Short-Term Effect of Glucocorticoid Injection into the Superficial Masseter Muscle of Patients With Chronic Myalgia: A Comparison Between Fibromyalgia and Localized Myalgia

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The aim of this study was to investigate whether the treatment effect of intramuscular glucocorticoid injection differs between patients with fibromyalgia and those with localized myalgia of the masseter muscle concerning pain, tenderness to digital palpation, pressure pain threshold, pressure pain tolerance level, maximum voluntary occlusal force, or intramuscular temperature. Twenty-five patients with fibromyalgia and 25 patients with localized myalgia of the masseter muscle were first asked to assess their pain on a visual analogue scale; afterward, a routine clinical examination, including tenderness to digital palpation, was performed. For each patient, the pressure pain threshold, pressure pain tolerance level, and maximum voluntary occlusal force, as well as the intramuscular temperature, were recorded. Finally each patient received an injection of glucocorticoid. The examination and glucocorticoid treatment were repeated after approximately 2 weeks, and a follow-up was performed after another 5 weeks. In the fibromyalgia group, there was a reduced tenderness to digital palpation in response to the treatment. The localized myalgia group responded with a general improvement of symptoms as well as a significant reduction of pain intensity and tenderness to digital palpation. The results of this study indicate that patients with fibromyalgia and localized myalgia in many respects show a similar response to local glucocorticoid treatment.

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key words: intramuscular temperature; occlusal force; pain; pressure pain threshold; pressure pain tolerance level

Facial pain in the form of localized myalgia (LM) of the mandibular muscles is one of the most common pain conditions found in patients suffering from temporomandibular disorders (TMD).[1] Eriksson et al reported in a pilot study that patients with generalized myalgia, ie, fibromyalgia (FM), also frequently have pain and tenderness of the mandibular muscles.[2] In our clinical experience, these patients are more resistant to therapy than are patients with LM. This opinion, however, has not been scientifically tested. If such a difference exists, it may be caused by different pathophysiologies, but the pathophysiology behind chronic

myalgia is largely unknown. It has been suggested that muscle pain is caused by an inflammatory process due to mechanical microtrauma,[3] triggering a cascade of events that lead in turn to the release of mediators, such as histamine, serotonin, prostaglandins, and leukotriens.[4] The latter two substances are synthesized from arachidonic acid residues obtained from breakdown of phospholipids by phospholipase A_2 in the cell wall.[5] Together with other mediators, these substances are responsible for the classic signs of inflammation, including pain. Muscle biopsies from patients with FM and LM have failed to support the theory of an inflammatory origin to muscle pain, however, since no classic signs of inflammation have been found.[6,7] Besides peripheral mechanisms, some have proposed that central mechanisms may be involved in chronic muscle pain. Gobel[8] suggested that a sensitization of central nervous neurons as a result of long-lasting nociceptive muscle pain may lead to morphological changes in the central nervous system. This theory is supported by the finding of changes in the expression of C-fos in second-order neurons within the spinal cord after long-lasting stimulation of peripheral nociceptors.[9] Several authors have suggested that disturbances in descending endogenous pain-modulating systems may be of importance in the development of generalized chronic myalgia, eg, fibromyalgia.[10,11]

Intramuscular tender-point injection is a therapy used extensively for treatment of myofascial pain.[12] In many pain clinics, intramuscular injections are also used to treat patients with FM. Travell et al pioneered this concept 50 years ago when she reported pain relief in the shoulder and arm after intramuscular injections of local anesthetics.[13] Saline has been reported to have an effect similar to that of lidocaine in the treatment of myofascial pain.[14,15] More recently, Cheshire et al[16] reported that botulinum toxin has a significantly greater effect on muscle pain and tenderness than does saline when administered in trigger points of patients with myofascial pain. Lewit[17] reported pain relief lasting for up to several months even after dry needling of trigger points. The short-term pain-relieving effect of these various kinds of intramuscular injections could be merely a placebo effect[18] or patients' positive expectations for a treatment effect,[19] and may not necessarily be caused by the agent injected.

Glucocorticoids (GCs) have been shown to have an anti-inflammatory effect by inhibiting the activity of phospholipase A_2[20] and, to a lower degree, serotonin.[21] A combination of GC and local anesthetics for trigger-point injections has therefore been recommended by some investigators.[22,23] Systemic treatment with GC, however, does not seem to have a pain-relieving effect in patients with FM.[24]

To our knowledge, no comparative studies have been performed on the effect of local GC injection in patients with FM and LM. The first aim of this study was therefore to investigate whether the effect of intramuscular GC injection into the superficial masseter muscle differs between patients suffering from FM and those suffering from LM with regard to pain, tenderness to digital palpation (TDP), pressure pain threshold (PPT), pressure pain tolerance level (PPTL), maximum voluntary occlusal force (MVOF), and intramuscular temperature (IMT). A second aim was to investigate whether background factors influence the treatment result, or if there is any association between treatment effects.

Materials and Methods

Patients

The study included patients attending the Clinic of Oral Physiology who met the following criteria: pain in the region of the superficial masseter muscle for more than 3 months; tenderness of the masseter muscle to digital palpation; no symptoms that could be referred to disease in other components of the temporomandibular system (eg, toothache, neuralgia, local temporomandibular joint disease); and absence of local skin infection over the injection site. The study comprised 50 patients (Table 1), 25 (24 females and 1 male) of whom had been diagnosed by their physician to suffer from fibromyalgia according to the criteria of the American College of Rheumatology[25] and 25 (22 females and 3 males) who had localized myalgia in the masticatory muscles. Recordings of the patients were taken at three visits. The first two visits took place on average 3.7 weeks apart, and the last visit took place on average 8 weeks after the second visit. Patients were examined by one and the same of three investigators (ME, BHM, PA) at all visits. The methods used and the selection of patients were approved by the local ethical committee at Huddinge Hospital, Karolinska Institute, Stockholm.

Methods

At each visit, a 100-mm visual analogue scale (VAS) marked at endpoints with "No pain" and

Table 1 Age and Duration of General and Local Symptoms in 25 Patients With Fibromyalgia and in 25 Patients With Localized Myalgia of the Temporomandibular System

		Duration (y)	
	Age (y)	General	Local
Fibromyalgia			
Mean	47	10.3	9.2
SD	13.5	7.0	8.1
Median	44	8.0	5.0
Range	25–75	0–26	0.5–30
IQR	37–58	4–15	3–15
Local myalgia			
Mean	50	na	8.8
SD	15.1	na	7.2
Median	52	na	6.0
Range	23–74	na	1–30
IQR	36–62	na	3–12

SD = standard deviation.
IQR = interquartile range.
na = not applicable.

"Worst pain ever experienced" (ACO, Helsingborg, Sweden) was used to assess the worst degree of pain experienced by patients during the past week. This scale has been found to be reliable for assessment of human pain.[26] At the second and third visits, the patients were also asked directly whether their pain was eliminated (0), much improved (1), improved (2), unchanged (3), impaired (4), or much impaired (5) as compared to visit 1. These responses were tabulated as a subjective treatment result (STR).

Routine clinical examination methods were used,[27] including registration of tenderness to digital palpation (TDP) of the mandibular muscles. A three-point scale was used where 1 = mild-to-moderate tenderness with difference between right and left side, 2 = moderate-to-strong tenderness with a palpebral reflex, and 3 = marked tenderness with a withdrawal reflex. This method has been reported to have an acceptable intra- and interobserver reliability.[28] The point of maximum tenderness (PMT) in the most tender superficial masseter muscle was localized and recorded on a schematic figure.

A pressure algometer with a recording tip of 10 mm in diameter and a scale ranging from 0 to 5 kg (Pain Diagnostics and Thermography, Great Neck, NY) was used to assess the PPT and PPTL (kPa) on the PMT and on the corresponding point of the contralateral muscle. The pressure rate used was approximately 0.5 $kg/cm^2 \cdot s$, and patients were instructed to specify when the sensation of pressure changed to pain (PPT) and, at a different recording, when the pain became intolerable (PPTL). This method has been shown to be reliable with small intra- and interobserver variation.[29]

The MVOF between the right central incisors was measured in newtons at visits 1 and 2. The equipment used consisted of a bite fork (Dentoforce 2, T. Ljungström AB, Sollentuna, Sweden) connected to an oscilloscope (Type 1425, Gould, Hainault, UK). Patients were asked to place their upper and lower incisors in a groove on the bite fork and then to bite as hard as possible for 3 to 4 seconds. This was repeated twice, with a relaxation period of 30 seconds in between. The highest value of the three readings was used in the analysis. This method has been shown to be reliable, with high correlation between repeated measures.[30]

The IMT in the PMT region of the masseter muscle was measured at visits 1 and 2. The temperature measurement was made through the skin with a sterile probe (diameter of 0.7 mm) containing a thermocouple (C-N7, Exacon Scientific Instruments ApS, Roskilde, Denmark). After subcutaneous anesthesia with 1.0 mL lidocaine (Xylocain 20 mg/mL, Astra, Södertälje, Sweden), a standard catheter (Venflon 2, Boch Omeda AB, Helsingborg, Sweden) with an outer diameter of 1.2 mm was inserted into the muscle. The catheter was inserted to a depth of 10 mm from the skin surface at an angle of approximately 45 degrees. The intramuscular temperature was recorded through the catheter at a depth of 19 mm from the skin surface by a digital thermometer (MC 9200, Exacon Scientific Instruments) with an accuracy of 0.1°C. The measurement was made when the temperature had been stable for 15 seconds. This method has been found to be reliable; only small variations have been found between recordings 4 to 5 weeks apart.[31] The sublingual temperature (SLT) and room temperature (RT) were recorded shortly before the muscle temperature recordings were taken.

Treatment

Patients were treated with injection of 0.3 mL methylprednisolone (Depo-Medrol 40 mg/mL, Upjohn, Kalamazoo, MI) into the PMT region of the superficial masseter muscle after the temperature measurements were taken at visits 1 and 2. The injections were made with a 25-mm needle (diameter of 0.4 mm) and were given bilaterally or unilaterally depending on whether pain was present.

Table 2 Subjective Symptoms and Clinical Signs in Patients With Fibromyalgia and Localized Myalgia of the Temporomandibular System Before (Visit 1) and After (Visits 2 and 3) Treatment With Intramuscular Injection of Glucocorticoid

Symptom or Sign	Visit	Fibromyalgia				Local Myalgia			
		Median	Range	IQR	n	Median	Range	IQR	n
Subjective symptoms									
VAS	1	7	0–10	3–8	25	7	2–10	5–8	24
	2	5	0–10	4–8	25	5**	0–9	3–7	25
	3	4	0–10	2–7	23	5	0–10	1–8	23
Clinical signs									
TDP	1	2	0–2	2–2	25	2	0–3	1–2	25
	2	2	0–3	1–2	25	1	0–3	1–2	25
	3	1*	0–2	1–2	23	1*	0–2	1–2	23
		Mean	SD		n	Mean	SD		n
PPT	1	83	36.7		24	127	58.1		25
	2	104	47.5		24	123	70.4		25
	3	106	44.0		23	123	60.9		23
PPTL	1	195	62.0		24	259	93.8		25
	2	224	84.3		24	262	106.8		25
	3	232	69.5		23	277	110.0		23
IMT	1	35.2	0.7		23	35.4	0.9		23
	2	35.4	0.7		24	35.3	0.8		23
MVOF	1	112	59		24	90	32		25
	2	110	55		24	96	38		24

Wilcoxon's matched pairs signed-ranks test, $^{*}P < .05$; $^{**}P < .01$; VAS = degree of facial pain assessed with a visual analogue scale; TDP = tenderness to digital palpation of the most tender superficial masseter muscle; PPT = pressure pain threshold of the most tender superficial masseter muscle; PPTL = pressure pain tolerance level of the most tender superficial masseter muscle (kPa); IMT = intramuscular temperature of the most tender superficial masseter muscle (°C); MVOF = maximum voluntary occlusal force (N); IQR = interquartile range; SD = standard deviation. n = number of patients (VAS, MVOF) or number of muscles (TDP, PPT, PPTL, IMT). Comparison is made between visits 1 and 2 and between visits 1 and 3. *P* values adjusted according to Bonferroni.

Statistics

Patients' intraindividual differences in STR, VAS, and TDP between visits were tested for statistical significance by Wilcoxon's matched pairs signed-ranks test, and their differences in PPT, PPTL, MVOF, and IMT between visits by Student's dependent *t* test. Differences in treatment effect between groups were tested for significance by the Mann-Whitney *U* test (STR, VAS, and TDP) or by Student's independent *t* test (PPT, PPTL, MVOF, and IMT). Correlations between treatment effects as well as between treatment effects and background factors were tested for statistical significance by Spearman's ranked correlation coefficient (r_s) or by Pearson's product-moment correlation coefficient (r). In all statistical analyses concerning TDP, PPT, PPTL, and IMT, the most tender superficial masseter muscle was used. The significance level was set to $P < .05$, and individual *P* values were corrected for multiple comparisons according to Bonferroni.

Results

Treatment Result

Figure 1 shows the treatment results according to the patients' own evaluations (STR). There was no treatment effect in the FM group, while in the LM group there was an improvement at visit 2 ($P = .033$) as well as at visit 3 ($P = .017$). Table 2 shows the VAS and clinical signs at visits 1, 2, and 3. In the LM group, there was a reduction of pain (VAS) between visit 1 and visit 2 ($P = .005$). In both groups, there was a reduction of TDP between visit 1 and visit 3 ($P = .017$). There was no statistically significant change found in PPT, PPTL, MVOF, or IMT for either group, and there was no significant difference in treatment result between the groups for any of the variables. The SLT varied between 35.3 and 37.3°C, with a mean of 36.7°C, and the RT varied between 20 and 26°C, with a mean of 22.9°C. Neither the SLT nor the RT influenced the IMT in any group.

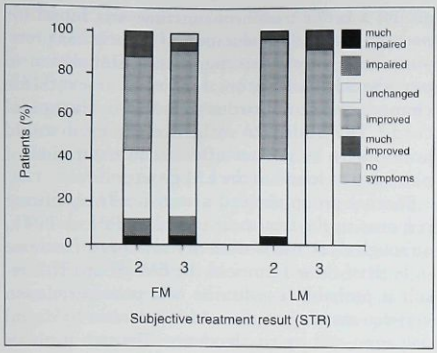

Fig 1 Treatment effect at visits 2 and 3 according to the patient's own evaluation (STR) in 25 patients with fibromyalgia and 25 patients with localized myalgia of the temporomandibular system after local glucocorticoid injection into the painful superficial masseter muscle. Patients in the LM group showed significant improvement at visit 2 ($P = .033$) and at visit 3 ($P = .017$).

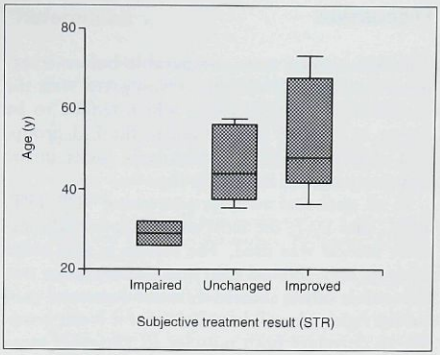

Fig 2 Box plot showing the median (line within the box), quartiles (upper and lower edges of the box), and tenth and ninetieth percentiles (whiskers) of age and its association with the patient's own evaluation of the treatment result (STR) at visit 3 after local glucocorticoid injection into the painful superficial masseter muscle of patients with fibromyalgia ($r_s = .55$, n = 23, $P = .031$).

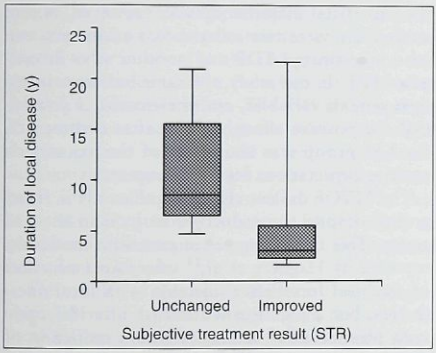

Fig 3 Box plot showing the median (line within the box), quartiles (upper and lower edges of the box), and tenth and ninetieth percentiles (whiskers) of duration of local symptoms and its association with the patient's own evaluation of the treatment result (STR) at visit 3 after local glucocorticoid injection into the painful superficial masseter muscle of patients with localized myalgia of the temporomandibular system ($r_s = -.55$, n = 23, $P = .033$).

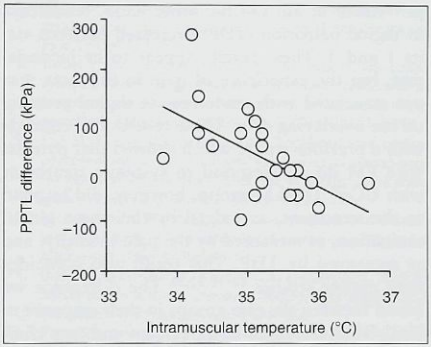

Fig 4 Correlation between pressure pain tolerance level and intramuscular temperature of the most tender superficial masseter muscle after local glucocorticoid injection in patients with fibromyalgia ($r = -.58$, n = 22, $P = .023$).The PPTL (kPa) is shown as the difference between visit 1 and visit 3. The intramuscular temperature (°C) was measured at visit 1.

Correlations Between Treatment Effects and Background Variables

In the FM group, STR (visit 3) was positively correlated to age ($r_s = .55$, $P = .031$) (Fig 2). In the LM group, STR (visit 3) was negatively correlated to duration of local disease ($r_s = -.55$, $P = .033$) (Fig 3). Treatment effect on PPTL (visits 1 to 3) was negatively correlated to the IMT at visit 1 in the FM group ($r = -.58$, $P = .023$) (Fig 4). There was no statistically significant association or covariation between treatment effects in any group.

Discussion

The two groups were comparable before treatment regarding all variables investigated with the exception of occlusal force, which tended to be higher in the FM group than in the LM group, and of PPT and PPTL, which were lower in the FM group than in the LM group.

In all statistical analyses concerning TDP, PPT, PPTL, and IMT, the most tender superficial masseter muscle was used. The reason is that some patients only showed pain and tenderness on one side, while others showed different degrees of pain on the right side and left side. Since it is not possible to correlate both muscles to variables measured individually, such as VAS or MVOF, it seemed appropriate to use the side of the most tender muscle.

In the FM group, there was no general improvement from the GC treatment, as judged by the patients' own evaluations (STR), and there was no effect on pain intensity, which means that the patients in this category did not experience any improvement at all. On the other hand, tenderness to digital palpation (TDP) decreased between visits 1 and 3. These results appear to be inconsistent, but the experience of pain in this area was not associated with tenderness to digital pressure on the overlaying skin. These results also coincide with a previous study, which showed that patients with FM do not respond to systemic treatment with GC.[24] The LM group, however, did respond to the treatment, as judged by their own global evaluation, as measured by the pain intensity, and as measured by TDP. This result also coincides with earlier studies.[12–17,22,23] The difference we found between the two groups in their response to local GC treatment is in agreement with our clinical experience that patients with FM are more resistant to therapy than are patients with LM. This difference may be the result of both psychological and physiological factors. One possible explanation to the finding that patients with FM do not experience any improvement in their condition in spite of a reduction in TDP could be that they have generalized pain, and therefore an improvement in one region may be masked by their total pain experience.

In the FM group, age was a favorable factor for the outcome of treatment. The reason for this is unknown, but there may be psychological or physiological explanations. Perhaps the older FM patients in this study had greater positive expectations for the treatment outcome[19] or were less anxious[32] than the younger patients. In the LM group, a better treatment outcome was found for patients with a short duration of pain. It has previously been shown that long-lasting stimulation of peripheral nociceptors results in irreversible changes in second-order neurons in the spinal cord.[9] The ability to influence the pain would accordingly be greater after a short duration of pain, as was found in the LM group.

Neither group showed a statistically significant response to the treatment regarding PPT or PPTL, although there was a tendency towards an increase in both of these factors in the FM group. This result is probably a reflection of a poor correlation between assessment of muscle tenderness by digital palpation and by an algometer. The two methods measure different aspects of tenderness. While the algometer measures the pain threshold of increasing pressure, manual palpation measures the nociceptive response to a normally nonpainful pressure stimulus. Both responses are probably the result of hyperalgesia of the muscle and surrounding tissues. List et al[33] reported a strong correlation between TDP and PPT at three different sites over the superficial masseter muscle. However, in that study there were two independent examiners, one who investigated TDP and another who investigated PPT. In our study, the same examiner investigated both variables, and therefore it is possible that the positive effect on TDP after treatment in the LM group was the result of the examiner's positive expectations for the treatment.

The MVOF did not change significantly in either group, despite the reduction of pain in the LM group. This finding agrees in part with the results reported by Hagberg et al,[14] who found no effect on occlusal force after injection with local anesthetics, but a significant increase after injection with physiological saline, despite a reduction of pain in both groups. They suggested that the positive effect on occlusal force by saline was attributed to a placebo effect and not to a reduction of pain.

In this study, local GC treatment caused no direct statistically significant effect on the IMT in either group. Since the IMT depends on the blood flow and metabolism of the muscle,[34] this finding probably means that no major circulatory changes are associated with the reduction of pain or tenderness in the masseter muscle in the two groups. Nevertheless, a low pretreatment IMT was found among patients in the FM group, who benefited most from the GC treatment with respect to PPTL. An explanation for this finding may be that pretreatment vasoconstriction is a predictive or decisive factor for the increase of PPTL following

local GC administration. The SLT and RT did not influence other variables in this study, not even the IMT, which means that the variation in IMT is not the result of general temperature changes in the body and that the ambient temperature did not influence the IMT.

In patients with LM, the positive treatment effect according to their own evaluation on pain intensity and tenderness to palpation is of considerable clinical interest, since these patients had suffered from chronic facial pain for an average of 9 years. This study does not consider the question of whether this effect could be attributed to placebo, although one might expect the placebo effect to be similar in both groups. The results of this study indicate that patients with LM experience a response to local GC treatment as judged from their own evaluation of the treatment effect and the reduced muscle pain intensity, while patients with FM do not experience any subjective treatment effect at all. The cause of this difference is unknown, but could involve psychological or physiological factors of central or peripheral origin. In the peripheral pathophysiology of pain, prostaglandins and leukotrienes could be suspected to be involved in the LM group, since this group responded with a reduction of pain after local GC administration. The GC treatment in this study was used to judge the differential effect in two patient categories of a well-known anti-inflammatory agent and not as the ultimate treatment for muscle pain. The effect of GC in this study should stimulate interest in further study of peripheral inflammatory pathogenic mechanisms behind muscle pain.

The results of this study indicate that patients with FM and LM show a similar response to local GC treatment. However, LM patients seem to experience a treatment effect according to their own evaluation as well as a reduction of pain intensity, while FM patients do not seem to experience any subjective treatment response at all.

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Resumen

El Efecto a Corto Plazo de las Inyecciones de Glucocorticoides en el Músculo Masetero Superficial de Pacientes con Mialgia Crónica: Una Comparación Entre la Fibromialgia y la Mialgia Localizada

El propósito de este estudio fue el de investigar si los efectos del tratamiento con inyecciones de glucocorticoides intramusculares varian entre pacientes con fibromialgia y mialgia local del músculo masetero en lo relacionado al dolor, palpación digital, umbral de dolor a la presión, nivel de tolerancia de dolor a la presión, fuerza de mordida voluntaria máxima, y temperatura intramuscular. Se efectuó un examen clínico que incluía umbral de dolor a la presión, nivel de tolerancia de dolor a la presión, y fuerza de mordida voluntaria máxima a 25 pacientes con fibromialgia y 25 pacientes con mialgia local, antes y en dos ocasiones luego de la terapia con glucocorticoides. Se midió la temperatura intramuscular en las primeras dos visitas, cuando se efectuó la terapia con glucocorticoides. No hubo ninguna diferencia entre los dos grupos en cuanto al resultado subjetivo del tratamiento, al dolor evaluado con una escala análoga visual o a la palpación digital. Sin embargo el umbral de dolor a la presión aumentó significativamente con el tratamiento en el grupo con la fibromialgia, pero no en el grupo con mialgia local. El nivel de tolerancia de dolor a la presión y la fuerza de mordida voluntaria máxima no cambiaron después del tratamiento en ninguno de los grupos ni mostraron alguna diferencia entre los grupos en cuanto al efecto del tratamiento. El efecto del tratamiento sobre la temperatura intramuscular varió significativamente entre los grupos. Por lo tanto, la respuesta a la inyección intramuscular de glucocorticoides varió entre los pacientes con fibromialgia y con mialgia local. Esta parece tener un comienzo mas lento en los pacientes con fibromialgia en comparación con los de mialgia local, y el umbral de dolor a la presión lo mismo que la temperatura intramuscular parecen responder diferentemente en los dos grupos de pacientes.

Zusammengfassung

Kurzzeitwirkung von Glucocorticoid-Injektionen in den oberflächlichen Massetermuskel bei Patienten mit chronischer Myalgie: ein Vergleich zwischen Fibromyalgie und lokalisieter Myalgie

Das Ziel dieser Studie bestand in der Untersuchung, ob sich die Behandlungswirkungen von intramuskulären Glucocorticoidinjektionen zwischen Patienten mit Fibromyalgie und lokaler Myalgie des M.masseter bezüglich Schmerz, Fingerpalpation, Druckschmerzschwelle, Druckschmerztoleranzebene, maximaler willkürlicher Beisskraft und intramuskulärer Temperatur unterscheiden. Fünfundzwanzig Patienten mit Fibromyalgie und 25 Patienten mit lokaler Myalgie wurden klinisch untersucht. Dies beinhaltete die Druckschmerzschwelle, die Druckschmerztoleranzebene und die maximale willkürliche Beisskraft vor und zweimal nach der Glucocorticoidtherapie. Die intramuskuläre Temperatur wurde in den ersten zwei Sitzungen gemessen, als die Glucocorticoidtherapie verabreicht wurde. Es zeigte sich kein Unterschied zwischen den Gruppen in Bezug auf das subjektive Behandlungsergebnis, Schmerzbeurteilung mittels visual analog scale oder Fingerpalpation. Dagegen war die Druckschmerzschwelle bei der Fibromyalgiegruppe mit Behandlung signifikant erhöht, aber nicht bei der Gruppe mit lokaler Myalgie. Die Druckschmerztoleranzebene und die maximale willkürliche Beisskraft veränderte sich in keiner der Gruppen nach der Behandlung oder zeigte irgendwelche Gruppenunterschiede beim Behandlungsresultat. Der Behandlungseffekt auf die intramuskuläre Temperatur war signifikant verschieden zwischen den zwei Gruppen. Somit unterscheidet sich die Antwort auf die intramuskuläre Glucocorticoidinjektion zwischen Patienten mit Fibromyalgia und lokaler Myalgie. Es scheint ein langsameres Auftreten zu haben bei Patienten mit Fibromyalgie als mit lokaler Myalgie, und die Druckschmerzschwelle sowie die intramuskuläre Temperatur scheinen in beiden Gruppen verschieden zu antworten.