lying positions during treatment to enable finding
MTrPs. Search for these MTrPs was difficult in muscles that were
chronically stiff or tight.

Outcome data include pre- and immediate post-session patient
VAS report (with maximum pain: 10/10), blood pressure (BP), pulse
(P), symptomatic (S) and asymptomatic side (A) range of motion
(ROM) measurement for neck, shoulders and lower limbs. We used
ROM parameters measured in centimeters (cm) that include: NR (neck
rotation) measured distance between middle of the chin to the ipsilateral
acromioclavicular joint; ER (external rotation of shoulder) measured
distance between tip of middle finger of tested side to contralateral
angle of the mouth, when the tested upper limb is externally rotated,
flexed at shoulder and elbow, and the patient places the tested limb
behind the neck, with forearm in pronation (the examiner must keep
the patient’s head straight in the midline, with chin parallel to the floor)
; IR (internal rotation of the shoulder) measured distance between the
tip of the middle finger of the tested side to contralateral midpoint
of the spine of the scapula, when the tested upper limb is extended
and adducted at the shoulder, with elbow flexed behind the trunk and
forearm in supination; and FAB (for FABERE which tests patient’s
and opposite side-lying positions during treatment to enable finding
MTrPs. Search for these MTrPs was difficult in muscles that were
chronically stiff or tight.

Table 1: Cause of pain in patients undergoing eToims (N=133).

<table>
<thead>
<tr>
<th>Cause of pain</th>
<th>No trauma history (N=18)</th>
<th>Trauma history (N=115)</th>
<th>&gt; 10 txs (N=38)</th>
<th>≤ 10 txs (N=95)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto accident</td>
<td>30</td>
<td>11</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Repetitive stress injury</td>
<td>23</td>
<td>8</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Falls</td>
<td>16</td>
<td>3</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Sports</td>
<td>11</td>
<td>1</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Lifting</td>
<td>11</td>
<td>2</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Failed back or neck surgery</td>
<td>10</td>
<td>4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Spinal stenosis</td>
<td>14</td>
<td>4</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>18</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data analysis was performed with patients’ recorded data classified
into Group 0 (those with ≤ 10 treatments and immediate reduction of
VAS<2); Group 1 (those with ≤ 10 treatments and immediate reduction
of VAS ≥ 2); Group 2 (those with >10 treatments and immediate
reduction of VAS<2 pain scales and Group 3 (>10 treatments and
immediate reductions of VAS ≥ 2). Analysis of pain reduction over
the course of the treatment was performed by determining the average
VAS gain by taking into account pre-treatment and post-treatment
VAS levels throughout the course of the treatment to the VAS at the
time when the patient decided not to return for further treatment or
when the observational period was terminated.

Results

Patients, who returned for multiple treatments over time, kept
to a regular treatment schedule and rarely missed appointments they
made. Patient characteristics are presented in table 1. Of the 133
patients, 68.4% experienced trauma, 10.5% had spinal stenosis, 7.5%
had previous spinal surgery, and 13.5% had miscellaneous causes
of muscle pain. The primary site of pain in study patients with ≤ 10
treatments was the neck in 46 patients and lower back in 47 patients.
The primary site of pain in patients with >10 treatments was the neck
in 19 and lower back in 21 patients. Of the 133 patients, 92 (69%) received ≤ 10 treatments and 41 (31%) received >10 treatments. Results
showed no significant difference for all ROM between Groups 0 and 1
using analysis of variance (ANOVA). Comparing the means between
Groups 2 and 3, all ROM parameters measured were significantly better for Group 3 (Table 2). VAS reduction over time as well as immediate treatment related VAS changes were significantly more for Group 1 than Group 0. Group 3 compared to Group 2 showed more immediate VAS reduction (p<0.01), but no difference in VAS over time. Multinomial logistic regression analysis showed that immediate VAS improvement was significantly influenced by age (p<0.01), duration of symptoms (p<0.01), treatment duration/session (p<0.05), pulse differences (p<0.01) and ROM improvement (p<0.001). Pearson correlation (Table 3) showed that in Group 3, the number of treatments negatively correlates with immediate systolic BP and pulse reduction as well as improvement of ROM. In Group 2, negative correlation was found for immediate and diastolic BP changes, SLRA and FABS. No correlations were noted for Groups 0 and 1 with any of the ROMs or vital signs measured. Mild reductions in systolic and diastolic BP were noted in Groups 2 and 3 and mild elevations of both systolic and diastolic BP were noted in Groups 0 & 1 (Figures 1 and 2; Table 2). Pulse reduction was seen across all 4 Groups (Figure 3; Table 2), especially in Group 3. SPSS program for Windows (version 12) was used for statistical analyses. There were no patient adverse events during, immediately after or between treatments.

Discussion

As noted, despite being a new treatment, the eToims treatment model is based upon traditional medical ethics of physician advice-patient consent. As patients paid out-of-pocket, direct involvement of patient pocket appears to provide a direct, strong incentive for patient active involvement in this relationship. Yet, that relationship could not be explained through the patient pocket. A moderate level of direct involvement of the patient was noted in all treatment groups (Table 4).

Table 2: Differences in immediate changes in ROM of the 4 groups receiving eToims.

<table>
<thead>
<tr>
<th>Group 0 N= 97</th>
<th>Level</th>
<th>Group 1 N= 138</th>
<th>Level</th>
<th>Group 2 N= 1186</th>
<th>Level</th>
<th>Group 3 N= 812</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP ∆ (mmHg)</td>
<td>0.128</td>
<td>0.181</td>
<td>-0.066</td>
<td>0.432</td>
<td>-0.098</td>
<td>0.001</td>
<td>-0.08</td>
</tr>
<tr>
<td>DBP ∆ (mmHg)</td>
<td>0.128</td>
<td>0.179</td>
<td>0.078</td>
<td>0.353</td>
<td>-0.073</td>
<td>0.012</td>
<td>-0.027</td>
</tr>
<tr>
<td>Pulse ∆ (no)</td>
<td>-0.027</td>
<td>0.78</td>
<td>-0.008</td>
<td>0.923</td>
<td>-0.009</td>
<td>0.758</td>
<td>-0.367</td>
</tr>
<tr>
<td>Pain ∆</td>
<td>-0.016</td>
<td>0.869</td>
<td>0.073</td>
<td>0.381</td>
<td>0.167</td>
<td>&lt;0.001</td>
<td>-0.257</td>
</tr>
<tr>
<td>NRS ∆ (cm)</td>
<td>0.164</td>
<td>0.088</td>
<td>-0.022</td>
<td>0.795</td>
<td>0.048</td>
<td>0.101</td>
<td>-0.152</td>
</tr>
<tr>
<td>NRA ∆ (cm)</td>
<td>-0.025</td>
<td>0.796</td>
<td>-0.029</td>
<td>0.729</td>
<td>-0.05</td>
<td>0.09</td>
<td>-0.204</td>
</tr>
<tr>
<td>ERS ∆ (cm)</td>
<td>-0.017</td>
<td>0.862</td>
<td>-0.211</td>
<td>0.01</td>
<td>-0.053</td>
<td>0.074</td>
<td>-0.251</td>
</tr>
<tr>
<td>ERA ∆ (cm)</td>
<td>-0.078</td>
<td>0.42</td>
<td>-0.139</td>
<td>0.092</td>
<td>-0.016</td>
<td>0.61</td>
<td>-0.26</td>
</tr>
<tr>
<td>IRS ∆ (cm)</td>
<td>-0.03</td>
<td>0.759</td>
<td>-0.04</td>
<td>0.728</td>
<td>0.045</td>
<td>0.128</td>
<td>-0.173</td>
</tr>
<tr>
<td>IRA ∆ (cm)</td>
<td>0.032</td>
<td>0.743</td>
<td>-0.04</td>
<td>0.634</td>
<td>0.019</td>
<td>0.520</td>
<td>-0.23</td>
</tr>
<tr>
<td>SLRS ∆ (degrees)</td>
<td>0.032</td>
<td>0.755</td>
<td>-0.062</td>
<td>0.476</td>
<td>0.137</td>
<td>&lt;0.001</td>
<td>-0.142</td>
</tr>
<tr>
<td>SLRA ∆ (degrees)</td>
<td>-0.032</td>
<td>0.76</td>
<td>0.013</td>
<td>0.884</td>
<td>-0.104</td>
<td>0.001</td>
<td>-0.166</td>
</tr>
<tr>
<td>FABS ∆ (cm)</td>
<td>-0.09</td>
<td>0.384</td>
<td>-0.181</td>
<td>0.03</td>
<td>-0.006</td>
<td>0.04</td>
<td>-0.237</td>
</tr>
<tr>
<td>FABA ∆ (cm)</td>
<td>0.059</td>
<td>0.574</td>
<td>-0.072</td>
<td>0.405</td>
<td>-0.034</td>
<td>0.261</td>
<td>-0.293</td>
</tr>
</tbody>
</table>

∆ = changes. Refer to Table 2 for other abbreviations

Table 3: Correlations between number of treatments and eToims induced immediate changes in VAS, BP, pulse and ROM measured.
be maintained over time without patient perception of accruing benefit from consenting to treatment. This helps explain strong patient involvement, demonstrated by regularly keeping eToims treatment appointments. Essentially, the rest of this discussion helps put this patient gain in perspective. Many methods are available to directly treat MTrPs. These involve needling methods, such as acupuncture, dry needling and local injections that involve water, saline, local anesthetics, steroids or Botox to inactivate, disrupt or suppress of MTrP activity. Meta-analysis has not shown treatments with Botox [16], acupuncture or dry needling of MTrPs [17] to be effective. Additionally, due to safety concerns none of these methods can be used repetitively or frequently to the same MTrPs, other MTrPs in the same vicinity or to multiple MTrPs, during the same session or with multiple treatment sessions applied throughout the body on a long-term basis during the lifetime of the chronic pain patient. The common theme in physical therapy techniques used in treating MTrPs include stretching, yet little is known about effectiveness of stretching or ways to enhance its effectiveness. Methods that include stretching, such as spray and stretch technique, when used together with hot packs, active range of motion exercises and interferential current or TENS have been found helpful. Similarly found helpful in treating MTrPs is post-isometric relaxation technique that restores the full stretch length of the muscle; and a home program, consisting of ischemic pressure and sustained stretching in individuals with neck and upper back pain. In athletes, stretching does reduce the incidence of new onset soreness, but does not appreciably reduce overall injury risk, although it may reduce the risk of some injuries. On the contrary, stretching for three weeks has not demonstrated effectiveness in improving muscle extensibility in patients with chronic musculoskeletal pain, although it increases tolerance to the discomfort associated with stretch [18]. A meta-analysis of randomized studies suggests that muscle stretching, whether conducted before, after, or before and after exercise, does not produce clinically significant reduction in delayed-onset muscle soreness in healthy adults [19]. When muscles such as hamstrings are stiff and subjected to eccentric exercise, strength loss, pain, muscle tenderness, and increased creatine kinase activity occurs. This is consistent with the sarcocere strain theory of muscle damage showing experimental evidence of association between flexibility and tendency to muscle injury [20]. These studies have shed light on the effects and limitations of mechanical stretching, confined to stretchable muscles, which usually are superficial. The solution to make stretching consistently more effective may lie in finding new methods that include non-invasive electrical stimulation procedures, such as eToims, to effectively exercise and mobilize deep muscle tissues at stretchable areas, particularly those with injured MTrPs. Morphologic and electromyographic studies have demonstrated atrophy and delayed activation of the deep muscles of the spine in patients with chronic neck pain [21] and chronic lower back pain [22]. Decrease in maximum force of the deep back muscles, such as multifidis, interspinales, intertransversarii, rotatores, iliocostalis, longissimus, psoas, and quadratus lumborum, increase resultant joint moments and reduce the stabilization function provided by these muscles to the lumbar spine [23]. This leads one to postulate that strengthening deep muscles by electrical stimulation-evoked twitches that exercise muscles might reduce the possibility of injury and pain in the lumbar spine. eToims supports the hypothesis that spondylotic radiculopathy with denervation supersensitivity is the underlying cause of myofascial pain. Consequently, denervation and/or conduction block leads to formation of MTrPs in many myotomes. eToims electrically excites MTrPs, eliciting twitches that not only mobilize deep muscles, but through this mechanism, simultaneously enable intramuscular stretching to relax shortened deep muscles in spasm, that otherwise are not ordinarily able to be stretched or exercised, especially in the presence of pain. Ability of eToims to stretch individual deep muscles of limbs and spine leads to reduction of traction effects on pain sensitive structures, such as entrapped intramuscular nerves and blood vessels, bone surfaces and joint capsules. eToims also performs as a local, focused intramuscular exercise therapy that improves circulation to affected areas. Experiments on rat skeletal muscles have shown that twitch contractions from stimulation with 1 Hz increase muscle blood flow by 240% [24]. Our prospective longitudinal study has shown eToims to be effective in reducing myofascial pain concomitant improvement in range of motion. This appears related to its unique advantage, to cause intramuscular stretching at involved MTrPs, where spasm and/or muscle fiber shortening is most concentrated. This includes those MTrPs in the deepest muscles layers opposed to bone and joints. The eToims ability to perform internal stretch resulting in deep muscle relaxation provides increased capacity for these deep muscles to withstand activity related pain-producing spasms/muscle shortening that occurs at various times of the day, on a daily basis in those with chronic pain. Massage is reported to reduce myalgia symptoms and has been shown to reduce systolic and diastolic BP and pulse rate, attributed to the ability of massage to increase parasympathetic tone and inhibit
ongoing treatment is because they do experience immediate pain 
treatments, they show less immediate improvement after a treatment.
number of treatments over time for demonstrating patient satisfaction
satisfaction with treatment for pain. The potential importance of
VAS decrease at least 2 levels appears an arbitrary and subjective and
pain reduction was <2 grades as in Group 2, indicated that requiring
patient satisfaction with eToims treatment over time. Patients, who
this led to adoption of this parameter as an important factor to analyze
negative correlation with number of treatments appeared, as shown in
especially when assessing pain immediately after treatment, since a
However, as treatment continued over long duration, this method of
with caution this method of assessment was used to analyze findings in
caution should be exercised when applying these findings to studies
pain level reported up to 10/10, that VAS reduction of at least 2 levels is
Consequently, based on this, if increase in pain tends to increase pulse,
than cutaneous afferents [29]. There is potential for increased susceptibility of MTrPs in chronic pain patients for
further trauma, induced by violent muscle contractions, as well as by
new injuries that include falls, lifting injuries, auto accidents, exercise,
or even repetitive contractions associated with activities of daily living.
These injuries tend to keep chronic pain patients in a constant state of
ongoing pain. The inability of chronic pain patients to continue to
exhibit progressive, cumulative increase in immediate improvement in
range of motion and progressive, cumulative immediate and/or
dramatic pain reduction with increasing number of treatments may
also be related to reduce efficiency of reciprocal inhibition. This results
in delayed and incomplete muscle relaxation following exercise,
disordered fine movement control, and unbalanced muscle activation
[30]. Increased capacity for re-injury, need for pain relief and/or need
for increased range of motion explains why patients self-select to
remain in eToims therapy for long periods. At least, patient needs
appear transiently met with repeat treatment, until patient self-selects
next treatment. If the patient’s condition is not severe, mild exercise
under eToims supervision may be beneficial. Although potential bias
was inadvertently introduced in observations because treatments were
not randomized, controlled or double blinded, our prospective
longitudinal observations confirm that non-invasive eToims has pain
relieving effects that appear safe and efficacious. Although observations
were only made on patients who self-paid for their treatments, this
cohort included patients in significant pain, unable to be alleviated by
traditional methods, including physical therapy, multiple medications
and spinal surgery. These patients self-paid for multiple treatments
with eToims over time due to experience of therapeutic efficacy and
safety, appearing to obtain pain relief with demonstrated increase in
mobility, associated with improvement in ROM, quality of life issues,
which were improved. Herein, study patients perceived benefit from
continued eToims treatment over time.

Conclusions

eToims is safe and efficacious with repeat use on a regular basis in
many muscles throughout the body over time in chronic long-term
care of patients with CRMP. There were no complications or adverse
effects related to eToims in patients followed longitudinally over 24
months, similar to findings in our previous longitudinal study of over
18 months. 3 Immediate post-treatment pain reliefs, associated with
some immediate post-treatment improvement in ROM and pulse rate
reduction, appear to relate to patient satisfaction with subsequent
self-selection to return for multiple treatments with eToims over
time. Self-selection for repeat treatment for which one self pays is
consistent with experience of improvement in quality of life. Further
research, especially randomized controlled trials, should be carried out


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to ascertain effectiveness of eToims over other treatment modalities. In CRMP management, muscle twitches provide the local key to pain relief.

References