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Comparison of the effectiveness of interfascial block and trigger point injection in the treatment of myofascial pain syndrome

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Abstract

The fascial plane has recently been the focus of interest in the treatment of myofascial pain syndrome (MPS) and interfascial blocks (IFB) have been shown to be effective in pain management. Few studies have compared the efficacy of ultrasound (US) guided IFB and trigger point injection (TPI). This study aimed to compare the effects of these two methods on pain and functionality in patients with myofascial pain in the trapezius muscle. 50 patients between the ages of 18-60 years, who presented with neck pain unresponsive to medical treatment for more than 3 months, had no other known disease, without significant discopathy and degeneration on cervical magnetic resonance imaging, met the diagnostic criteria for MPS, had a trigger point palpated in the trapezius muscle, who underwent US-guided TPI and 50 patients underwent US-guided IFB were analyzed. The Neck Disability Index (NDI) and Visual Analog Scale (VAS) scores before and 1 and 4 weeks after the procedure were evaluated in both groups. The pre and 4-week post-procedure VAS and NDI scores were similar in both groups, while the 1-week scores were significantly lower in IFB group than in TPI group ($p<0.001$, $p=0.035$). In both groups, the VAS and NDI scores decreased significantly at two follow-up points compared to pre-procedure scores ($p<0.001$). The current study demonstrated that US-guided IFB may be an alternative treatment to TPI in patients with myofascial pain in the trapezius muscle, improving pain and functional status, and is more effective than TPI in early pain management.

Keywords: Miyofascial pain syndrome, trigger point injection, trapezius muscle

Introduction

Myofascial pain syndrome (MPS), which is the most common cause of musculoskeletal system pain, is characterized by muscle trigger points and can present with local and reflective pain. This syndrome, which can present with symptoms of pain, muscle spasm, stiffness, tenderness, limited movement and weakness, is a significant cause of disability affecting approximately three-quarters of the world's population [1,2]. The trapezius, infraspinatus, rhomboid, levator scapulae and paravertebral muscles are the most commonly affected muscles [2]. Its diagnosis is based on anamnesis and physical examination. Trigger points are focal areas within a palpable taut band that cause localized pain, tenderness, and a local twitch response [3]. Trigger points lead to muscle contraction and nociceptor activation in the fascia, resulting in myofascial pain [4]. This pain negatively affects quality of life due to functional and psychiatric problems [5]. Analgesics, physical therapy, and interventional procedures have been recommended for pain management [6].

Diagnostic ultrasound (US) is currently used to improve the efficacy and reliability of interventional procedures [7]. Local injection of anesthetics into trigger points is a common method to release tense muscles and induce analgesia, and US-guided administration is known to be superior to the blind technique [8,9]. In addition to trigger point injections (TPI), the fascial plane has recently become of interest in MPS management [10,11]. Fascia is a layer of undifferentiated mesenchymal structures between muscles and surrounding structures, such as nerves and vessels. It possesses rich sympathetic innervation, and sensory receptors in the fascia are 10 times more abundant than in the muscles [12]. It has been demonstrated that US-guided interfascial plane blocks (IFB) are effective in MPS treatment [13]. Blocking the fascial nerve fibers has been suggested to reduce sensitization and induces muscle relaxation, leading to effective treatment [14].

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It is thought that IFB may be more effective than TPI in the treatment of MPS. However, few studies that compared the efficacy of US-guided TPI and IFB. Thus, the present study aimed to compare polythese two methods.

Material and Methods

This study is retrospective and was approved by the Ethics Committee of Fırat University Faculty of Medicine with the decision numbered 22953 and dated 11.03.2024. It was conducted accordance with principles of the Declaration of Helsinki. The study included 50 patients who underwent US-guided TPI and 50 patients who underwent US-guided IFB between 01.09.2024 and 31.12.2024 at Elazığ Fethi Sekin City Hospital Physical Medicine and Rehabilitation Outpatient Clinics. Informed consent forms were obtained from all participants.

The inclusion criteria were as follows; neck pain lasting more than 3 months and considered chronic neck pain [15], unresponsive to oral medical treatment, between the ages of 18-60 years, without significant discopathy and degeneration on cervical magnetic resonance imaging, meeting the diagnostic criteria for MPS [16], with only trapezius palpation as the trigger point, and no previous treatment other than oral medical treatment. Subjects with concomitant cervical radiculopathy or entrapment neuropathy, history of malignancy, inflammatory disease, chronic disease or coagulopathy, or taking anticoagulants, and pregnant women were excluded.

TPI and IFB can be performed with different drug combinations. Triamcinolone and prilocaine are among the drugs that can be used [17,18]. In our study, a combination of the two was used.

In the TPI group, the trapezius muscle was palpated while the patients was in a sitting position. Painful trigger points were identified and marked. The skin was sterilized using an antiseptic solution. The marked area was scanned in the transverse plane using with a high frequency linear US probe. A 27 gauge 40 mm long dental needle was inserted into the trapezius muscle in the trigger point area. After negative aspiration, a mixture of 40 mg triamcinolone and 3 cc Prilocain was injected.

In the IFB group, the trapezius muscle was palpated in a sitting position. The skin was sterilized using an antiseptic solution. The trapezius muscle was visualized in the transverse plane using a high-frequency linear US probe. A 27 gauge 40 mm long dental syringe was advanced in a plane close to the trigger point. The fascia between trapezius muscle and underlying muscle (supraspinatus and levator scapula) was targeted. The tip of the needle reached a hyperechoic line. After 2 cc of physiologic saline solution was given to confirm the presence in the interfascial space, a mixture of 40 mg triamcinolone and 3 cc Prilocain was injected.

During the procedure, dizziness developed in 2 patients in the TPI group and three patients in the IFB group. All patients were recommended trapezius stretching, back extensor strengthening, and cervical strengthening exercises and were motivated to exercise. Oral analgesics are not recommended.

Patients' pain levels were analyzed using the visual analog scale (VAS), and neck disability index (NDI) was used to determine the disability associated with neck pain. VAS is a 10-point scale where 0 indicates no pain and 10 indicates the highest pain level [19]. The NDI is a test that includes 10 questions that measure the effect of pain on daily activities, where each question is scored between 0 and 5, and the total score varies between 0 and 50. A high score indicates extreme disability [20]. VAS and NDI scores before the procedure and on the 1st week and the 4th week were analyzed, and temporal score changes were compared between the groups.

All analyses were conducted using Statistical Package for Social Sciences software version 22 (SPSS, Inc., USA). The Kolmogorov-Smirnov test was used to test the suitability of data for normal distribution. An independent samples t-test was used to compare pairs. Continuous variables were expressed as means ± standard deviations. Categorical data were expressed as percentages. $P<0.05$ was considered statistically significant.

Results

Age, body mass index (BMI), and gender were analyzed in both groups. No statistically significant difference was determined between two groups. The distribution of education and marital status of the groups was similar (Table 1).

Table 1. Interfascial block and trigger point injection group demographics

	Interfascial block	Trigger point injection	P*
Gender			
Female (%)	58	52	0.546
Age (years)	36.3±8.85	33.1±10.41	0.097
BMI (kg/m²)	27.1±3.45	26.8±4.43	0.749
Marital status			
Married (%)	66	62	0.835
Single (%)	34	38	
Education status			
Primary school (%)	26	24	0.915
High school (%)	40	38	
University (%)	34	38	

BMI: body mass index; *independent t-test; p<0.05 was considered significant

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The pre-procedure, 1-week post-procedure, and 4 weeks post-procedure VAS and NDI scores of both groups were analyzed. The pre-procedure and 4 weeks post-procedure VAS and NDI scores were similar in both groups, while 1-week post-procedure VAS and NDI scores were significantly higher in the TPI group when compared to the IFB group (Table 2).

VAS and NDI scores decreased significantly In the IFB and TPI groups on the 2 post-procedure measurements when compared to the pre-procedure scores (Table 3).

Table 2. Interfascial block and trigger point injection group pre-procedure, 1-week post-procedure, and 4 weeks post-procedure VAS and NDI scores

	Interfascial block	Trigger point injection	P*
Pre-procedure VAS	6.89±1.15	7.14±1.16	0.287
1-week post-procedure VAS	2.30±0.70	3.70±0.85	**0.000**
4 weeks post-procedure VAS	4.36±1.01	4.23±0.75	0.482
Pre-procedure NDI	26.26±4.92	26.3±5.16	0.968
1-week post-procedure NDI	9.34±3.44	10.86±3.64	**0.035**
4 weeks post-procedure NDI	16.44±3.74	16.86±3.60	0.569

VAS: visual analog scale, NSI: neck disability index; *independent t-test; p<0.05 was considered significant

Table 3. Temporal changes in interfascial block and trigger point injection groups VAS and NDI scores

		Pre-procedure	1st week	4th week	p*
IFB	**VAS**	6.89±1.15	2.30±0.70[a]	4.36±1.01[ab]	<0.001
	NDI	26.26±4.92	9.34±3.44[a]	16.44±3.74[ab]	<0.001
TPI	**VAS**	7.14±1.16	3.70±0.85[a]	4.23±0.75[ab]	<0.001
	NDI	26.3±5.16	10.86±3.64[a]	16.86±3.60[ab]	<0.001

IFB: interfascial block, TPI: trigger point injection, VAS: visual analog scale, NSI: neck disability index; a: p<0.001 when compared to pre-procedure (paired samples t-test); b: p<0.001 compared to week 1 (paired samples t-test); * Repeated Measures ANOVA ;p<0.05 was considered significant

Discussion

The present study demonstrated that both US-guided TPI and IFB were effective in MPS, and the changes in the VAS and NDI scores were statistically significant after 1 and 4 weeks. The VAS and NDI scores of the IFB group were similar to those of the TPI group after the 4 th week post-procedure, while the 1st post-procedure week VAS and NDI scores were significantly lower in the IFB group. As a result, IFB was thought to be more effective than TPI in the early period after injection. To our knowledge, this is the first study to compare the TPI and IFB methods in patients with myofascial pain in the trapezius muscle using triamcinolone and prilocaine.

Central and peripheral mechanisms play a role in the development of MPS. An increase in inflammatory mediators leads to muscular tissue ischemia via capillary vasoconstriction, and tissue ischemia leads to structural changes in muscular and adjacent soft tissues due to an increase in metabolic requirements. Permanent sarcomere contracture leads to the development of a palpable sensitive trigger point [21,22]. When painful trigger points are not treated, they send pain signals to the spinal cord via the afferent nerves, leading to sensitization of the spinal segments and chronic pain. Thus, permanent desensitization of these points should be the primary aim of treatment [23]. It is known that injection methods are more effective than non-invasive treatments in achieving this goal [22]. Although the superiority of various injection methods is controversial, local anesthetic injection is a common and effective method for the treatment of MPS [24-27]. Blockage of the transmission of pain stimuli to the spinal cord by preventing the release of neurotransmitters from peripheral nerve endings and increasing blood circulation via local vasodilatation could be the possible therapeutic mechanisms associated with the injection [28]. Furthermore, the concentration of specific inflammatory mediators, cytokines, and neuropeptides are higher at active trigger points [29]. Corticosteroids are employed in MPS injections because of their anti-inflammatory properties, and ability to break the pain cycle by selectively blocking nociceptive fiber transmission [30,31].

Muscle fascia is a dynamic phenomenon that produces an interfascial space between muscles and can control muscular activity via autonomous contraction elements [32]. Chronic inflammation, peripheral sensitivity, ischemia, and muscle hyperexcitability can reduce fascial mobility. It has been suggested that low fascial mobility leads to chronic myofascial pain [33]. Furthermore, the rich fascial innervation, presence of nociceptive-free nerve endings, substance P, and neuropeptides such as calcitonin gene peptide explain its role in pain development [34,35]. Interfascial injections are new methods that have been shown to be effective in MPS treatment by increasing fascial mobility and inactivating nociceptors [12,26,36]. In addition to studies that demonstrated the effects of interfascial block with local anesthetic [13,14], others have reported the efficacy of block with physiological saline [25,37]. In a study where the efficacy of lidocaine trigger point and interfascial saline injections were compared, Tantanatip et al. [26] reported similar pain scores in the 2nd and 4th post-procedure weeks. Ramos et al. [38] compared interfascial hydro-dissection of the trapezius with lidocaine, saline solution, and dry injection, and concluded that hydro-dissection was more effective both immediately after the injection and in the long term.

In our study, a mixture of 40 mg triamcinolone and 3 cc prilocain was used in both patient groups. Corticosteroids have been used in the management of trigger points because of their strong anti-inflammatory effects [39]. Corticosteroid use in interfascial blocks is thought to prolong duration and improve the quality of the block [40]. Chronic inflammation, which is one of the factors that decreases fascial mobility, can be resolved with corticosteroids and fascia mobility can be increased. The fact that we obtained effective results for up to 4 weeks in both patient groups may be due to the use of corticosteroids. The better results in the IFB group at 1 week after the procedure may be related to the more effective suppression of ectopic discharges in the fascia nerve endings. IFB may be superior to TPI for stronger analgesia in the short term. The decrease in pain scores and increase in functionality could improve patient compliance with stretching-strengthening exercises, which in turn could contribute to better long-term results.

Although IFB has advantages such as direct effect on fascial structures and high effectiveness rates in the early period; It is also important to note that trigger point injection can be more targeted to specific pain sources.

The limitations of the study included its retrospective nature and lack of the double-blind approach, a placebo group, the analysis of the pain threshold levels of the participants, and the analysis of the long-term results, and the limitation of the study period by 4 weeks. Since the same injectate material with the same cost was used in the comparison of the two techniques, this could be considered as a strength of the study.

Conclusion

In conclusion, the present study suggests that US-guided IFB may be a promising alternative treatment to trigger point injection in patients with myofascial pain in the trapezius muscle. IFB may be considered as a priority over TPI for more potent analgesia in the early period. The decrease in pain scores and the increase in functionality may increase patients' compliance with stretching-strengthening exercise programs, which may contribute to better long-term outcomes. However, more randomized, prospective, long-term clinical studies, including placebo-controlled groups, are needed to definitively determine the efficacy and safety of IFB in treatment of MPS.

Conflict of Interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical Approval
This study was carried out in accordance with the principles of the Declaration of Helsinki, after receiving approval from the ethics committee of Fırat University Faculty of Medicine (date: 11.03.2024 / number: 22953).

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