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Cervical region trigger point Injection with dry needling versus wet needling by lidocaine in geriatric population: a comparative study

Dalia A. Ibrahim[1*] and Hesham A. Abdelrahem[2]

Abstract

Background: Myofascial pain syndrome is a common musculoskeletal disorder which is characterized by presence of trigger points. Its prevalence is up to 60% in geriatric population, and local treatment is important due to the limitation in prescribing systemic pain killer for that population with multiple comorbidities, and the polypharmacy they have.

Objectives: This clinical trial aimed to compare between lidocaine injection 0.5% (wet needling) and dry needling "DN" (both are local techniques) in treatment of chronic neck pain in geriatrics.

Materials and methods: Forty elderly participants (above age of 60) who met the inclusion criteria and had a typical trigger point (MTrP) were allocated randomly in two groups, wet needling by lidocaine injection 0.5% versus dry needling. Measures which were taken pre- and post-treatment in each group and post-treatment for both groups were compared together. These measures were pain score and visual analog scale (VAS) for pain, patient satisfaction, and patient discomfort.

Results: Comparison of the post-treatment results in both groups showed that PS was significantly improved in both groups while VAS was significantly improved in the lidocaine group but improvement of VAS in the dry needling group (DNG) was non-significant. Comparison between the two groups in the post-treatment visit revealed non-significant difference between the two groups as regards PS but VAS in group I (lidocaine group) is significantly lower than that in group II (DNG), also significant higher patient satisfaction and significant lower patient discomfort in group I than in group II, and burning sensation was significantly higher in group II than in group I.

Conclusion: Dry needling still has some positive results yet. Wet needling by lidocaine was associated with rapid patient satisfaction and less discomfort and was proved to be practical for treatment of myofascial trigger point (MTrP). So, wet needling by lidocaine for MTrPs in geriatric population is a good choice.

Keywords: Dry needling, Lidocaine, Myofascial pain syndrome, Trigger point, VAS and pain score

* Correspondence: drdaliaahmedl976@yahoo.com
[1]Intensive Care and Pain management, Ain Shams University, Cairo, Egypt
Full list of author information is available at the end of the article

Introduction

Chronic musculoskeletal pain is common in the elderly with high prevalence as they get older (Rottenberg et al. 2015). It is a burdensome problem to seniors as it is the cause of disability (Coggon et al. 2013). Chronic musculoskeletal increases depression that is normally accompanied with poor sleep and lack of the ability to focus and manage our common stressors of life.

Furthermore, it may be an assistant factor in worsening the status of other chronic diseases, such as diabetes, hypertension, and heart disease, which are necessary for ongoing management of ultimate control (McClennon 2007). In conclusion, poorly treated pain not only reduces the quality of life for patients, but also increases remarkably healthcare costs.

Myofascial pain syndrome is a common and characteristic musculoskeletal disorder (Moskovich 1988) that causes chronic pain in several parts of the body, especially in the elderly (Alburquerque-Garcia et al. 2015). Myofascial pain is defined as the pain derived from myofascial trigger points (MTrPs, as firstly described by Drs. David Simons and Janet Travell) (Alvarez and Rockwell 2002). They represent focal hyperirritable areas in the skeletal muscles, which are associated with a hypersensitive palpable nodule, known as "a taut band." Manual compression of a trigger point gives rise to a local twitch response, accompanied by characteristic local pain and can refer pain to a zone of references (Cummings and White 2001).

Myofascial pain occurs due to recurrent "biomechanical overloading" leading to repetitive micro trauma with increased tone and tension (Borg-Stein and Simons 2002) which may lead to muscle stiffness and limitation of movement. Myofascial pain syndrome is the main cause of pain in the cervical region either a local pain or a referred one (Giamberardino et al. 2011).

Effective chronic pain management in the elderly is challenging. Various methods have emerged, including non-invasive and invasive treatments. Non-invasive oral treatments include nonsteroidal anti-inflammatories, opioid analgesics, muscle spasmolytics, neuropathic analgesics, and antidepressants. Invasive interventions include local anesthetics lidocaine injection, corticosteroids, neurolytic agents, botulinum toxin, and dry needling injections (Calvo-Lobo et al. 2015). Still, the controversy remains with regard to the most efficacious treatment of myofascial pain Trigger point (Colyar 2015). Two types of trigger point therapies were attempted in this clinical trial, dry needling by repeated introduction of the needle in the trigger point and wet needling by injection of 2 mL of lidocaine 0.5%. Therefore, the aim of this study is to demonstrate the efficacy of dry needling techniques versus wet needling techniques by using a small dose of lidocaine injection in the elderly infected with cervical pain due to myofascial pain syndrome.

Materials and methods

Study design

The present study was a randomized, controlled, single, and blinded study. Participants who met the inclusion criteria were allocated randomly to wet needling and dry needling groups. The patients received one session of treatment. Pre- and post-treatment measures were taken, and the measurements included pain score, visual analog scale, patient discomfort, and patient satisfaction (post--treatment measures were taken 2 weeks after injection).

Participants

Forty elderly patients (age > 60 years) participated in the study. The study was conducted at Ain Shams University Specialized Hospital. All participants had myofascial trigger points (MTrPs) in the upper trapezius on one or two sides for 3 months or longer.

The diagnosis of MTrPs was based on the following criteria: (1) Palpable hypersensitive and tender spot in a taut band, pain is reproduced on compression; {2} on muscle palpation, local twitch response is produced; {3} spontaneous pain is provoked by firm compression (Tough et al. 2007). Medical history and examination were conducted for all participants by the researchers to exclude other causes of pain. The participants who were included in the study should have normal neurological examination and are able to localize the point of maximum tenderness. Cervical spines CT and MRI scan of all patients were normal. The purpose and procedures of the study were described to all the participants, and informed consent were obtained before taking any part in this study.

Patients were excluded from the study if they have history of surgery in the neck and shoulder or neurological deficits in the upper limbs. Patients receiving another pain treatment modality or having any contraindication for intramuscular injection or who refuse to participate were also excluded.

Randomization

Participants who met the inclusion criteria were randomly allocated to two groups (20 patients each), using randomization program (https:// www.random.org/integer-sets) to prevent selection bias. They were blinded to the treatment type.

Sample size

Using PASSS program setting alpha error at 5% and power at 90%, results from a previous study by Kamanli et al. (2005) showed pain score for groups I and II after treatment was 1.2 ± 0.7 and 2.15 ± 0.6, respectively, and based on this 20 cases per group will be needed.

Treatment

Group I received wet needling in the form of 2 mL of lidocaine injection 0.5% (lidocaine hydrochloride–pharo B international 25 mg/5 ml) at the site of MTrPs, while group II received dry needling on the MTrPs. The patients received three sessions on three consecutive treatments. Treatment was conducted by both investigators. Patients' pain was assessed by visual analog scale (VAS) (Hawker et al. 2011) at baseline and 2 weeks after treatment, and their response was noted by the professor of geriatrics medicine who was blinded to the treatment type. All patients were in prone position or lateral lying position during the technique.

Technique of wet needling

Lidocaine trigger point injection (LTPI) technique is standardized to universal technique for injection, with 2 mL of lidocaine 0.5%. After cleaning with alcohol, the trigger point will be isolated with a pinch between the thumb and index finger with stabilizing pressure to prevent the trigger point from rolling away from the advancing needle. Then, the needle (25G, 1½ inch) will be inserted 1–2 cm away from the trigger point at an acute angle of 30° to the skin as the needle contract, and muscle twitching will be experienced. An amount of 2 mL of lidocaine 0.5% was injected once the needle was in the trigger point (Karadaş et al. 2013).

Technique of dry needling

The needle (25G, 1½ inch) was inserted 1–2 cm away from the trigger point and then was advanced into the trigger point at an angle of 30° to the skin as the needle contacts the trigger point; muscle twitching was experienced. The needle was introduced several times into this point (MTrPs) as instructed by the American Society of Anesthesiologists Task Force on chronic pain management, 2010 (American Society of Anesthesiologists Task Force on Chronic Pain Management; American Society of Regional Anesthesia and Paul Medicine, 2010).

Visual analog scale (VAS)

Subjective rating of pain intensity was measured by using the VAS. A 10-cm horizontal line is divided into 10 (Breivik et al. 2008). Zero represents no pain, and 10 cm represents the worst imaginable pain.

Pain score (PS)

Pain score (PS) measurements were obtained by placing the thumb to the skin covering the muscle containing the MTrP in a perpendicular fashion and exerting pressure until there was whitening of the nail bed, and then evaluating the pain intensity. Scoring was from 0 to 3 (0 no pain, 1 mild pain, 2 significant pain, and 3 severe pain resulting in jumping sign) (Ga et al. 2007). Patient satisfaction assessment was done by asking the patients weather satisfied or unsatisfied.

Ethical considerations

1. An informed consent was obtained from each participant.
2. They were oriented by the nature of the study, safety and efficacy of the procedure used, and data extracted from this study.
3. Confidentiality and privacy of data were ensured.
4. The participation was on voluntary basis, and the participants have the right to withdraw at any time.
5. Approval of the Ethical Committee of the Faculty of Medicine, Ain Shams University was obtained.

Statistical analysis

Data were collected, revised, coded, and entered to the Statistical Package for Social Science (SPSS) version 23. The qualitative data were presented as numbers and percentages while quantitative data with parametric distribution were presented as mean, standard deviations, and ranges. The comparison between the two groups regarding qualitative data was done by using chi-square test while the comparison between two groups regarding quantitative data was done by using independent t test. Also, the comparison between two paired groups regarding quantitative data were done by using paired t test. The confidence interval was set to 95% and the margin of error accepted as set to 5%. So, the p value was considered significant at the level of < 0.05.

Results

No significant differences were found between the two groups as regard demographic data, body mass index, duration of pain, localization of MTrP on the affected body half, age, and sex (Table 1). In group I (wet needling by lidocaine), pain score and VAS significantly decreased 2 weeks after treatment when compared with before injection values ($P < 0.001$) (Table 2).

In the dry needling group, (MTrP) PS significantly decreased 2 weeks after treatment compared with before treatment, values ($P = 0.011$) while there was a non-significant decrease in VAS (Table 3).

After treatment, the VAS for pain and patient discomfort were significantly lower, PS was insignificantly lower, and burning sensation was significantly more frequent in the wet needling group compared with those in the dry needling group (Table 4).

Patient satisfaction were more significantly higher in group I (wet needling by lidocaine) than those in the group II (dry needling). All complications were subsided within a few days and covered by patient satisfaction due to gradual pain relief which is more evident with wet

Table 1 Demographic data

Variables		Wet needling	Dry needling	Test value	*P* value
Age	Mean ± SD	68.19 ± 3.21	70.05 ± 4.93	1.414[≠]	0.166
Sex	Male	9 (45.0%)	10 (50.0%)	0.100[•]	0.752
	Female	11 (55.0%)	10 (50.0%)		
Affected body half	Right	8 (40.0%)	11 (55.0%)	0.902[•]	0.342
	Left	12 (60.0%)	9 (45.0%)		
BMI	Mean ± SD	26.36 ± 3.67	26.17 ± 4.95	0.138[≠]	0.891

[≠]Independent *t* test
•Chi-square test

needling by lidocaine. Patient discomfort after treatment was significantly lower in wet needling by lidocaine than dry needling.

Discussion

Myofascial pain syndrome is a regional muscular pain associated with muscular sensitivity which is responsible for some causes of pain at different sites in the body of the patients. Meticulous diagnosis and appropriate therapeutic approaches will prevent the problem of work loss and inappropriate treatment costs. Because pain is complex in nature, a multidisciplinary approach is recommended.

In this clinical trial, the aim was to investigate the differences between two types of treatment of cervical trigger point dry needling or wet needling by lidocaine. The challenge in this clinical trial was the type of population which is the geriatric patients with their increased incidence of cervical pain and associated comorbidities that may prevent them from traditional pain killer so local treatment of their cervical pain may be of great benefits.

The traditional way of this type of pain treatment is dry needling. In order to increase efficiency of this type of local treatment for cervical pain, lidocaine 0.5% injection was used and the differences between the two types of treatment were investigated. In the lidocaine injection group, there was a significant decrease in visual analog scale 2 weeks after injection compared with its values before injection. Our results go with the results of Xie et al. (2015), whose aim was also to investigate lidocaine 0.5% injection for treatment of chronic neck pain; they confirmed that lidocaine injection therapy reduces the degree and frequency of neck pain in patients after 6 months of treatment. Another study by Ga et al. (2007) compared lidocaine 0.5% injection technique versus intramuscular stimulation.

The authors reported that intramuscular lidocaine injection was effective than intramuscular stimulation. Aker et al. (1996) concluded that lidocaine injection is more effective, and another trial for lidocaine 0.5% injection in the trapezius muscle for chronic neck pain was tried by Staud et al. (2017); they compared it with normal saline injection, and they concluded that lidocaine injection has a specific effect on relief of pain and it is also related to improvement of chronic fatigue syndrome.

The other group of the current clinical trial is dry needling technique which is a type of mechanical treatment for chronic neck pain, and it is one of the traditional treatments. In this group, pain score significantly decreased after 2 weeks of needling but the decrease in the VAS was insignificant.

Irene et al. (Irene et al. 2015) compared dry needling with manual orthopedic therapy in chronic neck pain. They found that all lines of treatment are effective in reducing pain intensity but orthopedic manual therapy (OMT) showed more improvement than dry needling.

Gattie et al. (2017) demonstrated that dry needling with exercise will achieve greater reduction in pain and disability than dry needling only. Fogelman and Kent (2015) concluded that dry needling is acknowledged but generally disgraded for decades by others. Guthrie and Chorba (2016) reported good results of dry needling technique by improvement of VAS from 8 to 9/10 to 2/10 and lasting over several months but with a combination with acupuncture.

Table 2 Before and after treatment values in the lidocaine injection group. Values are median (IQR) and range for PS pain score and mean ± SD and range for (VAS) visual analog score

	Before treatment (first visit)	Post treatment (second visit)	Paired *t* test	*P* values
Trigger point PS of 0–3				
Median (IQR)	3 (2–3)	1 (0–2)	4.570	< 0.001*
Range	2.0–3.0	0.0–2.0		
VAS pain of 0–10	7.42 ± 0.82 (5.0–9)	2.8 ± 1.1 (0.0–4.0)	15.059	< 0.001*

*Significant $P < 0.05$

Table 3 Before and after treatment values in the dry needling group. Values are PS pain score median (IQR) and range and mean ± SD and range for (VAS) visual analog scale

	Before treatment (first visit)	Post treatment (second visit)	Paired *t* test	*P* values
Trigger point PS of 0–3				
Median (IQR)	2 (2–2)	1 (0–2)	2.111	0.021*
Range	2.0–3.0	0.0–2.0		
VAS pain (0–10)	7.03 ± 2.68 (1.7–9.9)	6.12 ± 2.94 (0.5–9.8)	0.792	0.436

*Significant $P < 0.05$

In the present study, lidocaine injection was more effective than dry needling in reducing the VAS. This is matching with Kamanli et al. (2005). Raeissadat et al (2018) had the opposite opinion that the dry needling for MTrP is to be as effective as wet needling by lidocaine but dry needling was less comforting than wet needling by lidocaine. In this clinical trial, discomfort after wet needling significantly lowered only 20% patients who have discomfort. While 60% of patient of dry needling still have discomfort. The same results reported by Genc et al. (1997) showed that during wet needling by lidocaine initial pain decreased due to lengthening of the relative refractory period of the peripheral nerves limiting maximum frequency of impulse conduction. This provides confidence in the physician and compliance during exercise program.

Another research on different treatments of myofascial trigger points (MTrPs) was done by Raeissadat et al. (2018) who compared between lidocaine injection, dry needling, and ozone injection. They concluded that ozone injection and lidocaine injection had better results but without significant difference. This result differs from the result of the present study.

Cummings and White (2001) constructed a systematic review that contained 23 papers which discussed dry needling versus wet needling (by different drugs and placebo). They concluded that direct needling of the trigger points appears to be effective but still there were a controversy whether the wet needling by active drugs has a benefit beyond placebo, and their results were not matching with the result of the present study which showed that lidocaine injection (wet needling) was more effective than dry needling. Another research made by Eroğlu et al. (2013) found that dry needling and lidocaine injection are both effective in treatment of myofascial trigger points (MTrPs) for chronic neck pain without significant difference and that exercise would improve the results of both techniques.

Regarding burning sensation, this present study showed only about eight patients (40%) of the wet needling by lidocaine group had experienced this burning sensation which was accepted on this group where the other group with dry needling had not experienced this sensation which was expected as compared to the study of Kamanli et al. (2005), they had 30% of their patients had this burning sensation which disappeared within 1 day and covered by pain relief after treatment.

Burning sensation after lidocaine injection is due to the acidity of the drug, and it can be minimized by injection of 90°, and continues injection is better than bolus injection to decrease number of nerve ending touching the drug (Park 2015) but rapid pain relief by lidocaine covered the burning effect and this can explain more patient satisfaction and less discomfort in the lidocaine group than in the dry needling group significantly.

Conclusion

Many types of treatments were described for treatment of chronic neck pain either mechanical (dry needling, muscle stimulation), medicinal (methylprednisolone IV), and injection therapies (as lidocaine 0.5% injection) and treatment must be tailored according each case.

Table 4 Comparing all variables of both groups after treatment

		Wet needing	Dry needling	Paired *t* test	*P* values
Trigger point PS of 0–3					
Median (IQR)		1 (0–2)	1 (0–2)	0.035	0.723
Range		0.0–2.0	0.0–2.0		
VAS pain of 0–10		2.8 ± 1.1 (0.0–4.0)	6.12 ± 2.94 (0.5–9.8)	3.664	0.001*
Patient discomfort		4 (20.0%)	12 (60.0%)	6.667	0.009*
Burning sensation		8 (40.0%)	0 (0.0%)	10.00	0.002*
Patient satisfaction	Satisfied	15 (75%)	8 (40%)	10.00	0.002*
	Unsatisfied	5 (25%)	12 (60%)		

*Significant $P < 0.05$

This present study showed that both wet needling by lidocaine and dry needling are effective in treatment MTrPs for chronic neck pain in geriatric population, yet wet needling is superior than dry needling in decreasing VAS for pain with more patient satisfaction and less discomfort.

Local treatment can help to decrease treatment of chronic neck pain by different types of systemic drugs in that age group with multiple comorbidities for further researches should be tried either by using different doses of lidocaine 0.5% or repeated sessions.

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Availability of data and materials
The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Authors' contributions
Idea, data collection, data analysis, and editing of the manuscript were done by the two authors. Both authors read and approved the final manuscript.

Ethics approval and consent to participate
This study was done after Ain Shams University ethical committee approval with the committee's reference number (R9 2018). A consent to participate was signed by the participants.

Consent for publication
A consent to publish has been obtained from the participant to report individual patient data.

Competing interests
The authors declare that they have no competing interests.

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Author details
[1]Intensive Care and Pain management, Ain Shams University, Cairo, Egypt. [2]Ain Shams University, Cairo, Egypt.

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